Support to selected Member States in improving hazardous waste management based on assessment of Member States' performance

Service Request under the Multiple Framework Contract with re-opening of competition “Assistance to the Commission on the assessment of Waste Management Plans and on compliance monitoring and support of the implementation of the Waste Framework Directive”

Contract No: 070201/2016/736294/ENV.B.3

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| Note | This report is the final report including the results of all project tasks. The report is accompanied by factsheets and roadmaps for 14 EU-Member States. These documents are provided separately from the present report. An overview of these documents is included in Annex 1 and Annex 2. |
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<td>AT</td>
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<td>BE</td>
<td>Belgium</td>
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<td>BG</td>
<td>Bulgaria</td>
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<tr>
<td>CEAP</td>
<td>Circular Economy Action Plan</td>
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<td>CLRTAP</td>
<td>Convention on Long-Range Transboundary Air Pollution</td>
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<td>COM</td>
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<td>CY</td>
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<td>DK</td>
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<td>E-PRTR</td>
<td>European Pollutant Release and Transfer Register</td>
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<td>ES</td>
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<td>European Union</td>
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<td>Industrial Emissions Directive</td>
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<td>List of Waste</td>
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<td>NACE</td>
<td>Nomenclature statistique des activités économiques dans la Communauté européenne</td>
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<td>NL</td>
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<tr>
<td>PCB</td>
<td>Polychlorinated Biphenyls and Polychlorinated Terphenyls</td>
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<td>PL</td>
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<td>POP</td>
<td>Persistent Organic Pollutant</td>
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<td>SME</td>
<td>Small and Medium Sized Enterprise</td>
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<td>UNECE</td>
<td>United Nations Economic Commission for Europe</td>
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<td>WFD</td>
<td>Waste Framework Directive</td>
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<td>Abbreviation</td>
<td>Description</td>
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<td>WMP</td>
<td>Waste Management Plan</td>
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<td>Working Package</td>
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1 Abstract

According to the Treaty of the European Union, the Commission has the task to ensure and oversee the proper application of EU legislation. This includes the application of the requirements on hazardous waste and PCB management within the EU Member States. Against this background, the subject of this contract was assisting the Commission in:

(1) Analysing the hazardous waste and PCB/PCB waste management situation in 14 selected Member States "on the ground"

(2) Proposing a set of recommendations (in the form of "roadmaps") to tackle the deficiencies identified in the 14 selected Member States.

(3) Organising a dialogue with national authorities and key public and private actors (Seminars in eleven Member States)

(4) Identifying critical factors, including best practices,

Taking these tasks as a background, the overall aim of this study is to enable and foster information exchange regarding hazardous waste and PCB management practices between the Member States improving current hazardous waste and PCB management and supporting the achievement of the current requirements of the EU waste legislation. Based on the study’s results and in particular the good practices identified from the Member States, the study elaborated recommendations for Member States and proposes accompanying measures for the European Commission to improve hazardous waste and PCB management in the EU.
2 Executive Summary

According to the Treaty on European Union, the EU Commission has the task to **ensure and oversee the proper application of EU legislation.** This includes the application of the requirements on hazardous waste and PCB and PCB waste management within the EU Member States.

According to EUROSTAT data, hazardous waste generation in the European Union (EU-28) amounted to a total of 95.5 million tonnes in 2014, which corresponds to 187 kg per capita. The production of hazardous waste varies considerably across countries (influenced by the economic structure, infrastructure projects, remediation activities etc.). Significant waste streams contributing to the total amount of hazardous waste generation across Europe are mineral wastes, contaminated soils and polluted dredging spoils, combustion wastes, and chemical wastes. In 2014 according to EUROSTAT data, in total 76.2 million tonnes of hazardous waste were treated in EU-28 with the majority (47.6 million tonnes) being disposed of.

These statistics require a deeper look behind as some discrepancies have been found by several recent studies on hazardous waste management in the EU: In 2014, the EU Commission assigned a BiPRO-led consortium to undertake a study concerning the implementation of the Waste Framework Directive's provisions concerning hazardous waste. It has emerged from this study's findings, and was also confirmed by the work of the European Environment Agency, that there are major gaps on statistical data (generation/treatment of hazardous waste) for some Member States, which have been addressed by this previous study. Apart from the assessment of the statistical gap, the previous study revealed that most requirements of EU legislation on hazardous waste are well transposed into national legislation. However, practice shows that there are challenges in terms of the implementation and application of key obligations such as, *inter alia*, classification, labelling, permitting, mixing ban, collection, storage and treatment of hazardous waste. The study at hand further followed-up this approach and assessed the situation of hazardous waste management in further Member States.

Additionally, in the study at hand a focus was drawn to a particular hazardous waste stream, requiring special attention: (products and) waste containing PCBs. PCBs are a group of chemicals (polychlorinated biphenyls and polychlorinated terphenyls) which were manufactured between from 1954 and 1980 in total amounts of 1-2 million tons world-wide and were used mainly in the Northern hemisphere. PCBs were used in "closed applications" as a dielectric fluid in electrical equipment (such as capacitors and high voltage oil-cooled transformers) and as hydraulic fluids owing to their high stability, good heat conduction, electrical isolating, fire retardant capabilities etc. Furthermore, PCBs have been used in "open" applications, notably as sealants for house construction and surface coatings; some applications in bridges, flame retardant in plastics, plasticiser in paints, varnishes; lubricants, adhesives, inks and ink solvents in carbonless paper.

Equipment containing PCBs already in use is covered by specific provisions laid down in Directive 96/59/EC (PCB Directive)\(^1\). The Directive aims for the approximation of the laws of the Member States on the controlled disposal of PCBs, the decontamination or disposal of equipment containing PCBs

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and/or the disposal of used PCBs in order to eliminate them completely. At EU level, the relevant legal act for implementation the Stockholm Convention and the POPs Protocol is Regulation EC (No) 850/2004 (POP Regulation)\(^2\) which, at the same time in addition to the implementation of international obligations, sets out further obligations for Member States and economic operators.

Against this background, the subject of this assignment was assisting the Commission in:

1. Analysing the hazardous waste and PCB/PCB waste management situation in 14 selected Member States “on the ground”

The 14 Member States for the assessment in this study have been selected by the European Commission and comprise the following Member States:

*Bulgaria, Belgium, Cyprus, Czech Republic, Germany, Spain, France, Greece, Italy, Poland, Portugal, Romania, Sweden and the United Kingdom.*

To gather information on hazardous waste legislation, statistical data and the practical implementation of the legal requirements, a factsheet for each of the 14 selected EU Member States was elaborated containing information on hazardous waste management (see chapter 5.1 and Annex 1) and PCB/PCB waste management (see chapter 6.1 and Annex 1). The factsheets include among others:

- Relevant features of the national waste management system
- Waste Management Plans and specifications on hazardous waste
- Waste Prevention Programmes and specifications on hazardous waste
- Core requirements of the Waste Framework Directive on hazardous waste management
- PCB management in the Member State
- Official data on hazardous waste management: generation, composition, treatment, infrastructure, performance and PCB management
- Problems encountered in hazardous waste and PCB management and “Best practice”

The content of these factsheets has been finally confirmed with the Competent Authority of each selected Member State.

2. Proposing a set of recommendations (in the form of “roadmaps”) to tackle the deficiencies identified in the 14 selected Member States.

Documents on policy recommendations, so-called “roadmaps” were elaborated (see Annex 2) for the 14 selected Member States. These roadmaps contain a summary of the most important information from the respective factsheet together with a list of the major challenges, recommendations on policy options to tackle these challenges as well as corresponding good practices from other Member States that could be identified during the project in each of the selected Member States.

The roadmaps have been prepared in order to summarise the most important aspects treated during the seminars and to list different approaches for solving detected challenges immediately, by

transferring success factors from other Member States. In this way an exchange of information takes place and successful schemes are spread among the single countries of the EU.

(3) Organising a dialogue with national authorities and key public and private actors (Seminars in eleven Member States)

In all afore-mentioned Member States - apart from Belgium, Germany and France – seminars have been realised together with officials and stakeholders of the selected Member State. Aim of the seminars was to discuss hazardous waste and PCB management in the concerned Member State with focus on good practices, success factors and remaining challenges for the Member State. Thus, the topics of each seminar have been set in close cooperation with the competent authorities and input from other stakeholders.

(4) Identifying critical factors, including best practices,

Throughout the project the major challenges as well as good practices of Member States or the EU Commission have been identified and collected. The challenges and good practices faced in the Member States can be found in the 14 individual factsheets and roadmaps (see Annex 1 and 2). A summary of the most common challenges across the Member States is given for hazardous waste in chapter 5.2 and for PCB in chapter 6.2. A collection of good practices in hazardous waste and PCB management is given in Annex 4 and 5.

Additionally, a final workshop was held at 23 October 2017 in Brussels. The summary of the discussions with stakeholders is summarised in Annex 6.

Taking these five tasks (including the final workshop) as a background, the overall aim of this study was to enable and foster information exchange regarding hazardous waste and PCB management practices between the Member States improving current hazardous waste and PCB management and supporting the achievement of the current requirements of the EU waste legislation. Based on the study’s results and in particular the good practices identified from the Member States, the study elaborated recommendations for Member States, and also suggested accompanying measures for the European Commission to improve hazardous waste and PCB management in the EU (for more details, see chapter 7):

Classification of hazardous waste

The recommendations addressed to the Member States are:

- Create clear and harmonized guidance on waste classification taking into consideration the EU’s guidance document which is about to be published
- Establish and nurture a “culture” of clarity and compliance with regard to the established guidance
- Use national guidance / implementation notes complementing the EU guidance on waste classification as a starting point to further harmonise the practical classification and enforcement of the EU requirements;
To support the implementation of the above, we recommend that the EU Commission takes the following measures:

- **Publish (and update if needed) the EU’s guidance document on waste classification in the national languages of the Member States; promote the usage of the guidance in the Member States;**

**Inspections, responsibility and record keeping**

The recommendations addressed to the Member States are:

- Conduct comprehensive and coordinated inspections
- Strengthen responsibility of waste producers and other chain operators
- Adopt electronic record keeping and tracing systems

To support the implementation of the above, we recommend that the EU Commission takes the following measures:

- **Follow up to the proposed obligation for the Member States to set up an electronic registry and oblige actors to make data on hazardous waste available to the authorities through this register;**
- **Define minimum operating conditions for the operation of such registries, e.g. harmonise the reporting frequency; such minimum operating conditions should take into consideration the different technical and administrative capacities of the Member States**
- **Elaborate on the interface between national hazardous waste movements and transboundary shipments, including a possible initiative, if feasible and appropriate, for linking an electronic tracing / record keeping system for wastes subject to the EU Waste Shipment Regulation**

**Application of the waste hierarchy for hazardous waste without hampering protection of the environment and human health**

The recommendations addressed to the Member States are:

- Explicitly include hazardous waste prevention measures and targets in waste management plans and waste prevention programmes
- Reflect the waste hierarchy in national legislation, permitting and enforcement
- Collect and disseminate knowledge on potential hazardous substances in recycled material

To support the implementation of the above, we recommend the EU Commission takes the following measures:

- **Stimulate the application of the waste hierarchy for hazardous waste while protecting environment and human health**
Hazardous waste as an integral part of waste management planning

The recommendations addressed to the Member States are:

- Integrate hazardous waste as explicit part of waste management planning
- Create reliable and comparable information on hazardous waste as decision basis for planning

To support the implementation of the above, we recommend that the EU Commission takes the following measures:

- Strengthen the European approach on planning treatment capacities for hazardous waste based on national Waste Management Plans;
- Extend the existing guidance on waste management planning (“Preparing a Waste Management Plan. A methodological guidance note”) with technical guidance on hazardous waste management planning in national languages to ensure a more coherent and appropriate planning practice in the Member States, i.e. by providing clarification what key elements should be contained in hazardous waste management and to what extent these elements have to be described to be sufficiently covered;
- Raise awareness among Member States of the need to have a thorough section on hazardous waste (including the most relevant hazardous waste streams) in the national and regional WMPs;
- Discuss the option to establish a European register for permits of hazardous waste treatment facilities

Continued actions to identify and eliminate PCB from closed and open applications

In many Member States the identification and elimination of PCB from closed applications is considered to be completed. However, this project revealed that based on experience in many Member States, efforts on identification of PCB from closed applications should be continued. We recommend applying targeted (supply chain based) investigations. Furthermore, efforts are required to eliminate the inventoried equipment which was allowed to be used until the end-of its lifetime.

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considering the deadline for total elimination of PCB equipment by 2025 as stipulated in the Stockholm Convention.

Regarding **identification and elimination of PCB from open applications**, only a few Member States have already started to systematically address the matter. Considering available experience, we assume that in all Member States a high risk of PCB contaminations stemming from PCB usage in open applications exists. Thus, the following actions are recommended for Member States not yet addressing this issue:

- Extend knowledge on PCB contaminations/reservoirs in the Member State and their origin, inter alia by improving the monitoring of PCB in the environment
- Extend knowledge on historic usage of PCB-containing materials in e.g. buildings and other open applications in the Member State
- Prioritise waste streams (i.e. address waste from construction and demolition) with a particular strategy of e.g. source separation and elimination of PCB containing waste

To support the implementation of the above, we recommend that the EU Commission takes the following measures:

- **Transpose the deadline to eliminate all PCB from closed applications by 2025 from the Stockholm Convention into the EU POP Regulation**
- **Elaborate a strategy to identify and eliminate PCB from open applications or set up guidelines for the national strategies of the Member States**
- **Further promote the EU Protocol on Construction and Demolition waste, as well as the upcoming guidance on 'pre-demolition audits'**
3 Synthèse

Selon le traité de l'Union européenne, la Commission européenne a pour mission d'assurer et de veiller à la bonne application de la législation européenne. Cela comprend également, l'application des exigences législatives relatives aux déchets dangereux et à la gestion des PCBs et des déchets PCB dans les États membres.

Selon les données d'Eurostat, en 2014 la production de déchets dangereux dans l'Union européenne (UE-28) s'élève à un total de 95,5 millions de tonnes, ce qui correspond à 187 kg de déchets dangereux produit par habitant. La production de déchets dangereux varie considérablement selon les États membres (influencée par la structure économique, les projets d'infrastructures, les activités d'assainissement, etc.). Les déchets dangereux produites en Europe sont principalement, des déchets minéraux, des déchets issus des sols contaminés et des boues de dragage polluées, des déchets de combustion, et des déchets chimiques. Selon les données EUROSTAT, en 2014 76,2 millions de tonnes de déchets dangereux ont été traités dans l'UE-28, dont la majorité (47,6 millions de tonnes) ont été éliminé.

Les statistiques mentionnées dans le paragraphe précédent doivent être examinées de plus près, des divergences (ou différences) statistiques ont été retrouvées dans de récentes études sur la gestion des déchets dangereux dans l'UE. En 2014, la Commission européenne a confié à un consortium dirigé par BiPRO, la réalisation d'une étude sur la mise en œuvre de la directive 2008/98/CE relative aux traitement des déchets dangereux. Les résultats de cette étude confirmée par les travaux de l'Agence européenne pour l'environnement, montre qu'il existe d'importantes différences statistiques (relatives à la production / traitement des déchets dangereux) dans certains États membres. En dehors de l'évaluation de l'écart statistique, cette étude démontre que la plupart des exigences relatives à la législation européenne sur les déchets dangereux sont bien transposées dans la législation nationale. Cependant, la pratique montre qu'il y a des défis en termes de mise en œuvre et de l'application des principales obligations telles que la classification, l'étiquetage, l'autorisation, l'interdiction de mélanger les déchets dangereux, la collecte, le stockage et le traitement des déchets dangereux.

L'présente étude reprend la même approche que l'étude menée en 2014 et évalue la situation de la gestion des déchets dangereux dans un plus grand nombre d'États membres.

De plus, l'accent a été mis sur une catégorie de déchets dangereux, nécessitant une attention particulière : (produits et) déchets contenant des PCBs. Les PCBs sont une catégorie de produits chimiques : polychlorobiphényles et polychloroterphényles. Entre 1954 et 1980 1 à 2 millions de tonnes de PCBs ont été produits dans le monde, ils ont principalement été utilisés dans l'hémisphère Nord. Les PCBs ont été utilisés dans les « applications fermées » en tant que fluide diélectrique dans les équipements électriques (tels que les condensateurs et les transformateurs refroidis à l'huile à haute tension) et comme fluides hydrauliques en raison de leur grande stabilité, bonne conduction de la chaleur, isolation électrique, capacités de résistance au feu, etc. Les PCBs ont également été utilisés dans des applications « ouvertes », notamment comme produits d'étanchéité pour la construction de maisons et les revêtements de surface ; ils ont été utilisés dans la construction de ponts, comme ignifuges dans les matières plastiques, plastifiants dans les peintures, lubrifiants. Ils ont également été utilisés dans les vernis, adhésifs, encres et solvants d'encre dans le papier autocopiant.
Les équipements contenant des PCBs sont couverts par des règles spécifiques prévues par la directive 96/59/CE (directive PCB). La directive vise à rapprocher les législations des États membres relatives à l’élimination contrôlée des PCBs, à la décontamination ou l’élimination des équipements contenant des PCBs et/ou l’élimination des PCBs usagés, afin de les éliminer complètement. Au niveau européen, l’acte juridique pertinent pour la mise en œuvre des documents du droit public international (la Convention de Stockholm, et le UNECE Protocole sur les POP) est le règlement CE (No) 850/2004, qui, en plus de la mise en œuvre des obligations internationales, définit de nouvelles obligations pour les États membres et les acteurs économiques.

Dans ce contexte, le but de cette étude fut d’aider la Commission européenne à :

(1) Analyser la situation de la gestion des déchets dangereux, des PCBs et déchets contenant des PCBs dans 14 États membres « sur le terrain »


Afin de recueillir des informations sur la législation relative aux déchets dangereux, les données statistiques et la façon dont ces obligations légales sont mises en pratique, une fiche d’information pour chacun des 14 États membres sélectionnés a été élaborée. Cette fiche rassemble toutes les informations concernant la gestion des déchets dangereux (voir chapitre 5.1 et annexe 1) et PCB / déchets contenant des PCBs (voir chapitre 6.1 et annexe 1). Les fiches d'informations incluent, entre autres :

- Les caractéristiques pertinentes du système national de gestion des déchets
- Les plans de gestion des déchets et spécifications sur les déchets dangereux
- Les programmes de prévention des déchets et les spécificités relatives aux déchets dangereux
- Les exigences réglementaires de la directive cadre sur les déchets concernant la gestion des déchets dangereux
- La gestion des PCBs dans l’État membre
- Les problèmes rencontrés dans la gestion des déchets dangereux et PCBs et « Les bonnes pratiques »

Les informations contenues dans ces fiches ont été confirmées par l’autorité compétente de chacun des états membres sélectionnés

(2) Proposer une série de recommandations (sous forme de « feuilles de route ») pour remédier aux écarts identifiés dans les 14 États membres sélectionnés.

Les documents concernant les recommandations politiques, appelés « feuilles de route » ont été élaborés (voir annexe 2) pour chacun des 14 États membres sélectionnés. Ces documents contiennent un résumé des informations les plus importantes contenues dans la fiche d’information de chacun des pays sélectionnés, ainsi qu’une liste des principaux défis à relever, des recommandations pour relever
ces défis, ainsi que les bonnes pratiques utilisées par d'autres États membres et qui pourraient être identifiés au cours du projet dans chaque des États membres sélectionnés.

Les feuilles de route ont été préparés afin de résumer les aspects les plus importants traités au cours des conférences, lister différentes approches permettant de résoudre immédiatement les problèmes détectés, en utilisant des méthodes qui sont un succès dans d’autre États membres de l’UE. De cette façon, un échange d’informations se crée et les programmes les plus efficaces sont répartis entre les différents pays de l’UE.

(3) Organiser un dialogue avec les autorités nationales et les principaux acteurs publics et privés (séminaires dans onze États membres)


(4) Identifier des facteurs critiques et les meilleures pratiques

Tout au long du projet, les principaux défis ainsi que les bonnes pratiques des États membres ou la Commission européenne ont été identifiées et collectées. Les défis et les bonnes pratiques rencontrées dans les États membres se trouvent dans les 14 fiches d’information et les feuilles de route (voir annexe 1 et 2). Un résumé des défis relatifs aux déchets dangereux et PCBs, les plus couramment rencontrés dans chacun des États membres a été élaboré chapitre 5.2 et chapitre 6.2. Un recueil de bonnes pratiques concernant la gestion de déchets dangereux et PCBs figure à l’annexe 4 et 5.

La dernière conférence a eu lieu le 23 Octobre 2017 à Bruxelles. Le résumé des discussions sont résumées à l’annexe 6.

Compte tenu de ces cinq tâches (y compris la dernière conférence) en arrière-plan, l’objectif global de cette étude est de favoriser l’échange d’informations sur les déchets dangereux et les pratiques de gestion des PCBs entre les États membres, améliorer les systèmes de gestion des déchets dangereux et PCBs et soutenir la réalisation des exigences réglementaires actuelles relatives à la législation européenne sur les déchets. Sur la base des résultats de l’étude et en particulier les bonnes pratiques identifiées dans les États membres, l’étude a permis d’élaborer des recommandations pour les États membres, et a également permis de proposer des mesures d’accompagnement pour améliorer la gestion des déchets dangereux et des PCBs dans l’UE (pour plus de détails, voir chapitre 7).

Classification des déchets dangereux

Les recommandations adressées aux États membres sont les suivantes :
- Créer des directives claires et harmonisées sur la classification des déchets en tenant compte du document guide de l’UE qui sera prochainement publié.
- Mettre en place et entretenir une « culture » de la clarté, du respect à l’égard de la direction établie
- Utiliser des documents guides nationaux / mettre en place des actions au niveau national complémentaires aux directives de l’UE sur la classification des déchets, qui serviront de point de départ pour harmoniser la classification d’un point de vue pratique et l’application des exigences réglementaires de l’UE

Afin de soutenir la mise en œuvre des actions mentionnées précédemment, nous recommandons que la Commission européenne prenne les mesures suivantes :

- **Publier (et mettre à jour si nécessaire) le document guide de l’UE concernant la classification des déchets dans les langues nationales des États membres ; promouvoir l’utilisation des directives dans les États membres ;**

Les inspections, la responsabilité et la tenue des dossiers

Les recommandations adressées aux États membres sont les suivantes :

- Effectuer des inspections générales et coordonnées
- Renforcer la responsabilité des producteurs de déchets et d’autres opérateurs de la chaîne
- Adopter l’écriture des dossiers sous forme électronique et systèmes de traçage

Afin de soutenir la mise en œuvre des actions mentionnées précédemment, nous recommandons que la Commission européenne prenne les mesures suivantes :

- **Garder l’obligation proposée aux États membres de mettre en place un registre électronique et obliger les acteurs à mettre à disposition des autorités les données sur les déchets dangereux au travers ce registre ;**
- **Définir des conditions minimales d’utilisation de ces registres, par exemple harmoniser la fréquence des rapports ; ces conditions minimales d’utilisations devraient tenir compte des capacités techniques et administratives des différents États membres**
- **Détailier les mouvements nationaux de déchets dangereux et les transferts transfrontaliers, avec éventuellement un suivi électronique / système d’enregistrement des déchets soumis au règlement de l’UE relative aux transferts de déchets**

L’application de la hiérarchie des déchets pour les déchets dangereux sans nuire à la protection de l’environnement et la santé humaine

Les recommandations adressées aux États membres sont les suivantes :

- **Inclure explicitement les mesures et objectifs de prévention des déchets dangereux dans les plans de gestion des déchets et les programmes de prévention des déchets**
• Tenir compte de la hiérarchie des déchets dans la législation nationale, permettant de l’appliquer
• Collecter et diffuser des informations sur les substances potentiellement dangereuses dans les matériaux recyclés.

Afin de soutenir la mise en œuvre des actions mentionnées précédemment, nous recommandons à la Commission européenne de prendre les mesures suivantes :

- **Hiérarchiser les déchets dangereux tout en protégeant l’environnement et la santé humaine**
- **Fournir des documents guides concernant hiérarchisation des déchets, notamment des déchets dangereux**
- **Poursuivre l’initiative envisagée dans la feuille de route « Analyse de l’interface entre les produits chimiques, les produits et la législation des déchets et l’identification des options stratégiques » communiquer ultérieurement avec la Commission européenne, Entre autres, développer des connaissances en ce qui concerne le risque de substances très préoccupantes dans les matériaux recyclés**

**Les déchets dangereux comme partie intégrante de la planification de la gestion des déchets**

Les recommandations adressées aux États membres sont les suivantes :

• Intégrer les déchets dangereux dans les plans de gestion des déchets
• Créer des informations fiables et comparables sur les déchets dangereux, servant de bases décisionnelles pour la planification

Afin de soutenir la mise en œuvre des actions mentionnées précédemment, nous recommandons que la Commission européenne de prendre les mesures suivantes :

- **Renforcer l’approche européenne sur les capacités de planification du traitement des déchets dangereux basé sur les plans nationaux de gestion des déchets ;**
- **Étendre les directives existantes sur la planification de la gestion des déchets (« Preparing a Waste Management Plan. A methodological guidance note ») avec des conseils techniques sur la planification de la gestion des déchets dangereux dans les langues nationales, pour assurer une pratique de planification plus cohérente et appropriée dans les États membres, en fournissant des clarifications sur les éléments clés devant figurer dans les plans de gestion des déchets dangereux et dans quelle mesure ces éléments doivent être couverts et décrits.**
- **Sensibiliser les États membres de la nécessité d’avoir une section complète sur les déchets dangereux (y compris les catégories de déchets dangereux les plus pertinents) dans les plans nationales et régionales ;**
- **Discuter de la possibilité d’établir un registre européen des permis d’installations de traitement des déchets dangereux**

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5 http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1516900580991&uri=CELEX:52018DC0032
La poursuite des actions visant à identifier et éliminer les PCBs des applications fermées et ouvertes

Dans de nombreux États membres, applications fermées ont été considérés comme identifiés et éliminés. Cependant, l’expérience révèle que dans de nombreux États membres, les efforts sur l’identification des PCBs à partir d’applications fermées doivent être poursuivies. Nous recommandons à ces États membres d’appliquer des enquêtes ciblées (chaîne d’approvisionnement). De plus, des efforts sont nécessaires pour éliminer les équipements inventoriés. Ces équipements ont été autorisés à être utilisés jusqu’à la fin de leur durée de vie, compte tenu de la date limite d’élimination totale des équipements contenant des PCBs en 2025, tel que stipulée dans la Convention de Stockholm.

En ce qui concerne l’identification et l’élimination des PCBs à partir d’applications ouvertes, seuls quelques États membres ont déjà commencé à aborder le problème de manière systématique. Compte tenu de l’expérience disponible, nous supposons que dans tous les États membres, il existe un risque élevé de contaminations par des PCBs résultant de l’utilisation de PCB dans des applications ouvertes. Ainsi, les actions suivantes sont recommandées pour les États membres qui ne traitent pas encore cette question :

- Étendre les connaissances sur les contaminations / réservoirs de PCBs dans l'État membre et leur origine, en améliorant la surveillance des PCBs dans l'environnement
- Approfondir les connaissances sur l'utilisation historique des matériaux contenant des PCBs, par exemple dans les bâtiments, et autres applications ouvertes dans l'État membre
- Donner la priorité à une certaine catégorie de déchets (par exemple des déchets issus de la construction et de la démolition), en adoptant une stratégie particulière, par exemple séparation à la source et élimination des déchets contenant des PCBs.

Afin de soutenir la mise en œuvre des actions mentionnées précédemment, nous recommandons que la Commission européenne de prendre les mesures suivantes :

- **Transposer la date limite relative à l’élimination des PCBs contenus dans les applications fermées d’ici à 2025 de la Convention de Stockholm dans le règlement (CE) 850/2004**
- **Élaborer une stratégie pour identifier et éliminer les PCBs dans des applications ouvertes, ou mettre en place des lignes directrices pour les stratégies à l’échelle des États membres**
- **Promouvoir le Protocole de l’UE sur les déchets de démolition et de construction, ainsi que les documents guides à venir relatifs aux « audits de pré-démolition »**.
4 Background and understanding

4.1 Background

According to the Treaty of the European Union, the Commission has the task to **ensure and oversee the proper application of EU legislation**. This includes the application of the requirements on hazardous waste and PCB management within the EU Member States.

**Hazardous waste: Identification, figures, management, key provisions of EU acquis**

*Identification / Definition of hazardous waste*

“Hazardous Waste” (HW) is defined by Article 3(2) of Directive 2008/98/EC on waste (Waste Framework Directive or WFD)\(^7\) as “waste which displays one or more of the hazardous properties listed in Annex III”. To note that

- each waste is either considered hazardous or non-hazardous;
- Article 7 of WFD re-emphasizes and makes reference to the established waste classification system of the List of Waste (LOW) as per Decision 2000/532/EC\(^8\). The different types of wastes in the list are defined by the six-digit code for the waste and the respective two-digit and four-digit chapter headings.
- Both Annex III to WFD, and the LOW have been revised in 2014 in order to take into account technical and scientific progress and to align the document with the modifications of EU chemicals legislation, notably GHS/CLP. The 2014 version of the LOW features 842 entries, each characterised by 6-digit entries. 408 entries are marked as hazardous (with an asterisk (*)). Thereof 228 entries are considered to be ‘absolute hazardous’, with the consequence that legal assumption is made that these wastes are hazardous wastes in the sense of Article 3(2) WFD. For the remaining 180 ‘mirror hazardous’ entries, the hazardous properties have to be assessed to finally decide upon the waste’s hazardousness [BiPRO 2015].

Thus, hazardous waste consists of a variety of very different and heterogeneous waste streams with the only common element that they meet the hazardous properties of Annex III of WFD.

*Key figures of hazardous waste management at EU level*

According to [EUROSTAT WASGEN 2014], hazardous waste production in the European Union (EU-28) amounted to a total of 95.5 million tonnes in 2014, which corresponds to 187 kg per capita. The production of hazardous waste varies considerably across countries (influenced by the economic structure, infrastructure projects, remediation activities etc.). In 2014, major HW generating countries in absolute terms were Germany (21.8 mt; 23 % of HW), Bulgaria (2.2 mt; 13 %), Estonia and France.


Significant waste streams contributing to the total amount of hazardous waste generation across Europe are mineral wastes, contaminated soils and polluted dredging spoils, combustion wastes, and chemical wastes.

In 2014, in total 76.2 million tonnes of hazardous waste were treated in EU-28 as follows, according to figures taken from [EUROSTAT WASTRT 2014a]:

- recovery other than energy recovery: 28.1 million tonnes
  - recovery other than energy recovery - except backfilling: 25.7 million tonnes
  - recovery other than energy recovery – backfilling: 2.4 million tonnes
- incineration with energy recovery (R1): 5.72 million tonnes
- incineration without energy recovery (D10): 4.67 million tonnes
- disposal: 47.6 million tonnes
  - deposit onto or into land: 36.4 million tonnes
  - land treatment and release into water bodies: 0.7 million tonnes

Please note that these statistics require a deeper look behind as some discrepancies have been found by several recent studies on hazardous waste management in the EU (see section below).

**Relevant EU acquis for management of hazardous waste**

The Waste Framework Directive sets the basic requirements on waste management including basic concepts such as

- the polluter pays principle,
- the responsibility for waste management for different actors (producers, holders, transporters of waste),
- the need to ensure that waste management is carried out without endangering human health and the environment, and
- the waste hierarchy (although in practice, in particular the application of the waste hierarchy raises often difficult questions in terms of hazardous waste management since it has to be taken into consideration that for instance recycling may not be in all cases a better option than recovery or landflling from an environmental point of view – and particularly not in case it leads to the perpetuation of hazardous substances in the material chain) and
- the principles of proximity and self-sufficiency which apply to those types of hazardous waste which are destined for disposal (however, transboundary shipments of hazardous waste destined for recovery can only be prevented on grounds of Article 12 Waste Shipment Regulation (EC) 2006/1013).

In addition to provisions applying to all types of waste, the WFD contains specific provisions related to the environmentally safe management of hazardous waste, such as
• requirements on labelling and identification documents to be accompanied in case of transferring the waste within a Member State (Article 19),
• record keeping (Article 35),
• monitoring and control obligations, and
• the so-called "mixing ban" (Article 18).

Moreover, permit exemptions that may be granted to hazardous waste installations are more restrictive (Article 25) than those for installations dealing with other wastes (Article 23). At the same time, treatment-related legal documents such as the Landfill Directive or the Industrial Emissions Directive 2010/75/EU (IED), in its provisions on waste incineration facilities, make important distinction whether the waste to be treated is hazardous or not; obviously, the requirements for treating hazardous waste are stricter. (The IED is of relevance for the management of HW also in other aspects: Firstly, the Directive defines EU-wide obligations for operators of installations in its scope as far it pertains to the management of HW (Article 11 (e) IED); further, treatment installations for HW are in the scope of the IED if exceeding the thresholds of its Annex 1.)

No specific target has been set by the WFD to reduce the amount of hazardous waste generation in the European Union. However, it can be said that the WFD provides for an implicit target: all hazardous waste needs to be handled in an environmentally safe manner. Note that the Commission legislative proposal to amend the Waste Framework Directive that was presented in December 2015 proposes the establishment of electronic registries for hazardous waste in the Member States in order to strengthen record keeping and traceability mechanisms.

State of implementation of EU acquis on hazardous waste

In 2014, the COM assigned the BiPRO-led consortium under this Framework Contract to undertake a study concerning the implementation of the Waste Framework Directive's provisions concerning hazardous waste. The objective of this study was to assess the national HW management practices in the 28 EU Member States (on the basis of a "screening exercise") in order to evaluate their performance with the final aim of making recommendations for improvement, via tailored "roadmaps" for those countries lagging behind.

The result of the screening exercise showed that there are differences between the Member States in implementing the HW requirements of the WFD. However, according to present research there is no 'sharp' demarcation line between the groups of "good" performers and the group of countries having implementation gaps. Furthermore, as it has emerged from the study's findings, and was also confirmed by the work of the European Environment Agency [EEA 2015], there are major gaps on statistical data (generation/treatment of hazardous waste) for some Member States, which made the interpretation of the overall results of the screening exercise difficult. The issue of the statistical gap between the generation and treatment of hazardous waste was thus considered a worrying finding which led to changing the focus of the second phase of the study: instead of developing roadmaps for those Member States lagging behind in performance, the study concentrated on analysing and clarifying this finding. The BiPRO study on hazardous waste performances investigated the statistical
gaps between hazardous waste generation and treatment for ten selected Member States (BG, EE, FI, DE, IE, IT, LV, LU, NL, UK) to identify whether the differences stem from statistical reasons or deeper problems in hazardous waste management. The assessment revealed multiple and country specific reasons for the gap. For EE, DE, IE and LV the gap largely could be explained whereas the statistical gap could not be fully explained for BG, FI, NL, LU, UK and IT.

Apart from the assessment of the statistical gap, the study revealed that most requirements of EU legislation on hazardous waste are well transposed into national legislation. However, practice shows that the implementation of all obligations, inter alia classification, labelling, permitting, mixing ban, collection, storage and treatment of hazardous waste, is facing problems for most of the requirements.

**PCB/PCB waste: Identification, figures, management, key provisions of EU acquis**

Within the hazardous waste streams, there is one waste type that requires special attention: (products and) waste containing PCBs poses particular challenges as regards their environmentally sound management.

*Identification / definition of PCB*

PCBs are a group of chemicals (polychlorinated biphenyls and polychlorinated terphenyls) which were manufactured between from 1954 and 1980 in total amounts of 1-2 million tons world-wide and were used mainly in the Northern hemisphere. The total amount produced in Europe has been estimated to account for about 700,000 t [BiPRO 2005]. PCBs were used in “closed applications” as a dielectric fluid in electrical equipment (such as capacitors and high voltage oil-cooled transformers) and as hydraulic fluids owing to their high stability, good heat conduction, electrical isolating, fire retardant capabilities etc. Furthermore, PCBs have been used in “open” applications, notably as sealants for house construction and surface coatings; some applications in bridges, flame retardant in plastics, plasticiser in paints, varnishes; lubricants, adhesives, inks and ink solvents in carbonless paper.

At EU level, Directive 85/467/EEC introduced significant restrictions on the marketing and use of PCBs. This Directive was further developed and amended (see description of current EU acquis below). PCBs are considered being persistent organic pollutants (POPs), and are subject to the Stockholm Convention on POPs and the UNECE (CLRTAP) Protocol on POPs, both which agreements the EU has signed.

Note that PCBs are also formed unintentionally in certain thermal and chemical processes.

**PCB waste**

In line with the different uses of PCBs, the following main types of waste can be distinguished, for several of which specific entries regarding PCB containing waste have been introduced to the LOW:

- WEEE containing PCBs (“closed applications”)
  - 16 02 09* transformers and capacitors containing PCBs
16 02 10* discarded equipment containing or contaminated by PCBs other than those mentioned in 16 02 09

- **Waste fluids and waste oils contaminated with PCBs ("closed applications")**
  - 13 01 01* hydraulic oils, containing PCBs
  - 13 03 01* insulating or heat transmission oils containing PCBs

- **Construction and demolition waste ("open applications" anti-corrosion coatings, joint sealers, etc.)**
  - 17 09 02* construction and demolition wastes containing PCB (for example PCB-containing sealants, PCB-containing resin-based floorings, PCB-containing sealed glazing units, PCB-containing capacitors)

Further relevant types of waste, without specifically addressed under the LOW, comprise contaminated soils; absorbents, wiping cloths, protective clothing, etc.; and recycled metals contaminated with PCBs.

**EU acquis - Main relevant provisions of PCB Directive**

Equipment containing PCBs already in use is covered by specific provisions laid down in Directive 96/59/EC (PCB Directive)\(^9\). The Directive aims for the approximation of the laws of the Member States on the controlled disposal of PCBs, the decontamination or disposal of equipment containing PCBs and/or the disposal of used PCBs in order to eliminate them completely. According to the Directive, Member States had to take the necessary measures to ensure that used PCBs are disposed of and that PCBs and equipment containing PCBs are decontaminated or disposed of in an appropriate manner. Member States were obliged to compile inventories of equipment with PCB volumes of more than 5 dm\(^3\). These inventories were to be sent to the Commission by September 1999\(^10\) at the latest. The equipment and PCBs contained in the inventories had to be decontaminated or disposed of by 2010 at the latest. The inventories must supply the following data:

- the names and addresses of the holders;
- the location and description of the equipment;
- the quantity of PCBs contained in the equipment;
- the date and type of treatment planned;
- the date of the declaration.

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\(^10\) Different deadlines applied to Member States that joined the EU after 1999
Moreover, the Directive stipulates that any equipment which is subject to inventory must be labelled. Member States must prohibit the separation of PCBs from other substances for the purpose of reusing the PCBs and the topping-up of transformers with PCBs.

Concerning the appropriate waste management, Member States had to take the necessary measures to ensure that:

- PCBs, used PCBs and equipment containing PCBs which is subject to inventory are transferred to licensed undertakings, at the same time ensuring that all necessary precautions are taken to avoid the risk of fire;
- any incineration of PCBs or used PCBs on ships is prohibited;
- all undertakings engaged in the decontamination and/or the disposal of PCBs, used PCBs and/or equipment containing PCBs have appropriate permits;
- transformers containing more than 0.05% by weight of PCBs are decontaminated under the conditions specified by the Directive.

Within three years following the adoption of Directive 96/59/EC, Member States had to draw up plans for the decontamination and/or disposal of inventoried equipment and the PCBs contained therein and plans for the collection and subsequent disposal of equipment not subject to inventory.

**EU acquis - Main provisions of POP Regulation regarding PCB and PCB waste**

At EU level, the relevant legal act for implementation the Stockholm Convention and the POPs Protocol is Regulation EC (No) 850/2004 (POP Regulation)\(^{11}\) which, at the same time, sets out further obligations for Member States in addition to international implementation obligations.

With respect to PCB, the POP Regulation fully prohibits the production, placing on the market and use of PCBs as such and in preparations.

Further, with regard to the treatment and disposal of PCB containing wastes, Article 7 as well as Annexes IV and V of the EU POP Regulation are relevant. Following Article 7(2), wastes consisting of POPs, containing or contaminated with them, must be treated in such way as to ensure that the POP content is destroyed or irreversibly transformed. Whereas pre-treatment is allowed, disposal and recovery operations with the goal of recovery, recycling, reclamation or reuse of POPs are banned.

Exemptions are possible only

- if the POP content is below the concentration limits as of Annex IV ("low POP concentration limit values"), Article 7(4) (a);
- in exceptional cases for specific waste streams for which destruction or irreversible transformation does not represent the environmentally preferable option, Article 7(4) (b); those wastes are listed in Annex V with "maximum POP concentration limit values").

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As prescribed in Annex V, Part 1 of the POP Regulation, for each waste that exceeds the concentration limit (low POP concentration limit values) set in Article 7(4)(a), only a limited number of waste disposal and recovery operations is allowed, for the case the content of POPs is destroyed or irreversibly transformed. For waste consisting of PCB, the approach of EU law can be summarised as visible in the figure below:

Figure 1: EU legislation on waste containing PCB

Waste containing, or contaminated with PCB (PCB waste) is subject to the provisions of Article 7 in case the concentration exceeds the limit value indicated in Annex IV to POP Regulation, i.e. 50 mg/kg. PCB waste exceeding this concentration limit is to be classified as hazardous waste following the revised LOW.
4.2 Tasks to be performed

Against this background, the subject of this contract is assisting the Commission in:

(5) Analysing the hazardous waste and PCB/PCB waste management situation in 14 selected Member States "on the ground'',

(6) Proposing a set of recommendations (in the form of "roadmaps") to tackle the deficiencies identified in the 14 selected Member States.

(7) Organising a dialogue with national authorities and key public and private actors (Seminars in eleven Member States)

(8) Identifying critical factors, including best practices,

Organising a final workshop involving all Member States to present both best practices and gaps/problems identified.

The 14 Member States for the assessment in this study have been selected by the European Commission and comprise the following Member States:

Bulgaria, Belgium, Cyprus, Czech Republic, Germany, Spain, France, Greece, Italy, Poland, Portugal, Romania, Sweden and the United Kingdom.

In all aforementioned Member States - apart from Belgium, Germany and France – seminars shall be realised.
4.3 Applied method and structure of this report

Applied method
The method to realise the tasks as described in the previous chapter is based on five working packages as displayed in the following figure (see Figure 2).

Figure 2: Working Packages (WP) undertaken in this project

In a first step, the management practice for hazardous waste and PCB / PCB waste was examined and presented for the 14 selected Member States in factsheets (see Annex 1). In a second step, policy suggestions in the form of ‘roadmaps’ have been elaborated based on the identified challenges in the Member State. The suggestions for 11 Member States have been discussed with public and private stakeholders in national seminars. The final roadmaps (see Annex 2) have been further adapted based on the outcome of these seminars. The overall project results have been presented on a final workshop in Brussels on 23rd of October 2017 and are further summarised in this report.

In-depth analysis of hazardous waste and PCB / PCB waste management practices (“factsheets”)

The analysis for the 14 Member States is based on expert interviews and additional desk research as displayed in the following figure.
The first step in this process was to identify relevant stakeholders. Interviews, in person, by telephone or by e-mail have been conducted with the stakeholders identified. The aims of the interviews were to collect more information, to assess the quality of already collected information (via desk research, summarised in the draft factsheet) and to obtain additional information.

In most cases, a draft version of the factsheet has been provided to the interviewee before the interview, together with a list of information requested. The interviews were not formally structured, but lead by the demand for data and information in the given case.

The purpose of the study was also to present the different views on the issue of HW management in a Member state, including those of:

- authorities of different administrative levels; e.g. authorities for registration, permitting, data collection and follow up, enforcement and inspections usually the Ministries of Environment, Environmental Agencies, Environmental Board, Inspectorates of national/federal state level;
- authorities involved in data collection and reporting, i.e. national statistical offices;
- practitioners involved in HW management, i.e. large companies or waste associations representing the companies;
- institutes and institutions involved in HW management, e.g. by providing guidelines and standards.

About five to ten extensive interviews have been realised per country, including several reviewing phases of the factsheet.
The expert interviews have been complemented by further desk research at national level, including documents either provided by the interviewed experts or collected via additional search (official websites, guidance, etc.). The desk search included:

- Follow-up on information collected during screening phase (i.e. criteria with discrepancies) literature, further studies on HW (e.g. major HW streams, amounts, treatment applied, reports about exports...) and statistical data if available.
- Identify data and information gaps focusing on 1) waste generation and treatment in the country and 2) obligation/practice of HW collection and storage.

The primary sources for the desk research include websites and data basis from administrative bodies and statistical offices.

All sources (expert interviews and published material) have been listed in the individual Member State factsheet and in chapter 8).

**Recommendations for improving hazardous waste and PCB / PCB waste management in the selected Member States (‘Roadmaps’)**

To elaborate policy recommendations (‘Roadmaps’) about three to six major challenges identified during the elaboration of the factsheets have been taken up in order to describe challenges and main reasons behind in a structured way. Based on the particular challenges, a set of potential measures is recommended, including a brief summary on the type of instrument, responsibility, indicative time scale, estimated cost and available EU funds. To further illustrate the suggested measure, relevant good practice examples from (other) EU MS are described in the roadmaps.

The draft policy recommendations have been presented at the seminars in the Member States and/or shared with the competent authority of the Member States. The documents have been finalised considering the comments of seminar participants and the competent authorities.

**Structure of this report**

To improve the readability of this report, the structure is further explained in the following:

- **Section 2** of the report presents a summary of the results of the in-depth analysis of hazardous waste management. It provides a short (graphical) overview on the results per Member State, whereas detailed information can be retrieved from the 14 Member State factsheets that are included as Annex 1 to this report.
  
  Additionally, section 2 outlines general findings on the most important challenges faced by the majority of the selected Member States. For the mentioned challenges, corresponding good practices are briefly mentioned and linked to a more detailed explanation on the good practice examples as provided by Annex 4.

- **Section 3** of the report presents a summary of the results of the in-depth analysis of PCB / PCB waste management. It provides a short (graphical) overview on the results per Member State,
whereas detailed information can be retrieved from the 14 Member State factsheets that are included as Annex 1 to this report.

Additionally, section 3 outlines general findings on the most important challenges faced by the majority of the selected Member States. For the mentioned challenges, corresponding good practices are briefly mentioned and linked to a more detailed explanation on the good practice examples as provided by Annex 5.

- Section 4 of the report presents recommendations for improving hazardous waste management in the EU. It contains overarching recommendations for all Member States whereas individual recommendations targeted to individual Member States can be retrieved from the 14 Member State roadmaps that are included as Annex 2 to this report. The roadmaps contain further information on the type of the recommendations, estimated costs and potentially available EU funds. Annex 3 provides guidance and further explanations on the aforementioned information used for the roadmaps.

Additionally, section 4 outlines particular recommendations for the European Commission.

Please note that the mentioned challenges and good practice in the following texts are indicative and present the findings from the dialogue between the stakeholders of the selected Member States and the Consultant. Hence, the mentioned challenges and the listed good practices in the Member States do not claim to be comprehensive.
5 Analysis of hazardous waste management practices in the selected Member States

5.1 Specific findings concerning hazardous waste management in the selected Member States

The in-depth analysis of hazardous waste and PCB management practices are summarised for the 14 selected Member States in 14 factsheets (attached in Annex 1). A (graphical) summary for each Member State can be found in the following.
5.1.1 Belgium

Key figures compared to EU 28 (according to Eurostat)

- HW generation: 2,946 kt (3%)
- HW treatment: 1,926 kt (3%)*
- Population: 11,206,489 (2%)
- Gross Value added at current prices: £m 358,478 (3%)

* According to WStatR disposal and treatment operations D6, D9, D11, D13, D14, D16, R12 and R13 are excluded from the reporting obligation, leading to a calculated only statistical gap

Source: EUROSTAT

**HW generation per capita**

- 263 kg * inh
  - EU 28 = 188

**HW generation intensity**

- 8.2 kg * € 1,000 GVA
  - EU 28 = 7.6

Belgium

Hazardous waste management

**HW imports**

- 552 kt / 2014
  - Source: EUROSTAT

**HW exports**

- 626 kt / 2014
  - Source: EUROSTAT

Key HW fractions

**Belgium**

- Other: 23%
- W12B: 7%
- W128_13: 8%
- W128: 22%
- W011: 5%
- W012: 8%
- W02A: 16%
- W081: 12%
- W081_12: 9%

**EU 28**

- Other: 22%
- W013: 5%
- W02A: 13%
- W081: 6%
- W124: 12%
- W128: 8%
- W128_13: 7%
- W128: 22%
- W02A: 16%
- W081: 12%
- W081_12: 9%

Source: EUROSTAT
Shares of HW generation compared to HW generation intensity by key economic sector

<table>
<thead>
<tr>
<th>Country</th>
<th>HW Generation Intensity (kg/t 1.000 GVA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>A: 0.8% 3.9</td>
</tr>
<tr>
<td>EU 28</td>
<td>149%</td>
</tr>
</tbody>
</table>

A - Agriculture, forestry and fishing
B - Mining and quarrying
C - Manufacturing
D - Electricity
E - Water/waste management
F - Construction
G-U - Wholesale, Transport, Services
EP-HH - Households

Source: EUROSTAT

HW treatment capacities

- No summarized data on country level, for Flanders publicly available register by OVAM
- R1 / D10
- Landfilling

HW generation by top 3 manufacturing sectors

- Belgium: 1.1 mt (2014)
- EU 28: 23.9 mt (2014)

- Manufacture of...
  - Basic metals / metal products, except machinery / equipment
  - Chemical, pharmaceutical, rubber and plastic products
  - Coke and refined petroleum products
  - Others

Source: EUROSTAT

Roadmap

**Best practise**

**Wallonia**
- High requirements for the personnel working in HW management
- Willingness of the authorities to discuss new projects before the official request for permit

**Brussels**
- Contact person for the industry that acts as facilitator and provides the companies with information.
- "Brudalex" imposes training for the main HW operators.
- Label for waste management "Entreprise écodynamique"

**Further challenges**

- Classification problems occur in entire Belgium due to a lack of clear definitions for certain hazardous waste terms in the European List of Waste and in national or regional guidance documents. In the Brussels region, this is combined with insufficient understanding of hazardous waste and its management in some waste producing companies.
- Uncertainty and room for interpretation exist with regard to mixing and dilution of hazardous waste.
5.1.2 Bulgaria

Key figures compared to EU 28 (according to Eurostat)

- HW generation: 12,206 kt (13%)
- HW treatment: 12,176 kt (16%)
- Population: 7,223,938 (1%)
- GDP: 37,126 (0.3%)

* According to WStatR disposal and treatment operations D8, D9, D11, D13, D14, D15, R12 and R13 are excluded from the reporting obligation, leading to a calculated only statistical gap.

Source: EUROSTAT

HW generation per capita

1,690 kg * inh
EU 28 = 188

HW generation intensity

329 kg * € 1,000 GVA
EU 28 = 7.6

Bulgaria
Hazardous waste management

HW imports: 47 kt / 2014
Source: EUROSTAT

HW exports: 5 kt / 2014
Source: EUROSTAT

Key HW fractions

- W12B: 90%
- Other: 2%

EU 28

- W12B: 17%
- W128: 7%
- W126: 8%
- W121: 9%
- W081: 6%
- W02A: 13%
- W013: 5%
- Other: 22%
- W011: Spent solvents
- W012: Acid, alkaline or saline wastes
- W013: Used oils
- W02A: Chemical wastes
- W032: Industrial effluent sludges
- W033: Sludges
- W00: Health care / biological wastes
- W071: Glass wastes
- W075: Wood wastes
- W077: Waste containing PCB
- W081: Discarded vehicles
- W084: Batteries, accumulators wastes
- W08A: Discarded equipment
- W102: Mixed, undifferentiated materials
- W103: Sorting residues
- W121: Mineral waste from C&D
- W124: Combustion wastes
- W126: Seals
- W127: Dredging spoils
- W128: Other mineral wastes
- W129: Mineral wastes from treatment

Source: EUROSTAT

Final Report
Support to selected Member States in improving hazardous waste management based on assessment of Member States' performance
Shares of HW generation compared to HW generation intensity by key economic sector

<table>
<thead>
<tr>
<th>Bulgaria</th>
<th>EU 28</th>
</tr>
</thead>
<tbody>
<tr>
<td>98%</td>
<td>0.8%</td>
</tr>
<tr>
<td>12,300</td>
<td>3.9</td>
</tr>
<tr>
<td>1.4%</td>
<td>13%</td>
</tr>
<tr>
<td>2.3</td>
<td>25%</td>
</tr>
<tr>
<td>0.1%</td>
<td>4%</td>
</tr>
<tr>
<td>1.02%</td>
<td>4%</td>
</tr>
<tr>
<td>31</td>
<td>149</td>
</tr>
<tr>
<td>30</td>
<td>37</td>
</tr>
<tr>
<td>12</td>
<td>150</td>
</tr>
</tbody>
</table>


Shares of HW generated (kg € 1,000 GVA)

Source: EUROSTAT

HW treatment capacities

No data available (research currently ongoing)

HW generation by top 3 manufacturing sectors

BG: 0.18 mt (2014)
EU 28: 23.9 mt (2014)

- Manufacture of: basic metals / metal products, except machinery / equipment
- Chemical, pharmaceutical, rubber and plastic products
- Coke and refined petroleum products
- EEE, motor vehicles, transport equipment
- Others

Source: EUROSTAT

Roadmap

Best practise

- Municipalities conclude contracts with waste operators for separate collection and disposal of HW generated from households through establishment of mobile collection points.
- Due to joint efforts of both authorities and companies all registered PCB have been treated and eliminated.
- Most of the treatment facilities have been recently established and apply best available technologies.

Further challenges

- Identification of possibilities to enhance availability and traceability of HW data also to the public
- Further improvement of proper identification of tar-containing asphalt, asbestos waste, and fluorescent tubes contained in CDW
- Continuous support to Municipal HW collection - Collection infrastructure and participation and habits of citizens to increase the separate collection of hazardous waste from households
5.1.3  Cyprus

Key figures compared to EU 28 (according to Eurostat)

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>HW generation</td>
<td>173 kt</td>
<td>0.2%</td>
</tr>
<tr>
<td>HW treatment</td>
<td>161 kt</td>
<td>0.2%</td>
</tr>
<tr>
<td>Population</td>
<td>852,504</td>
<td>0.2%</td>
</tr>
<tr>
<td>Gross Value added</td>
<td>15,409</td>
<td>0.1%</td>
</tr>
</tbody>
</table>

* According to WStatR disposal and treatment operations D8, D9, D11, D13, D14, D15, R12 and R13 are excluded from the reporting obligation, leading to a calculated only statistical gap.

Source: EUROSTAT

HW generation per capita

- **203 kg * inh**
- EU 28 = 188

HW generation intensity

- **11.3 kg * € 1,000 GVA**
- EU 28 = 7.6

Cyprus

Hazardous waste management

<table>
<thead>
<tr>
<th>HW imports</th>
<th>11 kt / 2014</th>
</tr>
</thead>
</table>

Source: EUROSTAT

<table>
<thead>
<tr>
<th>HW exports</th>
<th>&gt; 3 kt / 2014</th>
</tr>
</thead>
</table>

Source: EUROSTAT

Key HW fractions

Cyprus

- W001: 7%
- W12B: 81%
- Other: 12%

EU 28

- W013: 5%
- W02A: 13%
- W081: 6%
- W12B: 17%
- W121: 9%
- W124: 12%
- W126: 8%
- Other: 22%

Source: EUROSTAT

Final Report
Support to selected Member States in improving hazardous waste management based on assessment of Member States' performance
Shares of HW generation compared to HW generation intensity by key economic sector

<table>
<thead>
<tr>
<th>Sector</th>
<th>Cyprus</th>
<th>EU 28</th>
</tr>
</thead>
<tbody>
<tr>
<td>A - Agriculture, forestry and fishing</td>
<td>2.6%</td>
<td>0.8%</td>
</tr>
<tr>
<td>B - Mining and quarrying</td>
<td>2.5%</td>
<td>13%</td>
</tr>
<tr>
<td>C - Manufacturing</td>
<td>8%</td>
<td>12%</td>
</tr>
<tr>
<td>D - Electricity</td>
<td>5.6%</td>
<td>9.2%</td>
</tr>
<tr>
<td>E - Water/waste management</td>
<td>3.3%</td>
<td>19%</td>
</tr>
<tr>
<td>F - Construction</td>
<td>0.8%</td>
<td>17%</td>
</tr>
<tr>
<td>G-U - Households</td>
<td>12%</td>
<td>24%</td>
</tr>
<tr>
<td>EP-HH</td>
<td>4.0%</td>
<td>37%</td>
</tr>
</tbody>
</table>

Source: EUROSTAT

HW treatment capacities

- Pre-treatment / Recovery
- Landfilling

HW generation by top 3 manufacturing sectors

<table>
<thead>
<tr>
<th>Sector</th>
<th>CY: 0.14 Mt (2014)</th>
<th>EU 28: 23.9 Mt (2014)</th>
</tr>
</thead>
<tbody>
<tr>
<td>19%</td>
<td>18%</td>
<td>35%</td>
</tr>
<tr>
<td>28%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Manufacture of:
- Basic metals / metal products, except machinery / equipment
- Chemical, pharmaceutical, rubber and plastic products
- Coke and refined petroleum products
- Others

Source: EUROSTAT

Roadmap

**Best practise**
- Not identified.

**Further challenges**
- HW management in Cyprus is characterised by a substantial lack of data, although HW management operators are requested to inform authorities.
- HW is generated in small quantities, but numerous different types. Combined with the absence of dedicated HW management facilities, this restricts the design of a proper HW management system in the country.
- According to industry stakeholders, waste legislation may not effectively enforced in HW management, e.g., in permitting procedures; hence HW is going to low cost/quality treatment options rather than to higher quality solutions in some cases.
5.1.4 Czech Republic

Key figures compared to EU 28 (according to Eurostat)

- HW generation: 1,162 kt (1%)
- HW treatment: 897 kt (1%)
- Population: 10,525,347 (2%)
- Gross Value added at current prices: €141,582 (1%)

HW generation per capita:

- 110 kg * inh
- EU 28 = 188

HW generation intensity:

- 8.2 kg * € 1,000 GVA
- EU 28 = 7.6

Source: EUROSTAT

Czech Republic
Hazardous waste management

HW imports

- 26 kt / 2014
- Source: EUROSTAT

HW exports

- 33 kt / 2014
- Source: EUROSTAT

Key HW fractions

Czech Republic

- W012: 7%
- W013: 6%
- W032: 10%
- W121: 6%
- W126: 19%
- W128_13: 9%
- Other: 21%

EU 28

- W02A: 22%
- W12B: 17%
- W128_13: 7%
- Other: 22%
- W124: 12%
- W126: 8%
- W12: 9%

W011: Spent solvents
W012: Acid, alkaline or saline wastes
W013: Used oils
W02A: Chemical wastes
W032: Industrial effluent sludges
W033: Sludges
W100: Health care / biological wastes
W012: Glass wastes
W076: Wood wastes
W081: Discarded vehicles
W0841: Batteries, accumulators wastes
W06A: Discarded equipment
W162: Mixed, undifferentiated materials
W103: Sorting residues
W121: Mineral waste from C&D
W124: Combustion wastes
W126: Soils
W127: Drilling spoils
W128_13: Mineral waste from treatment
W128_13: Other mineral wastes

Source: EUROSTAT
Shares of HW generation compared to HW generation intensity by key economic sector

<table>
<thead>
<tr>
<th>Economic Sector</th>
<th>Czech Republic</th>
<th>EU 28</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Agriculture, forestry and fishing</td>
<td>1.1%</td>
<td>0.8%</td>
</tr>
<tr>
<td>B: Mining and quarrying</td>
<td>1.7%</td>
<td>13%</td>
</tr>
<tr>
<td>C: Manufacturing</td>
<td>0.4%</td>
<td>25%</td>
</tr>
<tr>
<td>D: Electricity</td>
<td>1.4%</td>
<td>19%</td>
</tr>
<tr>
<td>E: Water/waste management</td>
<td>9.6%</td>
<td>17%</td>
</tr>
<tr>
<td>F: Construction</td>
<td>24%</td>
<td>24%</td>
</tr>
<tr>
<td>EP_HH: Households</td>
<td>10%</td>
<td>12%</td>
</tr>
</tbody>
</table>

Source: EUROSTAT

HW treatment capacities

- Pre-treatment / Recovery
- Comprehensive network
  - Detailed overview in ISOH database
- Landfilling

HW generation by top 3 manufacturing sectors

- Czech Republic (CZ): 0.51 Mt (2014)
- EU 28: 23.9 Mt (2014)

- Manufacture of:
  - ...basic metals / metal products, except machinery / equipment
  - ...chemical, pharmaceutical, rubber and plastic products
  - ...coal and refined petroleum products
  - ...EEE, motor vehicles, transport equipment
  - Others

Source: EUROSTAT

Roadmap

**Best practise**

- Stakeholder and interested public have access to a comprehensive helpdesk EnviHelp, guidelines are published, seminars and lectures are organized periodically.
- On-line electronic system on evaluation of hazardous properties (HNVO) in waste
- Network of specialized persons authorized by MoE is established that provide support for classification
- The CEI is the responsible professional institution to supervise observing rules of law in the field of the environment. Annual reports give a detailed overview of the activities.

**Further challenges**

- Among the 14 regions responsible for permitting of HW facilities, differences exist regarding interpretations and requirements for treatment facilities.
- There are some challenges with data on HW generation and treatment as there are two autonomous versions with differing methodology available. The new online electronic tracking system (Czech acronym SEPNO) will be in function beginning 2018 as reported by the CZ MoE 2017 and the CZ ISPOP 2017.
5.1.5 France

Key figures compared to EU 28 (according to Eurostat)

- HW generation: 10,414 kt (11%)
- HW treatment: 8,206 kt (11%)
- Population: 66,152,155 (13%)
- Gross Value added at current prices: €1,925,074 (15%)

As of 2014

* According to WStaR disposal and treatment operations D8, D9, D11, D13, D14, D15, R12 and R13 are excluded from the reporting obligation, leading to a calculated only statistical gap.

Source: EUROSTAT

HW generation per capita
- 157 kg * inh
- EU 28 = 188

HW generation intensity
- 5.4 kg * € 1,000 GVA
- EU 28 = 7.8

France Hazardous waste management

HW imports
- 519 kt / 2014
Source: EUROSTAT

HW exports
- 1,106 kt / 2014
Source: EUROSTAT

Key HW fractions

France EU 28

- W02A: 13%
- W081: 13%
- W121: 9%
- W128_13: 8%
- W126: 18%
- Other: 37%
- W013: 5%
- W02A: 13%
- W081: 6%
- W121: 9%
- W126_13: 7%
- W126: 8%

Source: EUROSTAT
Shares of HW generation compared to HW generation intensity by key economic sector

**France**

- A: Agriculture, forestry and fishing: 10.1%
- B: Mining and quarrying: 12%
- C: Manufacturing: 36%
- D: Electricity: 23.2%
- E: Waste/waste management: 14%
- F: Construction: 1.4%
- G-U: Other economic activities: 1.9%
- EP-HH: Households: 4%

**EU 28**

- A: Agriculture, forestry and fishing: 0.8%
- B: Mining and quarrying: 3.9%
- C: Manufacturing: 13%
- D: Electricity: 25%
- E: Waste/waste management: 37%
- F: Construction: 150%
- G-U: Other economic activities: 2.4%
- EP-HH: Households: 12%

**Source:** EUROSTAT

**HW treatment capacities**

- Pre-treatment / Recovery: 504 different types of treatment plants
- R1 / D10: 173
- Landfilling: no data available

**HW generation by top 3 manufacturing sectors**

- EU 28: 23.9 mt (2014)
- FR: 2.7 mt (2014)

**Source:** EUROSTAT

**Roadmap**

**Best practice**

- Unique technical guidance on proper CLP labelling published in 2014 by INERIS.
- Specific guide on the topic: “Taking into account waste in the determination of the SEVESO status” (December 2015) complementary to further guides (please refer to the factsheet)
- Methods of assessment of HP 14 (Decree “Melange”) developed
- Guidance document “Decret Melange – Guide” on the correct mixing operations and on the existing exceptions
- Statutory EPR scheme for certain HW streams and diffuse specific waste.

**Further challenges**

- Uncertainties exist with respect to the extent of obligations stemming from the waste hierarchy for producers of HW, in particular guidance on the balance between the two aims of increased recovery/recycling whilst ensuring proper decontamination and protection of human health and environment.
5.1.6 Germany

Key figures compared to EU 28 (according to Eurostat)

- HW generation: 21,813 kt (23%)
- HW treatment: 20,521 kt (27%)*
- Population: 80,982,500 (16%)
- Gross Value added at current prices: €2,631,268 (21%)

* According to WStaR disposal and treatment operations D8, D9, D11, D13, D14, D15, R12 and R13 are excluded from the reporting obligation, leading to a calculated only statistical gap.

Source: EUROSTAT

Germany Hazardous waste management

HW imports: 2,507 kt / 2014
Source: EUROSTAT

HW exports: 617 kt / 2014
Source: EUROSTAT

Key HW fractions

Germany

- W013: 6%
- W02A: 12%
- W103, 8%
- W12B, 17%
- W126, 10%
- W13: 30%

EU 28

- W013: 5%
- W02A: 13%
- W081, 6%
- W124, 12%
- W126, 8%
- Other, 22%

Source: EUROSTAT
Shares of HW generation compared to HW generation intensity by key economic sector

<table>
<thead>
<tr>
<th>Germany</th>
<th>EU 28</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Agriculture, forestry and fishing</td>
<td>0.8%</td>
</tr>
<tr>
<td>B: Mining and quarrying</td>
<td>3.9%</td>
</tr>
<tr>
<td>C: Manufacturing</td>
<td>25%</td>
</tr>
<tr>
<td>D: Electricity</td>
<td>4.4%</td>
</tr>
<tr>
<td>E: Water / waste management</td>
<td>9.2%</td>
</tr>
<tr>
<td>F: Construction</td>
<td>7%</td>
</tr>
<tr>
<td>G-U: EP_HH: Households</td>
<td>1.2</td>
</tr>
<tr>
<td>EP-HH: Households</td>
<td>4.0%</td>
</tr>
</tbody>
</table>

Shares of HW generated
- HW generation intensity
  - (kg*€1,000 GVA)

Source: EUROSTAT

HW treatment capacities

- Comprehensive network
  - Pre-treatment / Recovery
    - Specific for HW and for both, HW and non-HW
  - # 31 HW incineration plants
    - Additional capacities also in incineration plants for non-HW, cement kilns, coal-fired plants
  - # 27 HW landfills (DK III)
  - # 13 Landfilling / Underground disposal

HW generation by top 3 manufacturing sectors

<table>
<thead>
<tr>
<th>DE:</th>
<th>EU 28:</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1 mt (2014)</td>
<td>23.9 mt (2014)</td>
</tr>
</tbody>
</table>

- 35% Manufacture of:... basic metals / metal products, except machinery / equipment
- 38% ... chemical, pharmaceutical, rubber and plastic products
- 11% ... coke and refined petroleum products
- 15% ... EEE, motor vehicles, transport equipment
- 18% Others

Source: EUROSTAT

Roadmap

- Best practice
  - Existing network of Federal and Länder expert ("Bund/Länder-Arbeitsgemeinschaft Abfall (LAGA)") for exchanging information, knowledge and experiences on HW, and drafting/adopting guidance documents.
  - Well established electronic record keeping system exists.
  - Particularly published statistics on HW at Länder level, based on six digit entries of the EU LoW and a analysis of their treatment route.
  - HW incinerators are equipped with energy recovery installations.

- Further challenges
  - No national guidance document regarding waste classification according the AVV exists or is planned.
  - Following to the repealing of a provision of KrWG (for waste above a certain defined calorific value, energy recovery is seen as equivalent to recycling), uncertainties exist with respect to the extent of obligations stemming from the waste hierarchy for producers of HW.
  - View on treatment of HBCD containing waste following the approach of AVV of considering all wastes exceeding the concentration thresholds of Annex IV to EU POP Regulation as hazardous, leading inter alia to capacity problems for the treatment of HBCD wastes.
5.1.7 Greece

### Key figures compared to EU 28 (according to Eurostat)

- **HW generation per capita**
  - **20 kg * inh**
  - EU 28 = 188

- **HW generation intensity**
  - **1.4 kg * € 1,000 GVA**
  - EU 28 = 7.6

---

**Greece**

**Hazardous waste management**

**HW imports**

- 6 kt / 2014
- Source: EUROSTAT

**HW exports**

- 180 kt / 2014
- Source: EUROSTAT

### Key HW fractions

**Greece**

- W124: 18%
- W0041: 21%
- W032: 8%
- W05: 7%
- W013: 16%
- W02A: 16%
- Other: 6%
- W12B: 9%

**EU 28**

- W013: 5%
- W02A: 13%
- W031: 6%
- W12B: 17%
- W128_13: 7%
- W126: 8%
- Other: 22%

---

**Source:** EUROSTAT
Shares of HW generation compared to HW generation intensity by key economic sector

<table>
<thead>
<tr>
<th>Greece</th>
<th>EU 28</th>
</tr>
</thead>
<tbody>
<tr>
<td>A - Agriculture, forestry and fishing</td>
<td>0.8%</td>
</tr>
<tr>
<td>B - Mining and quarrying</td>
<td>0%</td>
</tr>
<tr>
<td>C - Manufacturing</td>
<td>6.2%</td>
</tr>
<tr>
<td>D - Electricity</td>
<td>0%</td>
</tr>
<tr>
<td>E - Water/waste management</td>
<td>36%</td>
</tr>
<tr>
<td>F - Construction</td>
<td>0%</td>
</tr>
<tr>
<td>G-U - Other</td>
<td>0%</td>
</tr>
<tr>
<td>EP-HH - Households</td>
<td>0%</td>
</tr>
</tbody>
</table>

Shares of HW generated

HW generation intensity (kg*€1,000 GVA)

Source: EUROSTAT

HW treatment capacities

- Pre-treatment / Recovery
- R1 / D10
- Landfilling

# 43

HW generation by top 3 manufacturing sectors

<table>
<thead>
<tr>
<th>GR:</th>
<th>EU 28:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.08 mt (2014)</td>
<td>23.9 mt (2014)</td>
</tr>
</tbody>
</table>

Roadmap

- Best practise
  - Not identified.

- Further challenges
  - Data quality on HW allows for limited knowledge on real situation on arising, flows and treatment of HW
  - Treatment infrastructure for sound management of HW needs to be further extended
  - Remediation of historical waste
  - Inadequate inspections and enforcement, in particular with respect to small/medium producers of HW
5.1.8 Italy

Key figures compared to EU 28 (according to Eurostat)

- HW generation
- HW treatment
- Population
- Gross Value added at current prices as of 2014

- 8,924 kt (9%)
- 3,574 kt (5%)*
- 60,789,140 (12%)
- €m 1,456,419 (12%)

* According to WStatR disposal and treatment operations D9, D8, D11, D13, D14, D15, R12 and R13 are excluded from the reporting obligation, leading to a calculated only statistical gap

Source: EUROSTAT

HW generation per capita

- 147 kg * inh
- EU 28 = 188

HW generation intensity

- 6.1 kg * € 1,000 GVA
- EU 28 = 7.6

Italy

Hazardous waste management

HW imports

- 123 kt / 2014
- Source: EUROSTAT

HW exports

- 670 kt / 2014
- Source: EUROSTAT

Key HW fractions

Italy

- W011 Spent solvents
- W012 Acid, alkaline or saline wastes
- W013 Used oils
- W02A Chemical wastes
- W032 Industrial effluent sludges
- W06 Health care / biological wastes
- Other, 20%
- W013, 9%
- W02A, 17%
- W032, 7%
- W12B, 5%
- W12B_13, 17%
- W103, 6%
- W124, 6%
- W103, 12%

EU 28

- W011 Glass wastes
- W012 Wood wastes
- W017 Waste containing PCB
- W02A Discarded vehicles
- W02A Discarded equipment
- W031 Batteries, accumulators wastes
- W032 Mixed, undifferentiated materials
- Other, 22%
- W013, 5%
- W02A, 13%
- W081, 6%
- W12B, 17%
- W12B_13, 7%
- W12B, 17%
- W12B_13, 7%
- W126, 8%
- W126, 8%
- W121, 9%
- W121, 9%
- W127 Drilling spoils
- W128W Other mineral wastes
- Source: EUROSTAT
Shares of HW generation compared to HW generation intensity by key economic sector

<table>
<thead>
<tr>
<th>Italy</th>
<th>EU 28</th>
</tr>
</thead>
<tbody>
<tr>
<td>38%</td>
<td>149</td>
</tr>
<tr>
<td>212</td>
<td>150</td>
</tr>
<tr>
<td>22%</td>
<td>24</td>
</tr>
<tr>
<td>0.5%</td>
<td>0.8%</td>
</tr>
<tr>
<td>0.2%</td>
<td>13%</td>
</tr>
<tr>
<td>6.7</td>
<td>25%</td>
</tr>
<tr>
<td>3.9%</td>
<td>17%</td>
</tr>
<tr>
<td>5.0</td>
<td>12%</td>
</tr>
<tr>
<td>1.2</td>
<td>9.2%</td>
</tr>
<tr>
<td>1.6%</td>
<td>19%</td>
</tr>
<tr>
<td>EP-HH Households</td>
<td>12%</td>
</tr>
<tr>
<td>4.0%</td>
<td></td>
</tr>
</tbody>
</table>

A - Agriculture, forestry and fishing  
B - Mining and quarrying  
C - Manufacturing  
D - Electricity  
E - Water/waste management  
G - U: Wholesales, Transport, Services  
F - Construction  
EP-HH - Households

Source: EUROSTAT

HW treatment capacities

- Comprehensive network: different types of treatment plants
- #1 plant
- #3 lines in vte (additional capacities also in incineration plants for non-HW)
- #11 (additional capacities also in landfills for non-HW)

HW generation by top 3 manufacturing sectors

- Italy: 3.4 mt (2014)
- EU 28: 23.9 mt (2014)

Manufacture of:
- basic metals / metal products, except machinery / equipment
- chemical, pharmaceutical, rubber and plastic products
- coke and refined petroleum products
- Others

Source: EUROSTAT

Roadmap

Best practice
- Data on HW are available to the public on a very detailed level, both for generation and treatment
- High collection and recycling rate of lead-acid batteries based on an extended responsibility producers scheme in place for 25 years and proven treatment technology
- One of the highest results in waste oil regeneration in Europe in 2014

Further challenges
- Align the significant regional differences in implementation of HW management
- Further to improve activities regarding helpdesks and advice
- Solve problems with practical implementation of the waste registration system (SISTRI)
- Find a solution for the remaining limitations to effective inspections mainly for the large number of small and medium sized companies
- To overcome the lack of clear regulation and implementation of acceptance criteria for depositing HW
5.1.9 Poland

**Key figures compared to EU 28 (according to Eurostat)**

<table>
<thead>
<tr>
<th>HW generation</th>
<th>1,679 kt (2%)</th>
<th>1,877 kt (2%)*</th>
<th>38,011,735 (7%)</th>
<th>3,364,443 (3%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HW treatment as of 2014</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* According to WStatR disposal and treatment operations D6, D9, D11, D13, D14, D15, R12 and R13 are excluded from the reporting obligation, leading to a calculated only statistical gap.

**HW generation per capita**

<table>
<thead>
<tr>
<th>HW generation per capita</th>
<th>44 kg * inh</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU 28 = 188</td>
<td></td>
</tr>
</tbody>
</table>

**HW generation intensity**

<table>
<thead>
<tr>
<th>HW generation intensity</th>
<th>4.6 kg * € 1,000 GVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU 28 = 7.6</td>
<td></td>
</tr>
</tbody>
</table>

**Poland Hazardous waste management**

**HW imports**

117 kt / 2014

**HW exports**

24 kt / 2014

**Key HW fractions**

<table>
<thead>
<tr>
<th>Poland</th>
<th>EU 28</th>
</tr>
</thead>
<tbody>
<tr>
<td>W012; 9%</td>
<td>W013; 5%</td>
</tr>
<tr>
<td>W013; 7%</td>
<td>W02A; 13%</td>
</tr>
<tr>
<td>W12B; 14%</td>
<td>W081; 6%</td>
</tr>
<tr>
<td>W126, 10%</td>
<td>W121; 9%</td>
</tr>
<tr>
<td>W124, 13%</td>
<td>W124; 12%</td>
</tr>
<tr>
<td>W02A; 21%</td>
<td>W128; 8%</td>
</tr>
</tbody>
</table>

Other, 19%

---

**Support to selected Member States in improving hazardous waste management based on assessment of Member States' performance**
**Shares of HW generation compared to HW generation intensity by key economic sector**

<table>
<thead>
<tr>
<th>Poland</th>
<th>EU 28</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.8%</td>
</tr>
<tr>
<td>B</td>
<td>1.0%</td>
</tr>
<tr>
<td>C</td>
<td>4.8%</td>
</tr>
<tr>
<td>D</td>
<td>8.5%</td>
</tr>
<tr>
<td>E</td>
<td>12%</td>
</tr>
<tr>
<td>F</td>
<td>12%</td>
</tr>
<tr>
<td>EP-HH</td>
<td>17%</td>
</tr>
<tr>
<td>G-U</td>
<td>4.0%</td>
</tr>
</tbody>
</table>

- A: Agriculture, forestry and fishing
- B: Mining and quarrying
- C: Manufacturing
- D: Electricity
- E: Water/waste management
- F: Construction
- G-U: Wholesales, Transport, Services
- EP-HH: Households

Shares of HW generated
- HW generation intensity (kg€ 1,000 GVA)

**Source:** EUROSTAT

---

**HW treatment capacities**

- Pre-treatment / Recovery
- R1 / D10
- Landfilling

No specific data available

**HW generation by top 3 manufacturing sectors**

- **Poland:** 0.7 mt (2014)
- **EU 28:** 23.9 mt (2014)

Manufacture of:
- basic metals / metal products, except machinery / equipment
- chemical, pharmaceutical, rubber and plastic products
- coke and refined petroleum products
- EEE, motor vehicles, transport equipment
- Others

**Source:** EUROSTAT

---

**Roadmap**

**Best practice**

- Implementation of separate municipal waste collection is conducted at the local level in the separate waste collection points.
- Incentives for citizens to provide separate municipal HW collection
- Detailed requirements for the operators of HW thermal treatment installations (for details please refer to the factsheet)
- Collection and transport of HW is conducted only by specialized (authorized or permitted) companies.
- National Waste Prevention Program 2014 was elaborated.

**Further challenges**

- Room for further improvement could be identified alongside the entire waste management chain, in particular as regards waste (incl. HW) collection and transportation.
- Lack of a guideline document on waste classification at the national level results in improper waste classification. Problems with proper waste classification are reported by waste holders and waste collection/treatment companies. On the contrary, the Polish authorities state that there is no fact or evidence supporting this statement and that this shouldn’t be regarded as a problem on country level.

---

**Final Report**

Support to selected Member States in improving hazardous waste management based on assessment of Member States' performance
5.1.10 Portugal

**Key figures compared to EU 28 (according to Eurostat)**

<table>
<thead>
<tr>
<th>HW Generation</th>
<th>HW Treatment</th>
<th>Population</th>
<th>Gross Value added at current prices as of 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>462 kt (0%)</td>
<td>175 kt (0%)*</td>
<td>10,401,682 (2%)</td>
<td>€151,365 (1%)</td>
</tr>
</tbody>
</table>

* According to WStatR disposal and treatment operations D6, D9, D11, D13, D14, D15, R12 and R13 are excluded from the reporting obligation, leading to a calculated only statistical gap

**HW generation per capita**

<table>
<thead>
<tr>
<th>44 kg * inh</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU 28 = 188</td>
</tr>
</tbody>
</table>

**HW generation intensity**

| 3.0 kg * € 1,000 GVA |
| EU 28 = 7.6 |

---

**Portugal**

**Hazardous waste management**

**HW imports**

28 kt / 2014

Source: EUROSTAT

**HW exports**

55 kt / 2014

Source: EUROSTAT

**Key HW fractions**

**Portugal**

- **W013**: 10%
- **W02A**: 24%
- **W032**: 12%
- **W041**: 10%
- **W124**: 9%
- **W05**: 5%
- **Other**: 29%

**EU 28**

- **W013**: 5%
- **W02A**: 13%
- **W081**: 6%
- **W12B**: 17%
- **W126_13**: 7%
- **W126**: 8%
- **W124**: 12%
- **W121**: 9%
- **Other**: 22%

Source: EUROSTAT

---

**Final Report**

Support to selected Member States in improving hazardous waste management based on assessment of Member States' performance
Shares of HW generation compared to HW generation intensity by key economic sector

<table>
<thead>
<tr>
<th>Portugal</th>
<th>EU 28</th>
</tr>
</thead>
<tbody>
<tr>
<td>37%</td>
<td>149</td>
</tr>
<tr>
<td>29%</td>
<td>37</td>
</tr>
<tr>
<td>27%</td>
<td>150</td>
</tr>
<tr>
<td>A: Agriculture, forestry and fishing</td>
<td>0.8%</td>
</tr>
<tr>
<td>B: Mining and quarrying</td>
<td>3.9</td>
</tr>
<tr>
<td>C: Manufacturing</td>
<td>11%</td>
</tr>
<tr>
<td>D: Electricity</td>
<td>12</td>
</tr>
<tr>
<td>E: Water/waste management</td>
<td>9.2%</td>
</tr>
<tr>
<td>F: Construction</td>
<td>19%</td>
</tr>
<tr>
<td>G-U</td>
<td>24</td>
</tr>
<tr>
<td>EP-HH: Households</td>
<td>4.0%</td>
</tr>
</tbody>
</table>

A: Shares of HW generated
B: HW generation intensity (kg € 1,000 GVA)

Source: EUROSTAT

HW treatment capacities

- Pre-treatment / Recovery
- No specific data available
- Landfilling

HW generation by top 3 manufacturing sectors

- EU 28: 23.9 mt (2014)
- PT: 0.17 mt (2014)

- Manufacture of basic metals/metal products, except machinery/equipment
- Chemical, pharmaceutical, rubber and plastic products
- Coke and refined petroleum products
- EEE, motor vehicles, transport equipment
- Others

Source: EUROSTAT

Roadmap

**Best practice**
- The APA has issued a Waste Classification Guide that serves as orientation for waste producers in order to avoid misclassifications of waste.
- The electronic record keeping system based on different modules can be very beneficial after its final implementation.

**Further challenges**
- Incorrect classification of HW due to consultation of wrong legislation.
- According to the waste management industry sometimes it is noted that HW is improperly packed when transported, wrongly classified and consequently wrongly labelled and thus sometimes mixed.
- There are cases of improper HW mixing occurring as noted by waste management facilities, but there is no knowledge of sanctions applied to offenders [PT ECODEAL 2017].
5.1.11 Romania

**Hazardous waste management**

### Key figures compared to EU 28 (according to Eurostat)

- **HW generation**
  - 590 kt (1%)
  - 560 kt (1%)*
  - 19,908,979 (4%)
  - €133,044 (1%)

*According to WStatR disposal and treatment operations D8, D9, D11, D13, D14, D15, R12 and R13 are excluded from the reporting obligation, leading to a calculated only statistical gap.

Source: EUROSTAT

### HW generation per capita

- **30** kg * inh
- **EU 28 = 180**

### HW generation intensity

- **4.4** kg * inh / 1,000 GVA
- **EU 28 = 7.6**

---

### Romania

- **HW imports**: 11 kt / 2014
- **HW exports**: 25 kt / 2014

Source: EUROSTAT

### Key HW fractions

#### Romania

- **0.59 mt**
  - W013: 12%
  - W012A: 10%
  - W012B: 19%
  - W020: 6%
  - W03: 5%
  - W041: 10%
  - Other: 12%

#### EU 28

- **95.5 mt**
  - W013: 5%
  - W02A: 13%
  - W03: 11%
  - W041: 7%
  - W042: 14%
  - W06: 17%
  - W12: 9%
  - W12B: 13%
  - Other: 22%

Source: EUROSTAT

---

**Final Report**

Support to selected Member States in improving hazardous waste management based on assessment of Member States’ performance.
Shares of HW generation compared to HW generation intensity by key economic sector

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Romania</td>
<td>11.1%</td>
<td>1.3%</td>
<td>0.8%</td>
<td>3.9%</td>
<td>24%</td>
<td>0%</td>
<td>1.7%</td>
<td>5.1%</td>
</tr>
<tr>
<td>EU 28</td>
<td>0.8%</td>
<td>3.9%</td>
<td>0.8%</td>
<td>3.9%</td>
<td>13%</td>
<td>12%</td>
<td>12%</td>
<td>12%</td>
</tr>
</tbody>
</table>

Shares of HW generated (kg * € 1,000 GVA)

HW treatment capacities

- Pre-treatment / Recovery: n.a.
- # 18 incineration plants
- # 7 cement kilns
- Landfilling: # 11

HW generation by top 3 manufacturing sectors

- EU 28: 23.9 mt (2014)
- RO: 0.18 mt (2014)

Roadmap

**Best practice**
- Creating a software application in order to monitor the traceability of hazardous waste at the national level.

**Further challenges**
- Serious risk of hazardous waste being not classified as such exists in Romania. A reason therefore might be the lack of guidelines/documents for the classification.
- Lack of detailed guideline on how to use the existing record keeping/tracking system and the available voluntary electronic system.
- Unclear legislation on temporary storage of hazardous waste.
- Insufficient enforcement of waste legislation in combination with limited capacity of all involved authorities.

Final Report
Support to selected Member States in improving hazardous waste management based on assessment of Member States’ performance
5.1.12 Spain

**Spain**

**Hazardous waste management**

**HW imports**

214 kt / 2014

Source: EUROSTAT

**HW exports**

43 kt / 2014

Source: EUROSTAT

**Key HW fractions**

Spain

- W011: Spent solvents
- W012: Acid, alkaline or saline wastes
- W013: Used oils
- W02A: Chemical wastes
- W03: Industrial effluent sludges
- W06: Health care / biological wastes

2.98 mt

Source: EUROSTAT

EU 28

- W013: Glass wastes
- W02A: Waste containing PCB
- W032: Discarded vehicles
- W04: Discarded equipment
- W0841: Batteries, accumulators wastes
- W084: Mixed, undifferentiated materials

95.5 mt

Source: EUROSTAT

**HW generation per capita**

64 kg * inh

EU 28 = 188

**HW generation intensity**

3.2 kg * € 1,000 GVA

EU 28 = 7.6
Shares of HW generation compared to HW generation intensity by key economic sector

<table>
<thead>
<tr>
<th>Sector</th>
<th>Spain</th>
<th>EU 28</th>
</tr>
</thead>
<tbody>
<tr>
<td>A - Agriculture, forestry and fishing</td>
<td>1.1 0.8%</td>
<td>0.8% 3.9%</td>
</tr>
<tr>
<td>B - Mining and quarrying</td>
<td>1.0 0.1%</td>
<td>13%</td>
</tr>
<tr>
<td>C - Manufacturing</td>
<td>1.2</td>
<td>25%</td>
</tr>
<tr>
<td>D - Electricity</td>
<td>1.1</td>
<td>4%</td>
</tr>
<tr>
<td>E - Water / waste management</td>
<td>2.0%</td>
<td>17%</td>
</tr>
<tr>
<td>F - Construction</td>
<td>1.1</td>
<td>17%</td>
</tr>
<tr>
<td>G-U</td>
<td>1.2</td>
<td>24%</td>
</tr>
<tr>
<td>EP-HH</td>
<td>1.0%</td>
<td>4.0%</td>
</tr>
</tbody>
</table>

Agriculture, forestry and fishing, Mining and quarrying, Manufacturing, Electricity, Water / waste management, Construction, Education,HK-Households

Shares of HW generated

Source: EUROSTAT

HW treatment capacities

# >595

(>20.6 mt)

Landfilling

Pre-treatment

Recovery

Statistics

HW generation by top 3 manufacturing sectors

Spain: 1.3 mt (2014)

EU 28: 23.9 mt (2014)

<table>
<thead>
<tr>
<th>Sector</th>
<th>%</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacture basic metals / metal products, except machinery / equipment</td>
<td>7%</td>
<td>35%</td>
</tr>
<tr>
<td>Manufacture chemical, pharmaceutical, rubber and plastic products</td>
<td>18%</td>
<td></td>
</tr>
<tr>
<td>Manufacture coke and refined petroleum products</td>
<td>19%</td>
<td></td>
</tr>
<tr>
<td>Manufacture EEE, motor vehicles, transport equipment</td>
<td>27%</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>19%</td>
<td></td>
</tr>
</tbody>
</table>

Source: EUROSTAT

Roadmap

Best practice

- The Register of Production and Waste Management is an electronic register of producers, managers (transporters, dealers, agents), companies carrying out waste treatment and facilities where waste treatment is carried out.
- In parallel, work is being carried out within the framework of a working group with the Autonomous Communities on the establishment of a common electronic procedure for all the Autonomous Communities to ensure the traceability of the waste during its transfer.

Further challenges

- Harmonisation of waste legislation and its enforcement practices between the 17 Autonomous Regions.
- The number of different competent bodies in some cases causes a lack of harmonisation, lack of harmonisation regarding permits and respective criteria.
- Although most of regions have created electronic traceability systems, there is a lack of information exchange between them.
- Inspection and control in industries is carried out by competent bodies. The Spanish government is making efforts to harmonise practices creating a commission to coordinate waste policies implementation.
5.1.13 Sweden

Key figures compared to EU 28 (according to Eurostat)

- HW generation: 2,568 kt (3%)
- HW treatment: 1,093 kt (1%)*
- Population: 21,669,110 (2%)
- Gross Value added at current prices: £m 383,237 (3%)

* According to WStatR disposal and treatment operations D8, D9, D11, D13, D14, D15, R12 and R13 are excluded from the reporting obligation, leading to a calculated only statistical gap

Source: EUROSTAT

HW generation per capita

- EU 28: 188 kg / inh
- EU 28 = 7.6 kg / 1,000 GVA

HW generation intensity

Sweden

Hazardous waste management

HW imports 252 kt / 2014

Source: EUROSTAT

HW exports 321 kt / 2014

Source: EUROSTAT

Key HW fractions

Sweden

- W013: 6%
- W02A: 15%
- W075: 11%
- W081: 11%
- W126: 23%
- W08A: 7%
- Other: 19%

- W126_13: 9%

EU 28

- W013: 5%
- W02A: 13%
- W081: 6%
- W12B: 17%
- W124: 12%
- W126: 8%
- Other: 22%

- W126_13: 7%

Source: EUROSTAT

Final Report
Support to selected Member States in improving hazardous waste management based on assessment of Member States' performance
Shares of HW generation compared to HW generation intensity by key economic sector

**Sweden**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Shares of HW generated</th>
<th>HW generation intensity (kg € 1,000 GVA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A - Agriculture, forestry and fishing</td>
<td>0.8%</td>
<td>13%</td>
</tr>
<tr>
<td>B - Mining and quarrying</td>
<td>3.3%</td>
<td>25%</td>
</tr>
<tr>
<td>C - Manufacturing</td>
<td>4.1%</td>
<td>14%</td>
</tr>
<tr>
<td>D - Electricity</td>
<td>9.8%</td>
<td>24%</td>
</tr>
<tr>
<td>E - Water/waste management</td>
<td>10%</td>
<td>17%</td>
</tr>
<tr>
<td>F - Construction</td>
<td>16%</td>
<td>12%</td>
</tr>
<tr>
<td>G - Transport, Services</td>
<td>10%</td>
<td>12%</td>
</tr>
<tr>
<td>EP_HH-Households</td>
<td>10%</td>
<td>4.0%</td>
</tr>
</tbody>
</table>

Source: EUROSTAT

**EU 28**

<table>
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<td>EP_HH-Households</td>
<td>10%</td>
<td>4.0%</td>
</tr>
</tbody>
</table>

Source: EUROSTAT

**HW treatment capacities**

- **Pre-treatment / Recovery**: # 61 types of treatment plants
- **R1 / D10**: # 17 both, for HW and non-HW
- **Landfilling**: # 24 both, for HW and non-HW

**HW generation by top 3 manufacturing sectors**

- **Sweden**: 0.4 mt (2014)
- **EU 28**: 23.9 mt (2014)

Roadmap

**Best practice**

- Sweden has implemented legislation for all aspects of HW management, which has been supplemented with information directed towards all relevant parties, available from many sources.
- The Swedish EPA is collecting data on HW management through various sources and has also done a number of studies in order to assess the implementation of the legislation as well as to assess the quality of the data generated for HW.

**Further challenges**

- Sweden does not have a centralised reporting system for HW, including PCB containing waste, impeding the generation of reliable figures and to trace the waste through the waste cycle.
- Deficiencies exist in regard to hazardous waste management and classification, in particular among smaller hazardous waste producing companies and accidental misclassification occurs due to a lack of waste assessments.
- Variations occur between municipalities in the scope, frequency and quality of inspections.
5.1.14 United Kingdom

**Key figures compared to EU 28 (according to Eurostat)**

- HW generation: 5,755 kt (5%)
- HW treatment: 2,763 kt (4%)*
- Population: 64,559,135 (13%)
- Gross Value added at current prices: €2,014,931 (16%)

* According to WStatR disposal and treatment operations D6, D8, D11, D13, D14, D15, R12 and R13 are excluded from the reporting obligation, leading to a calculated only statistical gap.

**HW generation per capita**

- 89 kg / inh
- EU 28 = 188

**HW generation intensity**

- 2.9 kg / € 1,000 GVA
- EU 28 = 7.6

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**United Kingdom**

**Hazardous waste management**

**HW imports**

- 137 kt / 2014

**HW exports**

- 332 kt / 2014

---

**Key HW fractions**

**United Kingdom**

- W011: Spent solvents
- W012: Acid, alkaline or saline wastes
- W013: Used oils
- W02A: Chemical wastes
- W03: Industrial effluent sludges
- W05: Health care / biological wastes
- W081: Other; 31%
- W082: Other; 31%
- W086A: Other; 31%
- W12: 6%
- W121: 8%
- W128_13: 7%

**EU 28**

- W013: 5%
- W02A: 13%
- W081: 6%
- W121: 9%
- W124: 12%
- W126: 8%
Shares of HW generation compared to HW generation intensity by key economic sector

**United Kingdom**

<table>
<thead>
<tr>
<th>Sector</th>
<th>HW Generation (kg €1,000 GVA)</th>
<th>Share of HW Generated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture, forestry and fishing</td>
<td>0.8%</td>
<td>4.0%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>13%</td>
<td>5.0%</td>
</tr>
<tr>
<td>Electricity</td>
<td>12%</td>
<td>10%</td>
</tr>
<tr>
<td>Water and waste management</td>
<td>25%</td>
<td>0.8%</td>
</tr>
<tr>
<td>Construction</td>
<td>37%</td>
<td>19%</td>
</tr>
<tr>
<td>EP-HH (Households)</td>
<td>150%</td>
<td>12%</td>
</tr>
</tbody>
</table>

**EU 28**

<table>
<thead>
<tr>
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</tr>
<tr>
<td>EP-HH (Households)</td>
<td>150%</td>
<td>12%</td>
</tr>
</tbody>
</table>

HW treatment capacities

- Pre-treatment / Recovery >30 kt/a
- R1 / D10 >100 kt/a
- Landfilling

HW generation by top 3 manufacturing sectors

<table>
<thead>
<tr>
<th>Sector</th>
<th>UK: 0.9 mt (2014)</th>
<th>EU 28: 23.9 mt (2014)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic metals / metal products, except machinery / equipment</td>
<td>26%</td>
<td>36%</td>
</tr>
<tr>
<td>Chemical, pharmaceutical, rubber and plastic products</td>
<td>18%</td>
<td>19%</td>
</tr>
<tr>
<td>Coke and refined petroleum products</td>
<td>19%</td>
<td>28%</td>
</tr>
<tr>
<td>Others</td>
<td>35%</td>
<td>47%</td>
</tr>
</tbody>
</table>

Roadmap

**Best practice**

- Extensive guidance documents on relevant aspects for HW management
- Producers/collectors have to justify in their consignment notes whether the waste hierarchy was reflected when choosing the further treatment of the waste
- Project “HazDoc” with the aim of developing an electronic system for tracking hazardous waste

**Further challenges**

- Current uncertainties as regards development of the environmental legislation after the UK may have left the EU jurisdiction.
- Correct waste classification is still an ongoing challenge
- Recent changes of record keeping system affected the overview of authority and data quality
- The waste hierarchy is not adequately reflected in the implementation of HW management, e.g., in permitting procedures; hence HW is going to low cost/quality treatment options rather than to BAT solutions in some cases.
5.2 General findings concerning hazardous waste management across the selected Member States

The management of waste streams as different as hazardous household waste, hazardous C&D waste and industrial HW does require different approaches and different treatment infrastructure; it also generates idiosyncratic challenges for each Member State. While some of the challenges are country specific, there are many problems that can be encountered in many of the Member States analysed in the study. Therefore, strategies that have been developed in one Member State to address a challenge may be of interest to other Member States experiencing a similar problem. To properly take this into account, the identified challenges and best practices were grouped. The most common categories of challenges were developed:

- Appropriate waste management planning, considering current and future hazardous waste generation and the available infrastructure / treatment capacity for certain types of HW
- Assisting economic actors in / ensuring correct classification of waste
- Enforcement of waste legislation in general and in particular as regards small and medium sized enterprises (SMEs), i.e. limited capacity for inspections; (e.g. to control the mixing ban) and missing emphasis of the producers’ responsibility for the fate of hazardous waste until final treatment
- Record keeping / tracking; Data gaps and access of public authorities to data due to lack of electronic register infrastructure
- Applying/implementing the waste management hierarchy for HW, in particular for industrial producers of HW

Despite the above-mentioned challenges in implementing EU legislation on hazardous waste in practice, Member States, following our investigations, generally seem to have sufficiently transposed the relevant requirements from EU acquis.

5.2.1 Waste management planning

Relevance

Apart from to the implementation of EU waste legislation by Member States, national waste management planning plays an important role in anchoring the aims and principles of legislation in the national policies and practice of waste management. Recital 1 of EU Waste Framework Directive mentions the national waste management plans as a “key concept” of the legislative framework for the handling of waste in the EU. Furthermore, Recital 37 states that it is necessary to specify further the scope and content of the waste management planning obligation, and to integrate into the process of developing or revising waste management plans the need to take into account the environmental impacts of the generation and management of waste. This chapter will briefly set out the main obligations for Member States regarding waste management planning, and then draws conclusions with regard to the compliance of national waste management plans with these obligations.
Legal framework

Article 28(1) of Waste Framework Directive lays down the obligation for Member States to draw up a waste management plan (WMP):

Member States shall ensure that their competent authorities establish, in accordance with Articles 1, 4, 13 and 16, one or more waste management plans.

Those plans shall, alone or in combination, cover the entire geographical territory of the Member State concerned.

Article 28(2) sets out the general lines for WMPs, which are also applicable to HW:

The waste management plans shall set out an analysis of the current waste management situation in the geographical entity concerned, as well as the measures to be taken to improve environmentally sound preparing for re-use, recycling, recovery and disposal of waste and an evaluation of how the plan will support the implementation of the objectives and provisions of this Directive.

Article 28(3) WFD lays down minimum requirements for WMPs, which are also applicable to HW:

The waste management plans shall contain, as appropriate and taking into account the geographical level and coverage of the planning area, at least the following:

(a) the type, quantity and source of waste generated within the territory, the waste likely to be shipped from or to the national territory, and an evaluation of the development of waste streams in the future;

(b) existing waste collection schemes and major disposal and recovery installations, including any special arrangements for waste oils, hazardous waste or waste streams addressed by specific Community legislation;

(c) an assessment of the need for new collection schemes, the closure of existing waste installations, additional waste installation infrastructure in accordance with Article 16, and, if necessary, the investments related thereto;

(d) sufficient information on the location criteria for site identification and on the capacity of future disposal or major recovery installations, if necessary;

(e) general waste management policies, including planned waste management technologies and methods, or policies for waste posing specific management problems.

Article 28(4) lays down optional elements which Member States may incorporate into their WMPs:

The waste management plan may contain, taking into account the geographical level and coverage of the planning area, the following:

(a) organisational aspects related to waste management including a description of the allocation of responsibilities between public and private actors carrying out the waste management;

(b) an evaluation of the usefulness and suitability of the use of economic and other instruments in tackling various waste problems, taking into account the need to maintain the smooth functioning of the internal market;
(c) the use of awareness campaigns and information provision directed at the general public or at a specific set of consumers;

(d) historical contaminated waste disposal sites and measures for their rehabilitation.

Article 28(5) states that the WMPs shall conform to the waste planning requirements laid down in Article 14 of EU Packaging / Packaging Waste Directive 94/62/EC and the strategy for the implementation of the reduction of biodegradable waste going to landfills, referred to in Article 5 of EU Landfill Directive 1999/31/EC.

In 2009, in a judgment concerning a national WMP\textsuperscript{12}, the Court of Justice of the European Union underlined the relevance of proper waste management planning by ruling that the national WMP of Greece did not comply with the requirements for such a plan under the then Article 7(1) of the previous Waste Framework Directive 2006/12. In addition, the Court further defined some of the obligatory elements which Member States have to incorporate into their WMPs.

The first requirement is linked to the obligation under sub b of paragraph 3 and concerns mapping the geographic location of treatment sites.

“Member States are required to establish under this provision shall contain either”:

a) a map geographic determining the precise location of implantation of such sites,

b) or sufficiently precise criteria for the competent permitting authority to be able to establish whether the site or facility in question is part of the management under the plan.\textsuperscript{13} (With regard to b), these criteria should include:

1. geological and hydrogeological conditions,
2. the distance of such sites from inhabited areas,
3. the prohibition on establishing installations in the vicinity of sensitive areas or
4. the existence of adequate infrastructure, such as connections to transport networks.\textsuperscript{14}

With regard to the above, the CJEU added that the fact that:

“the competent authorities take account of these elements in the context of environmental permits issuance procedure is irrelevant in that regard. It should be recalled that mere administrative practices, which are alterable at will by the authorities and are not given appropriate publicity, cannot be regarded as constituting the proper fulfilment of obligations to transpose a directive.”\textsuperscript{15}

Conclusions

Although Member States have adopted WMPs, in some cases the national (or regional, where applicable) WMPs have to be updated. The quality of WMPs as regards HW is improving, however, ,

\textsuperscript{12} Judgment of 10th September 2009, Commission v Greece, C-286/08, ECLI:EU:C:2009:543
\textsuperscript{13} Ibid, par. 47
\textsuperscript{14} Ibid, par. 49
\textsuperscript{15} Ibid, par. 51
as the recent assessment of the waste management plans\textsuperscript{16} has shown, there remains more room for improvement. The Member State factsheets (see Annex 1) reflect to what extent the national (or respectively regional) WMPs consider hazardous waste in planning. The quality of the planning has not been particular subject to this project; however, in several MS the WMP does not provide an overview of HW generation, HW treatment and disposal capacities (including a list of treatment and disposal centres with their capacity), nor data showing the treatment modalities (recycling, recovery, landfilling, other disposal) or the data is incoherent.

These shortcomings suggest that planning has a large potential for improvement – one important element is in our opinion the lack of reliable data quality, as apparent from the identification of statistical data gaps. Where data quality is poor, no sound basis for solid planning is available (where authorities have access to data on HW generated from electronic registries, or even from electronic tracking systems, this impacts positively the quality of waste management planning).

Good practices on holistic HW management planning can be found e.g. in Germany (see GP 1-1) and for inclusion of particular HW streams in France (see GP 1-2). More good practice examples can be found in Annex 4.

5.2.2 Assessment of statistics on hazardous waste

Relevance

A profound data basis is of substantial interest due to the potential impacts of hazardous waste management on health and environment. Insofar a good traceability of waste from generation by main groups of industries or sectors of the economy to its final treatment is required. Detailed information about hazardous waste generation and composition are the basis for a correct classification and identification of treatment opportunities according to the EU waste hierarchy and could form the basis for investment decisions by relevant stakeholders. Hazardous waste generation and treatment data reflecting real amounts are required to monitor hazardous waste management and to identify achieved progress and remaining challenges, respectively.

Key findings

Statistical data for hazardous waste generation and treatment available at EUROSTAT are based on the data reporting obligation according to the European Waste Statistics Regulation (EC) 2150/2002 (WStatR), applied for the first time for the reporting year 2004. The objective of the European Waste Statistics Regulation is to ensure a better monitoring of the implementation of EU waste policy goals. National statistics reported to Eurostat are based on data collected by administrative sources, surveys (obligatory for businesses with more than 10 employees), statistical estimation procedures or combinations of these means. Specific regulations on data collection on waste generation are part of Annex I, while regulations on data on recovery and disposal of waste are described more in detail in Annex II of the WStatR. Reporting on recovery and disposal of waste is limited to selected recovery

and disposal operations defined in Annexes I and II of Waste Framework Directive. Based on this, disposal and treatment options D8, D9, D11, D13, D14 and D15 as well as R12 and R13 are excluded from the reporting obligation.

Hazardous waste generation

The reference year for the project is 2014. All data are based on data for waste generation and treatment, version as of February 2, 2017. The total amount of hazardous waste (HW) generated by the EU 28 Member States (MS) was 95.5 million tonnes in 2014, referring to 187 kg per inhabitant. Major HW generating countries in absolute terms are Germany (21.8 Mt; 23 % of HW generated by the EU 28 MS), Bulgaria (2.2 Mt; 13 % of EU MS), Estonia and France (each 10.4 Mt; 11% of EU MS) and Italy (8.9 Mt; 9 % of EU MS). The share of the 14 Member states analysed more in detail within this project represents 75 % of the total amount generated (71.9 Mt), on average 164 kg per inhabitant.

The following chart compares hazardous waste generation per capita among the EU 28 MS.

Figure 4: Hazardous waste generation per capita 2014

Source: [EUROSTAT WASGEN 2014]; amount per capita calculated according to [EUROSTAT DEMOGIND 2014]

* data for Portugal are based on version as of October 26, 2017

MS specific data exhibit a greater variance. Considerable outliers were observed for Bulgaria and Estonia. While most of hazardous waste generated in Bulgaria refers to other mineral wastes (summed
up as W12B, consisting of asbestos waste (W122)+ waste of naturally occurring minerals (W123) + various mineral wastes (W125)), in Estonia it is combustion waste (W124) and is estimated to be to a large extend oil shale residues. The lowest HW generation per capita was observed for Greece with 20 kg *per capita. At a relevant lower level compared to the EU average are also Romania (30 kg per inhabitant), Portugal and Poland (each 44 kg per inhabitant).

The indicator ‘hazardous waste generation per capita’ allows for a certain comparability between MS. It has to be noted, that any assessment should not be limited to the simple comparison of HW generated per capita. Whereas a detailed analysis is needed for each MS in particular, hazardous waste generation per capita provides a first indication about the situation in a MS. In particular, below-average hazardous waste generation17 in countries with an average or above-average output could be seen as an indication that the amount of hazardous waste is underreported or that some hazardous wastes are wrongly classified as non-hazardous. However, only an in-depth analysis could allow deriving firm conclusions.

Hazardous waste composition

As presented in the following figure, the major hazardous waste type generated by the EU 28 Member States is mineral waste summing up to 52.1 Mt in 2014 (54 % of total hazardous waste generated). Mineral waste fractions can be distinguished: from construction & demolition, soils, mineral wastes from treatment, combustion waste, dredging spoils and other mineral waste.

With a share of 13 % (12.4 Mt) of total hazardous waste generated, chemical wastes are the second major group.

![Hazardous waste composition 2014](image)

Figure 5: Hazardous waste composition 2014

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17 after deduction of the mining waste generation which should be analysed separately not to distort the analysis with the very high amount of HW generated by mining sector
Hazardous waste composition varies among the analysed selected 14 EU MS, depending mainly on the industry structure of the country. Detailed information can be found in the country specific factsheets in Annex 1 to this report. The following observations for the 14 EU MS can be made:

- The Top 3 generated HW fractions are responsible on average for half of the total amount of HW generated within the country.
- In BG and CY, other mineral wastes are the dominating waste fraction with a share of 98% (11.9 Mt) and 81% (0.1 Mt) respectively of the total amount generated within the country.
- Relevant shares of mineral waste were generated also in:
  - DE with mineral waste from construction and demolition (W121) with 22% of the total amount generated within the country, 4.7 Mt and mineral waste from waste treatment and stabilised waste (W128_13) with 12%; 2.6 Mt,
  - RO (other mineral waste (W12B), 19%; 0.6 Mt),
- IT (mineral waste from waste treatment and stabilised waste (W128_13): 1.5 Mt; 17%,
  - Soils (W126) belong to the Top 3 HW fractions in SE (23%; 0.6 Mt), BE (22%; nearly 0.7 Mt), CZ (19%; 0.2 Mt), FR (18%; 1.9 Mt) and RO (14%; 0.1 Mt),
  - Combustion waste (W124) belong to the Top 3 HW fractions in GR (18%; 0.04 Mt), ES (10%; 0.3 Mt) and PL (13%; 0.2 Mt).
- In 11 (except BG, CY, RO) of the analysed 14 MS chemical waste (W02A) generated belongs to the Top 3 HW fractions generated. The shares vary between 12% (DE) and 24% (PT) of the total HW amount generated within the country.
- HW from discarded vehicles (W081) belong to the Top 3 HW fractions in the UK (29% of the total amount generated within the country; 5.8 Mt), BE (12%; 0.4 Mt), FR (13%; 1.4 Mt), IT (12%; 1.1 Mt), SE (12%; 0.3 Mt).

Hazardous waste treatment compared to generation

A challenge of the project was the comparison of statistical data for hazardous waste generation and treatment, as the exclusion of selected R and D procedures from reporting obligation leads to a distorted picture of a ‘statistical gap’ of Eurostat based data. In order to fill the reporting gap, national statistics were analysed and relevant national authorities contacted for additional information. The following table presents a brief overview of the identified statistical data gaps between HW generation and treatment according to EUROSTAT data and national statistics. It further gives indications on the reasons for differences between EUROSTAT and national data and the argumentations to explain the statistical gap between HW generation and treatment. A detailed analysis of the reasons for the gaps can be found in the factsheets in Annex 1 to this report.
Table 1: Overview on data completeness for hazardous waste generation and treatment according to EUROSTAT and national statistics

<table>
<thead>
<tr>
<th>EU MS</th>
<th>Statistical gap* according to EUROSTAT</th>
<th>Statistical gap according to national statistics</th>
<th>Comments on difference between EUROSTAT and national statistics</th>
<th>Explanation of data gap</th>
<th>Assessment**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>33% (947 kt)</td>
<td>N/A</td>
<td>Lack of additional national statistics</td>
<td>Import, pre-treatment</td>
<td></td>
</tr>
<tr>
<td>Bulgaria</td>
<td>1% (72 kt)</td>
<td>48% (57 kt)</td>
<td>Different accounting of extractive HW</td>
<td>Intermediary operations, pre-treatment</td>
<td></td>
</tr>
<tr>
<td>Cyprus</td>
<td>10% (19 kt)</td>
<td>N/A</td>
<td>Lack of additional national statistics</td>
<td>Storage</td>
<td></td>
</tr>
<tr>
<td>Czech Republic</td>
<td>48% (557 kt)</td>
<td>CZSO: 46% (-536 kt) CENIA: 59% (932 kt)</td>
<td>Two different national statistics, different reporting obligations</td>
<td>Storage, change of waste properties and consistency</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>16% (1,622 kt)</td>
<td>24% (2,591 kt)</td>
<td>No explanation given</td>
<td>Storage, change of waste consistency, inaccurate reports on imports/exports</td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>13% (3,181 kt)</td>
<td>12% (3,147 kt)</td>
<td>Change of waste properties and consistency</td>
<td>Import/export, excluding certain recovery/disposal operations</td>
<td></td>
</tr>
<tr>
<td>Greece</td>
<td>-80% (-51 kt)</td>
<td>N/A</td>
<td>Lack of additional national statistics</td>
<td>Storage, double counting, methodological approaches, pre-treatment</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>57% (4,802 kt)</td>
<td>-3% (-245 kt)</td>
<td>Different methodological approaches and reporting obligations</td>
<td>Storage, classification of HW</td>
<td></td>
</tr>
<tr>
<td>Poland</td>
<td>-6% (-104 kt)</td>
<td>-9% (-174 kt)</td>
<td>Small difference, though not explained</td>
<td>Classification of HW, storage, pre-treatment</td>
<td></td>
</tr>
<tr>
<td>Portugal</td>
<td>37% (259 kt)</td>
<td>4.8% (22 kt)</td>
<td>EUROSTAT data exclude certain treatment operations</td>
<td>No explanation</td>
<td></td>
</tr>
<tr>
<td>Romania</td>
<td>13% (75 kt)</td>
<td>N/A</td>
<td>Lack of additional national statistics</td>
<td>Intermediary operations</td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>26% (834 kt)</td>
<td>-15% (-285 kt)</td>
<td>National data exclude certain economic sectors</td>
<td>Storage, double counting</td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>58% (1,486 kt)</td>
<td>-9% (-235 kt)</td>
<td>Different reporting obligations</td>
<td>Rounding differences, confidential data, management issues</td>
<td></td>
</tr>
<tr>
<td>United Kingdom</td>
<td>50% (2,798 kt)</td>
<td>31% (1,350 kt)</td>
<td>Different counting approaches</td>
<td>Double counting, intermediate treatment</td>
<td></td>
</tr>
</tbody>
</table>

* The statistical gap [in kt] is calculated as $\sum_{\text{HW}} \text{statistical gap} = \sum_{\text{HW}} \text{to be treated within the country} - \sum_{\text{HW}} \text{treatment statistically recorded}$, whereas $\sum_{\text{HW}} \text{to be treated within the country} = \sum_{\text{HW}} \text{generated} - \sum_{\text{HW}} \text{exported} + \sum_{\text{HW}} \text{imported}$

The share of the statistical gap [in %] was calculated as $\frac{\sum_{\text{HW}} \text{statistical gap}}{\sum_{\text{HW}} \text{to be treated within the country}}$

** Green: No/Small gap remains, Yellow: Gap remains partly, Red: Large gap remains

Source: [EUROSTAT WASGEN 2014], [EUROSTAT WASSHIP 2014], national statistics according to data sources presented in the country specific factsheets in Annex 1 to this report

For a comprehensive assessment of the remaining statistical gaps further aspects must be considered. Due to different specific causes it will not be possible to obtain fully consistent generation and treatment data. The principal reasons being:
• limited reporting obligations according to Annex II WStatR as the main reason for the statistical gap when using Eurostat data,
• different data collection methodologies, responsibilities and data sources for data collection on hazardous waste generation and treatment,
• impact of pre-treatment operation leading to a change of classification from hazardous to non-hazardous waste,
• amounts of hazardous waste temporarily stored,
• data reporting in dry or wet conditions,
• data on import and export of hazardous waste are based on the ‘Joint questionnaire of Basle Convention and Eurostat’, leading to original reporting according to Basle Y codes, where information based on EWC codes are added only on a voluntary basis; additionally, for some positions hazardous waste and non-hazardous waste are summed up.

Nevertheless, based on the analysis and assessment of national HW statistics and taking into consideration the above-mentioned aspects, the following can be highlighted:

• For 8 of the 14 analysed MS, national statistics (mostly only publicly available information) were made available, allowing for a gap calculation. Some MS have slightly different national systems, not corresponding in every detail to the Eurostat reporting system, thus hampering a comparison.
• BG, CY ES, FR, GR, RO could not provide additional national statistics covering the treatment and disposal operations not included in Eurostat.
• Statistical gaps for CY and PL are with up to 10 % of minor relevance. It can be assumed, that remaining differences could be explained – among others – by the above-mentioned reasons.
• Considering the total amount, BG has a lower statistical gap too. For BG of course, it has to be noted, that – excluding extracting HW – the gap for the remaining HW fractions is with 48 % significantly higher; reasons could not be fully identified.
• For IT, PT and SE the statistical gap according to EUROSTAT could be explained with additional national statistics.
• The statistical gap for the UK could be reduced with additional data from national statistics, the remaining statistical gap of 31 % still leaves room for further search for reasons.

Hazardous waste intensity

HW generation compared to economic production is an important indicator enabling a first indicative assessment of the waste intensity of production and consumption within the MS, an assessment by key economic sector and to derive goal oriented targets. Monitoring the indicator ‘waste intensity’ over a certain time allows further assessments, e.g. whether there has been any decoupling of waste generation from economic growth. The comparability between MS is to a certain extent limited, as additional structural information have to be considered.
The following Figure 6 summarizes the waste intensity for EU 28 MS; calculated as HW generation compared to gross added value (GAV) at current prices/2014 (for any monitoring constant prices should be used).

![Figure 6: Hazardous waste generation intensity](image)

Source: [EUROSTAT WASGEN 2014]; [EUROSTAT nama_10_a64 2014]

* data for Portugal are based on version as of October 26, 2017

A detailed presentation of waste intensity by key economic sector for the 14 MS analysed in detail can be found in the country specific summary factsheets in chapter 5.1 of this report. Additionally, the following Figure 7 depicts the hazardous waste intensity for manufacturing and construction industry in the selected Member States.
According to data available for 2014 the following conclusions can be drawn:

- The average waste intensity for all EU 28 MS amounts to 7.8 kg per 1,000 € GAV at current prices.
- BG and EE are the MS with the highest waste intensity driven mainly by the specific situation of the large amount of mineral waste in BG and combustion waste in EE. Excluding the outliers for BG and EE the average waste intensity for the EU MS amounts to 5.8 kg per 1,000 € GAV.
- Excluding the outliers for BG, waste intensity amongst the 14 analysed MS varies between 1.4 kg per 1,000 € GAV at current prices for GR and 11.3 kg per 1,000 € GAV at current prices for CY.
- The highest waste intensity across EU 28 MS was observed for the NACE industry sector B - Mining and Quarrying (149 kg per 1,000 € GAV) and E - Water and Waste Management (150 kg per 1,000 € GAV). Waste intensity in sectors B - Mining and Quarrying is to a relevant extend impacted by the extremely high values for BG (12,320 kg per 1,000 € GAV).
- Waste intensity by industry sector E - Water and Waste Management shows relevant higher values than on EU 28 average in the following countries: CZ (270 kg per 1,000 € GAV), DE
Waste intensity in sector C - Manufacturing amounts on EU average to 12 kg per 1,000 € GAV. While the waste intensity in CZ (13 kg per 1,000 € GAV), FR (12 kg per 1,000 € GAV), PL (10 kg per 1,000 € GAV), DE (8 kg per 1,000 € GAV) and SE (7 kg per 1,000 € GAV) is around or below EU 28 average, BE and BG have a significantly higher waste intensity (21 and 31 kg per 1,000 € GAV respectively).

The most important industry sectors\[\text{18}\] within the EU are the manufacture of basic metals / metal products, except machinery/equipment (NACE C24–C25), of chemical, pharmaceutical, rubber and plastic products (NACE C20–C22) and of coke and refined petroleum products (NACE C19). They are responsible for 82% of all waste generated by the industry sector C - Manufacturing. In selected MS like DE, GR, RO, PL, SE, CZ also the manufacture of computer, electronic and optical products, electrical equipment, motor vehicles and other transport equipment (NACE C26–C30) contribute a relevant share to HW generation.

Given the diversity of HW, it is not surprising, that each of the investigated Member States has its own ‘profile’ in terms of generation and treatment of HW. Overall, the picture is distinctively diverse, showing no clear patterns even in countries with similar economic conditions.

The information value based on the indicator alone is to a certain extend limited. For a comprehensive assessment as per MS and for the comparison between MS – of course – further additional information needs to be considered, such as e.g. country specific industry structure, product portfolio and cost structure or waste management systems etc.

**Conclusion and suggestions**

The ability to monitor hazardous waste management based on a profound data basis from generation to treatment varies between MS. Not all MS were able to present relevant data on hazardous waste treatment operations which are not part of reporting obligations according to WStatR.

Monitoring of HW management is limited to EUROSTAT figures only; additional national statistics are required to complete the picture and draw the right conclusions. It is therefore recommended, to include all R and D procedures, without any exemptions to the reporting obligation according to the WStatR. Its in addition recommended to include in the Quality reports additional information regarding MS specifics, e.g. on temporarily storage, specific pre-treatment operations leading to a change of classification from hazardous to non-hazardous waste.

Member States operating an electronic reporting system partly connected to notification and/or consignment notes have a smaller statistical gap or, if there is a gap, it can be sufficiently explained. In MS where the statistical gaps could not be explained – even when taking account all reasons explaining the differences of data – it can be concluded that there is poor reporting for HW actions and no full record/control of those actions.

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\[\text{18}\] classification according to statistical classification of economic activities in the European Community. NACE Rev. 2
In general, it can be concluded that the data reporting basis and publicly available data on HW in several MS need to be significantly improved. Hence, we recommend that Member States should perform plausibility checks as regards specific hazardous waste generation (per capita — e.g. for household waste- or per produced unit — e.g. for industrial chemical waste) and investigate in case of persistent statistical gaps and/or suspiciously low production of hazardous waste in a given sector or among regions.

This observation is strongly linked to the improvement of record keeping systems (chapter 2.2.7) It is recommended to verify if the record keeping system can be directly linked to statistical reporting procedures.

5.2.3 Classification of hazardous waste

Relevance

Proper waste classification is the necessary pre-requisite for a proper HW management. The classification of a waste as hazardous triggers the application of specific obligations as required in the WFD. Furthermore, the correct classification of HW is essential for the gathering of reliable data with regard to inter alia the amounts of HW produced, the most significant HW streams and the shipment of HW streams between MS. Finally, as discussed in chapter 5.2.7, the European Commission in its circular economy action plan [CEAP 2015], underlined the importance of waste management for the way in which the waste hierarchy is put into practice. Within this context, correct classification of HW is important because the correct and safe handling of HW contributes to toxic-free recycled material streams, which in turn is to boost the European market for secondary raw materials as envisaged by the Commission.

Legal framework

Hazardous waste is defined in Article 3 of the WFD as waste which displays one or more of the hazardous properties listed in Annex III. Subsequently, Annex III of the WFD distinguishes 15 different hazardous properties. These properties are, to an extent, elaborated in the Annex itself. Furthermore, the European Commission is about to publish a guidance document on the classification of hazardous waste. Basis for this guidance document will be [BiPRO 2015].

The methodology for identification of waste as hazardous has been linked to entries under the European List of Waste. The entries under the LOW categorise waste streams according to the source and type. Within this list, any entry marked with an Asterisk (*) will be considered to be hazardous per se. Therefore, waste which has a composition that corresponds to an entry marked with an asterisk shall be considered hazardous. All other entries will be considered non-hazardous.

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To identify the applicable entry of the LoW, the appropriate entry of the LoW needs to be assessed for the waste in question, taking into account that specific entries at Member States level may have been introduced in the legal document at national level reflecting the EU LoW. Subsequently, it needs to be assessed which of the following type this entry is:

- **Absolute hazardous (AH) entry (marked with an asterisk (*))**
  Wastes which are assigned to AH entries cannot be allocated to alternative entries and are hazardous without any further assessment. In case an AH entry is assigned, the waste will be classified as hazardous and no further assessment is needed.

- **Absolute non-hazardous (ANH) entry**
  Wastes which are assigned to ANH entries cannot be allocated to alternative entries and shall be classified as non-hazardous without any further assessment. In case an ANH entry is assigned, the waste will be classified as non-hazardous and no further assessment is needed.

- **Mirror entry**
  Mirror entries are a pair of at least two alternative entries. In contrast to AH or ANH entries, if waste is to be allocated to a pair of alternative entries, further steps in the assessment for allocation have to be undertaken. Paired alternatives are:

  - Mirror hazardous (MH) entry (marked with an asterisk (*))
  - Mirror non-hazardous (MNH) entry

For mirror entries, the holder will have to assess if the waste displays any of the hazardous properties based on the knowledge of the waste’s composition. This can be done by either calculating if certain threshold limits of hazardous substances under the various hazardous properties are exceeded or testing whether the waste displays any of the hazardous properties.

For a more elaborate explanation on the methodology for the classification of hazardous waste, please refer to [BiPRO 2015] as mentioned above.

**Challenges**

The collected information has shown that HW operators and competent authorities in MS are facing challenges with regard to the correct classification of hazardous waste. Misclassification seems to occur throughout the HW management chain, from producers of HW and intermediaries up to the treatment operators. The reasons given for the occurrence of non-classification or misclassification vary per Member State. Some Member States mention a lack of clarity in the list of waste. For example, some of the categories of HW in the list of waste are not clearly defined. For this reason, waste holders sometimes do not find a suitable waste code to assign to the waste. In addition, for those wastes that could either be classified as hazardous or non-hazardous according to the list of waste, a good knowledge of their composition is needed (alternatively, tests can be performed), which cannot be always taken for granted.

For the mentioned reasons of misclassification, the good practices (see Annex 4) concerning guidance on the correct classification of HW on EU level (see GP 2-3), in the United Kingdom (see GP 2-1) and Belgium (Flanders) (see GP 2-4) may offer solutions. Other good practices could be the Waste
Management Officers in Germany (see GP 2-2), as well as the regional waste advisors and the promotion of guidance material in the United Kingdom (see GP 2-1, GP 2-5, GP 2-7).

In addition, some Member States report a variation of waste classification in different regions. The number of different competent bodies causes differences in the criteria that are considered when classifying HW. This means that the same type of waste can be considered to be HW or Non-HW depending on the region where it is classified which is also a cause for misclassifications.

Finally, some Member States mentioned that wrong legislation or guidelines from other Member States are consulted for the determination of the classification of HW. With regard to the latter, the translation of guidelines into the national language can lead to difficulties.

With regard to these challenges, the holistic framework, addressing regional differences in the UK (see GP 2-5) may provide perspectives. Other possible good practices could be found with regard to the national working groups in Germany and Belgium (see GP 2-6) as examples for own national guidance instruments and efforts to harmonise classification practice.

More good practice examples can be found in Annex 4.

**Conclusions**

Correct classification of wastes is important as the classification of a waste as hazardous has a significant impact on the fate of that waste. There is a number of obligations related to HW management in EU legislation. Correct classification is of utmost importance as misclassification can cause HW to enter treatment routes foreseen for non-hazardous waste, hampering the control possibilities for authorities and lead to an underestimation of the total hazardous waste generation. The collected data indicates that the classification of hazardous waste constitutes an important challenge for many of the analysed Member States.

In particular, lack of clarity with regard to the application of the definition and varying methods of application would require more attention. Good practices from various Member States with regard to the provision and promotion of guidance material, as well as enhanced coordination between the national authorities applying the HW definition, as well as helpdesks that can be contacted in case of doubt, may offer solutions.

5.2.4 System of waste-related inspections

**Relevance**

Recital 45 of the Waste Framework Directive states that Member States should provide for effective, proportionate and dissuasive penalties to be imposed on natural and legal persons responsible for waste management, such as waste producers, holders, brokers, dealers, transporters and collectors, establishments or undertakings which carry out waste treatment operations and waste management schemes, in cases where they infringe the provisions of the Directive.
As one of the three pillars of enforcement of waste legislation, inspections play an important role with regard to discovering and proving breaches of the legal provisions on HW. Together with the two other pillars, shared responsibility within the waste management chain (see chapter 5.2.5 and record keeping and tracing (chapter 5.2.6), inspections provide competent authorities with an up-to-date overview of the actions of HW actors.

In its 7th Environmental Action Programme, the EU has concluded that the benefits of Union environment legislation can be maximised by improving its implementation. Within this context, there is a need to equip those involved in implementing environment legislation at Union, national, regional and local levels with the knowledge, tools and capacity to, inter alia, improve the enforcement process.

It is not the aim of this chapter to provide an in-depth analysis of the enforcement systems in Member States (note that various projects, such as the Environmental Implementation Review (EIR)\(^\text{20}\) and the “Make it Work”\(^\text{21}\) initiative are already being conducted, covering the enforcement of environmental legislation on the Member State level, and seek to overall foster a high level of smart enforcement commonly applied in the EU). Rather, this chapter will provide a general overview of the collected information with regard to aspects of enforcement. Furthermore, this chapter will list the main challenges which are faced by Member States and good practices of specific MS will be highlighted.

**Legal framework**

The main obligation for Member States with regard to the enforcement of the provisions of the WFD on waste, and therefore also HW, has been laid down in Article 34 WFD:

1. *Establishments or undertakings which carry out waste treatment operations, establishments or undertakings which collect or transport waste on a professional basis, brokers and dealers, and establishments or undertakings which produce hazardous waste shall be subject to appropriate periodic inspections by the competent authorities.*

2. *Inspections concerning collection and transport operations shall cover the origin, nature, quantity and destination of the waste collected and transported.*

3. *Member States may take account of registrations obtained under the Community Eco-Management and Audit Scheme (EMAS), in particular regarding the frequency and intensity of inspections.*

Furthermore, Article 36 WFD creates an obligation for MS to sanction the non-adherence to the obligations under the WFD with effective, proportionate and dissuasive sanctions.

1. *Member States shall take the necessary measures to prohibit the abandonment, dumping or uncontrolled management of waste.*

2. *Members States shall lay down provisions on the penalties applicable to infringements of the provisions of this Directive and shall take all measures necessary to ensure that they are implemented. The penalties shall be effective, proportionate and dissuasive.*

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\(^{21}\) [IEEP 2018], [http://minisites.ieep.eu/work-areas/environmental-governance/better-regulation/make-it-work](http://minisites.ieep.eu/work-areas/environmental-governance/better-regulation/make-it-work)
Within the broader context of enforcement of EU waste law, the case law of the CJEU provides for an additional relevant requirement for the enforcement of the provisions on HW management.

In a case concerning the inspection arrangements in a Member State regarding permits for the regeneration and use of waste oil, the CJEU established an obligation for Member States to provide for periodical inspections:

“by not providing, within the prescribed period, for periodical inspection of undertakings which regenerate waste oils or use them as fuel, or for examination of trends in the state of technical development and/or of the environment with a view to revising, where necessary, permits granted to those undertakings”

The CJEU consequently concluded that the Member State had failed to fulfil its obligations under [the previous Waste Oils Directive 75/439/EEC].

This finding of the court excludes the possibility of basing the enforcement of HW provisions on a system of incidental inspections [BiPRO 2012].

While Articles 34, 36 and the applicable CJEU case law lay down a clear obligation for MS to establish a system of enforcement and penalties, the wording of these Articles remains general, leaving room for MS to determine the mode of implementation. The resulting variation of enforcement practices in the Member States is discussed in the paragraphs below.

**Findings**

**Allocation of enforcement responsibilities**

The wording of Article 36 WFD does not specify the authority which should be competent to enforce regulations with regard to HW on the MS level. However, the collected data does not show a great diversity in the way this element of Article 36 WFD has been implemented. Almost every MS has allocated the competence to enforce HW regulations on a decentralized level (Federal state, province, municipality, etc.). In such a case, the decentralized regions have usually established one competent authority. In some MS, such as Italy and Bulgaria, enforcement is a shared competence of multiple decentralized inspection agencies. The table below shows the allocation of enforcement competence in Member States.

<table>
<thead>
<tr>
<th>Member State</th>
<th>Competent authority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium-Brussels</td>
<td>The division “Inspection and polluted soils” of the regional environmental administration “Brussels Environment” (Leefmilieu Brussel)</td>
</tr>
</tbody>
</table>

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23 Ibid, par. 213
25 Romania has allocated the enforcement of HW to a national enforcement authority, the National Environmental Guard (NEG)
| Belgium-Flanders | The Environmental Enforcement Decree establishes a regional inspection body (OVAM). Inspectors on the municipal level are appointed. |
| Belgium-Walloon | Department of Police and Control |
| Bulgaria | 16 Regional Inspectorates for Environment and Water (RIEW) |
| Cyprus | Inspector General and Inspectors are appointed by the Minister of MARDE |
| Czech Republic | Czech Environmental Inspectorate (CEI). The Ministry of Environment, regional authorities, districts offices and local councils also have the authority to perform inspections |
| France | In principle the French Ministry for an ecological and solidary transition (MEST) or the prefects are responsible. In practice the routine inspections are frequently initiated by the Directions Régionales de l'Environnement, de l'Aménagement et du Logement (DREALs) themselves |
| Germany | Responsibilities are defined by each of the 16 Länder, involving different competent authorities. |
| Greece | A variety of authorities is responsible: |
| | - The environmental inspectors body of the MoE |
| | - the permit-issuing authorities (responsible for inspections during the permit issuing period) |
| | - competent authorities of regions (for installations under their jurisdiction) |
| | - environmental inspectors (registered in a record kept by the MoE) |
| Italy | Environmental protection unit of the Carabinieri and by provincial authorities. Controls are carried out by the public authorities (e.g. Regional governments, Regional protection agencies ARPA, Forestry Authority, Financial police, Harbour authorities, Police department for environment) |
| Poland | Inspectorate of Environmental Protection via Chief Inspectorate of Environmental Protection and 16 Regional Inspectorates of Environmental Protection |
| Portugal | Regional Waste Authorities (ARR), currently represented by Regional Coordination and Development Committees (CCDRs), Municipalities and police authorities. In Azores, HW is inspected by Regional Environmental Inspection agency |
| Romania | Representatives of the National Environmental Guard (NEG) (which is subordinated to the Ministry of Environment). |
| Spain | Regional competent bodies for inspections who also establish inspection programmes, plans and are responsible for their implementation |
Object of enforcement

Paragraph 1 of Article 34 specifies the actors within the waste management chain which shall be subject to appropriate periodic inspections by the competent authorities. During discussions with competent authorities and stakeholders, including feedback from the seminars, it became evident that Member States consider the inspection of SME’s producing HW or involved in its management chain as an important issue for future focus. In particular the inspection and control mechanisms for intermediate actors such as waste collectors, dealers and/or brokers is perceived to be insufficient whereas large waste producer and large treatment operators are adequately covered by the authorities control framework.

In addition, some Member States have indicated that their inspection efforts could cover more parts of the HW management chain more intensively. This issue could be connected to the structure of national HW tracing systems. As will become apparent in chapter 5.2.6, some tracing systems do not always cover all steps within the HW management chain.

Style of enforcement

The collected data shows two main ways in which enforcement agencies determine their enforcement strategies:

- The hazard-based approach focusses on the installations/actors which pose the highest potential damage to human health and the environment in the case of non-compliance. The data shows that MS apply such an approach by, for example, focusing on:
  - Selecting a certain type of facility (IED or not)
  - The type of waste processed
  - The capacity and size of the facility.

- The risk-based approach focusses on the likelihood of infringement of HW regulations. The data shows that MS apply such an approach by, for example, focusing on:
  - The “history” of a facility with regard to compliance to HW regulation
  - Facilities that have never been inspected.
An example of risk-based enforcement can be found in the UK where the competent authorities operate the so-called OPRA\textsuperscript{26} system to allow it to assess the relative environmental risk of permitted site-based activities; this is a tool to target its regulatory effort into the higher-risk activities and poor performers, resulting in more site inspections to ensure less environmental risk. All activities are set into one of three tiers; Tier 1 for simple activities with a very small or no risk of impact on the environment. Tier 2 and 3 are for permitted activities and are judged by a compliance rating which allows the Environment Agency to ascertain the number of visits and cost of permit required. The compliance rating allows the Regulator to plan the amount of resources it will make available, report on how the site is performing and reflect performance in the charges required for the forthcoming year.

France, Sweden and the UK apply systems of self-monitoring which complement the enforcement efforts:

- In France, the authorisation order of an installation may prescribe a permanent verification by the operator of its discharges and/or its impact on the environment, called self-monitoring. The results, together with a comment on their compliance with the limit values applicable to the installation, must be sent to the inspection of the classified installations.
- In Sweden, all companies with environmentally hazardous activities must run a sufficient control of themselves in accordance with the obligations stated in Ordinance on Operator’s Self-monitoring [SE FVE 1998]. This Ordinance contains specific rules applicable for professional activities that require a permit or activities for which environmental reporting is compulsory.
- In the UK, under the ‘duty of care’, regular internal audits are established. The same applies for ISO 9001 and 140001 certified facilities (majority of ESA facilities). Under the permitting system all waste facilities must have a management system preferably certified (i.e. ISO 14001) [UK ESA 2015b].

\textit{Frequency of inspections}

As described in the section on the legal framework, CJEU case law has established an obligation for Member States to carry out periodic inspections. This finding of the court excludes the possibility of basing the enforcement of HW provisions on a system of incidental inspections [BiPRO 2012].

With regard to the frequency of inspections, a distinction ranges between the categories: incidental, once per year, once per multiple years.

Table 3: Frequency of inspections in the selected Member States

<table>
<thead>
<tr>
<th>Member State</th>
<th>Frequency of inspections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium-Brussels</td>
<td>No frequency reported</td>
</tr>
<tr>
<td>Belgium-Flanders</td>
<td>No frequency reported</td>
</tr>
</tbody>
</table>

26 Environmental Permitting Regulations Operational Risk Appraisal
<table>
<thead>
<tr>
<th>Member State</th>
<th>Frequency of inspections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium-Wallonia</td>
<td>At least once per year</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>At least once per year</td>
</tr>
<tr>
<td>Cyprus</td>
<td>No frequency reported</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>Once per multiple years</td>
</tr>
<tr>
<td>Germany</td>
<td>Multiple times per year</td>
</tr>
<tr>
<td>Greece</td>
<td>Periodic and incidental, frequency depends on waste type</td>
</tr>
<tr>
<td>France</td>
<td>HW landfills and incinerators: once per year; other types: once per multiple years</td>
</tr>
<tr>
<td>Italy</td>
<td>Periodic, frequency regarding a particular case is decided by authorities</td>
</tr>
<tr>
<td>Poland</td>
<td>Depending on annual inspection plan</td>
</tr>
<tr>
<td>Portugal</td>
<td>Frequency of inspections at establishments carrying out waste operations varies according to the procedures adopted by the different bodies</td>
</tr>
<tr>
<td>Romania</td>
<td>Depending on annual inspection plan</td>
</tr>
<tr>
<td>Spain</td>
<td>No frequency reported</td>
</tr>
<tr>
<td>Sweden</td>
<td>Once per multiple years; if companies represent an environmental risk, once per year</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>Multiple times per year</td>
</tr>
</tbody>
</table>

**Challenges**

With regard to the allocation of enforcement responsivities Member States such as Germany and Spain, have indicated that the harmonization and coordination of the various decentralized enforcement efforts remains a challenge. This highlights the need for enhanced communication between the different authorities. In this regard, the good practice from Germany (see GP 3-7) on national enforcement working groups may provide solutions. In addition, the good practice of coordinated access to national environmental inspections and enforcement data, as currently studied by the Swedish EPA, may also provide interesting options. Finally, the developments in Bulgaria with regard to decentralized inspections with centralized requirements deserve mentioning as a good practice (see GP 3-2).

In some Member States there are complaints from industry with regard to the communication between them and the competent authorities. Companies complain that communication with authorities is lacking. In the Czech Republic, industry has indicated that it would like to see the role of CEI not only as authority imposing sanctions but additionally also as authority giving methodological support. In Germany, a representative of the waste industry has indicated that the communication between authorities and treatment operators could be improved. A good practice example as regards communication can be found within the context of the Netherlands’ strategy “a circular economy in the Netherlands by 2050” where the Netherlands have decided to establish an “enforcement dialogue” between policymakers, inspectorate and entrepreneurs to discuss legal and policy obstacles for circular business cases and potential solutions (see GP 3-8).
With regard to the object of inspections, the data indicates that some systems of inspection are not focussing on the most relevant groups of operators. Some MS have indicated that more attention could be given to the inspection of SME’s which are involved in the treatment of HW. With regard to this category, certain Member States have indicated that the big number of SME’s renders enforcement challenging. Other Member States are facing challenges in acting against the informal operators, which are understood as operators not having an official authorisation.

With regard to these challenges, the current practices of Member States within the context of risk-based enforcement, as described in this chapter, may offer some solutions.

In addition the ‘shared responsibility regime’ applied in France (see GP 4-1) and other MS according to which the waste producer shares responsibility for the ultimate fate of the waste even though the waste may be managed by intermediate actors, could provide an extra system of control over the whole waste management chain.

More good practice examples can be found in Annex 4.

**Conclusions and recommendations**

The collected data shows variations in the way in which Member States have implemented the obligation of enforcing the legal framework on HW. In this regard, the frequency of inspections shows great differences among the analysed Member States. The most notable challenges for Member States concern the coordination of enforcement efforts among different competent authorities and effective control of specific parts or actors of the HW management chain, such as SME’s or informal operators. An important influence in this regard could be the limited available capacity for inspections, as this issue was raised during discussions with competent authorities. Another finding is that although the inspection competence in most MS is decentralised, a certain degree of centralised planning/coordination of the inspections and the possibility to have inspections organised and/or coordinated at a centralised level in cases of high concern is seen as beneficial.

The collected good practices indicate that more communication and cooperation between different authorities could provide solutions.

Adopting a risk-based approach with regard to inspections may help to mitigate challenges regarding available capacity. However, risk-based approach requires a good overview and dataset on the whole waste management chain. As will become apparent in chapter 5.2.6, the systems of record keeping and tracing, which should produce such an overview, pose certain challenges for some Member States.

In addition, the collected data shows that inspection authorities in some MS announce their inspection to the HW operators to be inspected. It is advisable that inspections also use unannounced inspections to maximize the chance of uncovering instances of non-compliance and malpractice.

Finally, and as discussed in chapter 5.2.5, the adoption of shared responsibility among various actors in the waste management chain may create a self-regulatory effect, which in turn may support a more risk based approach by authorities.
5.2.5 Responsibility for hazardous waste management

Relevance

This chapter will briefly describe the concept of “shared responsibility” which has been highlighted by authorities and stakeholders during discussions as an effective tool to increase the adherence of HW operators to the obligations of the WFD. The essence of shared responsibility is that multiple actors within the HW management chain remain responsible for the fate of a waste stream. This is likely to create an incentive for such operators to ensure correct management. As such, shared responsibility can be regarded as one of the three pillars of enforcement, as discussed earlier in chapter 5.2.4.

Legal framework

Article 15 of the WFD contains inter alia requirements for responsibilities regarding waste treatment, i.e. responsibility for certain defined actors for the full completion of waste treatment in accordance with the standards of the WFD (such as Article 4 and 13). Of particular relevance regarding the management of hazardous waste is paragraph 2 of Article 15 WFD which addresses both producers and holders of waste and intermediate actors as defined by the WFD.27

Paragraph 2 of Article 15 WFD states:

“When the waste is transferred from the original producer or holder to one of the natural or legal persons referred to in paragraph 1 for preliminary treatment, the responsibility for carrying out a complete recovery or disposal operation shall not be discharged as a general rule.

Without prejudice to Regulation (EC) No 1013/2006, Member States may specify the conditions of responsibility and decide in which cases the original producer is to retain responsibility for the whole treatment chain or in which cases the responsibility of the producer and the holder can be shared or delegated among the actors of the treatment chain.”

The second sentence of Article 15(2) allows Member States some discretion for specifying the shares of responsibility with the “general rule” as Article 15(2) sentence 1 being a guiding principle. Thus, Member States may decide to allocate full responsibility to certain actors such as the waste producers or brokers for the entire waste treatment, including possibly interim treatment and even wastes generated during interim treatment; they may introduce a system where responsibility is transferred or delegated; or they may apply a scheme which holds different responsible actors responsible simultaneously. Indeed, Member States did make use of this discretion and a variety of different systems exist at Member States level.

Findings

During discussions with competent authorities and stakeholders, including feedback from the seminars, we have learned repeatedly that the aspect of responsibility is one of the key tools for regulators to foster self-regulation of the industry. Some voices would go as far as claiming that if

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27 To a lesser extent Article 15(3) WFD may also be important as it addresses options for responsibility of producers of goods.
legally transposed and enforced, an appropriate approach was considered to be the most effective cross-cutting measure for overall improvement of HW management.

An approach where responsibility is not delegated but remains with the initial producer/the first waste holder (or any downstream holders as applicable) is considered having beneficial effects; in this case, the actor which is held responsible will always have a strong motivation to apply due diligence in selecting a reputable waste management company instead of solely considering the price. Hence, in jurisdictions that recognize such “shared responsibility”, it is common for waste producers to commission audits regarding proper waste management. As a consequence, the shared responsibility regime may strengthen an environmentally sound treatment of waste. By contrast, if the waste producer can delegate the entire responsibility to other actors, this may create incentives to transfer the waste at the lowest price to companies applying lower environmental standards.

A best practice example was identified for the case of France, where the producer is responsible for the waste until the final treatment, even if there are intermediate actors (e.g. traders, dealers) (see GP 4-1). More good practice examples can be found in Annex 4.

Conclusions

The discussion with competent authorities and stakeholders indicate that shared responsibility may strengthen an environmentally sound treatment of HW. The WFD allows some discretion with regard to the way in which the shares of responsibility are allocated within the HW management chain. An approach where responsibility is not delegated but remains with the initial producer/the first waste holder (or any downstream holders as applicable) is considered having beneficial effects.

5.2.6 Record keeping and tracing systems for hazardous waste

Relevance

Record keeping and tracing obligations with regard to hazardous waste are relevant in various ways. Firstly, the keeping of records by HW operators and frequent communications of these records to competent authorities enables the Member States to effectively meet their obligations under Article 28 WFD on the national WMP. Paragraph 3 sub (a) of this Article requires the inclusion in the national WMPs of information on the type, quantity and source of waste generated within the territory. At EU level, the collected information on HW in Member States will contribute to the compilation of reliable datasets on which effective policy measures can be based. Secondly, record keeping and tracing play an important in the effectiveness of national enforcement of legal obligations on HW. The availability of a robust dataset on the generation, movement and treatment of HW will provide enforcement authorities with an overview with which possible infringements can be identified and proven. As such, record keeping and tracing can be considered one of the three pillars of enforcement as already discussed under chapters 5.2.4 and 5.2.5.

Within the context of the circular economy package, the Commission has proposed to establish an electronic registry, at least for hazardous waste in order to improve its traceability.
This chapter provides a general overview of the collected data with regard to record keeping and tracing obligations for HW. Furthermore, this chapter will list identified challenges which are faced by Member States with regard to these obligations. Furthermore, good practices of specific MS will be highlighted.

**Legal framework**

The main obligations for MS with regard to the traceability of HW have been laid down in Article 17 WFD:

> Member States shall take the necessary action to ensure that the production, collection and transportation of hazardous waste, as well as its storage and treatment, are carried out in conditions providing protection for the environment and human health in order to meet the provisions of Article 13, including action to ensure traceability from production to final destination and control of hazardous waste in order to meet the requirements of Articles 35 and 36.

The main obligations with regard to record keeping on HW have been laid down in Article 35 WFD:

1. The establishments or undertakings referred to in Article 23(1), the producers of hazardous waste and the establishments and undertakings which collect or transport hazardous waste on a professional basis, or act as dealers and brokers of hazardous waste, shall keep a chronological record of the quantity, nature and origin of the waste, and, where relevant, the destination, frequency of collection, mode of transport and treatment method foreseen in respect of the waste, and shall make that information available, on request, to the competent authorities.

2. For hazardous waste, the records shall be preserved for at least three years except in the case of establishments and undertakings transporting hazardous waste which must keep such records for at least 12 months.

> Documentary evidence that the management operations have been carried out shall be supplied at the request of the competent authorities or of a previous holder.

3. Member States may require the producers of non-hazardous waste to comply with paragraphs 1 and 2.

**Findings**

**Method of record keeping**

Art 35 WFD requires the previously mentioned actors in the waste management chain to keep a chronological record with regard to the handled hazardous waste. The current wording of the WFD does not specify the form in which record should be kept. The proposal on a revised WFD entails the setting up of an electronic registry or coordinated registries to record the data on hazardous waste, covering the entire geographical territory of the Member State concerned. The collected data shows a variation in the methods of record keeping by Member States. Some MS (e.g. BE, DE, FR, GR and PT) already implemented electronic record keeping systems, whereas other MS currently develop and/or are gradually implementing such systems (e.g. BG, CY, CZ, IT, PL and the UK). Only a few Member States are not yet officially developing an electronic record keeping system (e.g. SE).
**Method/frequency of data-supply to authorities**

With regard to the possibility for the competent national authorities to request kept records, the following table indicates variations among Member States.

Table 4: Method/Frequency of data supply to authorities in selected Member States

<table>
<thead>
<tr>
<th>Member State</th>
<th>Immediate submission</th>
<th>Periodical submission</th>
<th>Submission upon request</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium, Brussels</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belgium, Flanders</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Belgium, Wallonia</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bulgaria</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cyprus</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Czech Republic</td>
<td>No data reported</td>
<td></td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>X*</td>
<td>X*</td>
<td></td>
</tr>
<tr>
<td>Greece</td>
<td>X</td>
<td></td>
<td></td>
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<tr>
<td>Italy</td>
<td>X</td>
<td></td>
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<tr>
<td>Poland</td>
<td>X</td>
<td></td>
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<tr>
<td>Portugal</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Romania</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>No data reported</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>United Kingdom</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Electronic consignment notes are submitted immediately to authorities; however the authorities do not have immediate access to the actor’s registries

The collected data also show variation among Member States with regard to actors from which records are requested. In most of the Member States the records on hazardous waste have to be submitted periodically by all actors. In addition to the duty to report periodically, in one Member State the competent authorities may request the information when deemed necessary. In another Member State, infectious waste from health care—though being categorized as hazardous waste—is excluded from the duty to be recorded.

**Commission proposal on electronic record keeping**

Bearing in mind the described variations with regard to data supply, the previously mentioned proposal on a new wording of paragraph 1 of Article 35 WFD may create a challenge for certain Member States. The proposed new wording determines that:

"The establishments or undertakings referred to in Article 23(1), the producers of hazardous waste and the establishments and undertakings which collect or transport hazardous waste on a professional basis, or act as dealers and brokers of hazardous waste, shall keep a chronological record of the quantity, nature and origin of that waste, and, where relevant, the destination, frequency of collection, mode of transport and treatment method foreseen in respect of the waste. They shall make that data..."
available to the competent authorities through the electronic registry or registries to be established pursuant to paragraph 4.”28

The wording of the proposal enables two possible outcomes for the Circular Economy Package negotiations on paragraph 1 of Article 35 WFD. The first possible outcome is that the mentioned actors in the waste management chain are obliged to submit records directly to the competent authorities, i.e. not merely upon request, or periodically. This system would be similar to the existing electronic systems in Germany and the Netherlands. The second interpretation would be that Member States would still be able to request records from the mentioned actors on an incidental basis or periodically. However, the records must be submitted in an electronic form.

Based on the collected data, the first interpretation would be a big challenge for Member States that do not require the immediate submission of records. In addition, the first interpretation implies that all mentioned actors are required to submit records. Such an interpretation would be a challenge for Member States that currently only require records from certain categories of actors.

An influential point in this regard would be the set of conditions of operation for the electronic registry. The proposed paragraph 5 to Article 35 WFD states that:

“The Commission may adopt implementing acts to establish minimum conditions for the operation of such registries. Those implementing acts shall be adopted in accordance with the procedure referred to in Article 39(2).”

Competent authority to require/manage data

The current Article 35 in the WFD does not specify the administrative level at which the competent national authority is allowed to request the kept records. In this regard, the collected data shows variations among the Member States. Many Member States have assigned a national authority or organisation the task of compiling a register or documenting submitted (periodical) records. Some of these Member States have created a system in which records are already collected in an electronic register. Another category of Member States has assigned the mentioned task to decentralized or regional authorities. For example, in Spain, several regions have created electronic traceability systems, based on different criteria. As a consequence, incompatibilities occur and traceability in shipments from one region to another is hampered. A final category of Member States designates various authorities which are competent with regard to different categories of HW. In Poland for example, both national and regional waste registries exist. The table below provides an overview of which competent authority is to request and manage kept records.

Table 5: Level of waste registries

<table>
<thead>
<tr>
<th>Member State</th>
<th>National</th>
<th>Decentralized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium, Brussels</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Belgium, Flanders</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Member State</th>
<th>National</th>
<th>Decentralized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium, Wallonia</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Bulgaria</td>
<td>X</td>
<td></td>
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<tr>
<td>Cyprus</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Czech Republic</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>No data reported</td>
<td>No data reported</td>
</tr>
<tr>
<td>Germany</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Greece</td>
<td>X</td>
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<td>Italy</td>
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<tr>
<td>Poland</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Portugal</td>
<td>X</td>
<td>X*</td>
</tr>
<tr>
<td>Romania</td>
<td>X</td>
<td></td>
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<tr>
<td>Spain</td>
<td>X</td>
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<tr>
<td>Sweden</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>United Kingdom</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

*The Azores have their own Waste Division, register and track HW*

The proposal on a revised WFD determines that proposed electronic registry or coordinated registries will cover the entire geographical territory of the Member State concerned. The proposal on a revised WFD does not further specify the administrative level at which the electronic registry or the coordinated registries shall be managed and accessible. However, the fact that the registry must cover the entire geographical territory of the Member State concerned, may influence the way in which the registration and request of records is organized in MS which have assigned competences to both central and decentralized authorities.

**Method of tracing**

Article 17 WFD does not state the form in which “action to ensure traceability” of HW through the whole waste management chain should take place. However, the Article does link traceability to the requirements of Article 35. This implies that the method of tracing should at least collect the information with regard to HW as stated in Article 35 WFD. Furthermore, Article 17 refers to Article 36 WFD concerning measures against abandoning and dumping, as well as laying down effective penalties for infringements. This implies that the tracing systems must provide sufficient information to enable the competent authorities to identify instances of abandoning and dumping, as well as the effective application of penalties to sanction infringements.

The collected data shows that some Member States have linked their system of tracing to the identification document which is required by Article 19 WFD for the transfer of HW within a Member State. While Article 19 only requires the “accompanying” of a transfer by an identification document, many tracing systems require the submission of these documents to the competent authorities.

Some Member States require ‘extra checks’ in the waste management chain. For example, the Czech Republic requires the notification of consignments. In Germany, permission is required before treatment of HW. Such “extra checks” within the tracing system, may provide more visibility and control over the fate of HW streams. However, the administrative burden of notifying consignments...
or applying for permission may render such systems less attractive for Member States with limited administrative capacity.

**Challenges**

With regard to record keeping, Member States have reported challenges in managing their current record-databases. There is a mentioned lack of transparent data due to lack of human resources to keep the register up-to-date. One Member State indicated that not all actors in the HW management chain submit records. Furthermore, one Member State indicated that challenges exist with regard to the practical implementation of its electronic waste registration system and that its manual system still exists in parallel.

For some MS with a manual record keeping system, the transition to an electronic system, as foreseen by the proposed addition of paragraph 5 to Article 35 WFD would imply enhanced efforts. An important issue in this regard is the set of minimum conditions for the operation of such an electronic register. The recording and submission of data in electronic form would be one level of transition. The management of an electronic database in which this data is immediately submitted by the operators is a more advanced level, which may require even more investments.

With regard to the tracing of HW, some Member States reported challenges in managing their tracing systems. One Member State mentioned that its manual system limits traceability. Another Member States has indicated that a typical waste transfer card presents only two parties involved in the single procedure (e.g. waste generator and waste collection company or two different waste collection companies). However, it is possible that wastes are owned by several permitted companies between generation and treatment. Therefore, the final receiver of waste is not able to identify the primary waste generator. As a result, problems with less transparent tracing of wastes (including HW) are reported. Another Member State indicated that, for now, although the companies report data on paper and in electronic format, the movements of HW can only be tracked until the stage of waste management. Finally, one Member State indicated that several regions have created electronic traceability systems, based on different criteria. As a consequence, incompatibilities occur and traceability in shipments from one region to another is hampered.

As summarised above, many Member States are currently updating/reviewing or introducing their record keeping system. In many cases a big threat for a mandatory practical implementation of the new systems is the perceived additional burden and involved cost for the industry which may hamper a political will for introducing such systems.

The introduction of an electronic tracing system may solve current traceability challenges. For regions which have developed various electronic systems, a centralised or overarching system may be a solution. However, the success of electronic tracing systems in some Member States will depend on the way in which the system is designed. Challenges regarding limited obligations for some actors will only be solved if the system is made more comprehensive. In particular, this means that the obligation for electronic record keeping needs to cover the whole territory of the Member States to avoid any loopholes. Additionally, exemptions for particular actors (e.g. specific intermediaries or producers of low waste amounts) need to be carefully considered.
Due to the ongoing work on implementing electronic record keeping and traceability systems in the Member States and the individual situations and circumstances in the Member States, it is difficult to promote Good Practice examples. Nevertheless, an abstract model for a good practice record keeping and traceability system based on the German system is presented in the following figure.

![Abstract record keeping and traceability system](image)

- *Art. 19(2) WFD: Accompanying identification document*
- **Art. 35 WFD: Chronological records**
- ***Art. 17 WFD: Traceability from production to final destination***

**Figure 8: Abstract record keeping and traceability system**

**Conclusions**

The data shows variations between MS with regard to the structure and operation of record keeping and tracing. Such variations mainly concern the method of record keeping and tracing (electronic or manual), the method and frequency of submitted data to the competent authorities and the designated competent authorities to which kept records are to be submitted.

Electronic systems for record keeping and tracing offer the advantage of up-to-date data, concentrated in one database and which should be easily accessible for the competent national authorities. The impact of the adoption of an electronic record keeping and tracing system depends on the minimum conditions under which such a system would operate, but it is likely to foster overall compliance with WFD obligations on HW management.
5.2.7 Application of the waste hierarchy for hazardous waste

**Relevance**

The waste hierarchy is one of the basic principles of European waste law, giving substance to one of the Directive’s two fundamental aims: the reduction of the overall impacts of resource use and improvement of the efficiency of such use. In its circular economy action plan (CEAP), the European Commission underlines the importance of waste management for the application of the waste hierarchy. Furthermore, the Commission underlines that all waste should be considered in the European efforts to achieve high levels of material recovery [CEAP 2015].

**Legal framework**

The wording of Article 4 WFD lays down an obligation for MS to apply the waste hierarchy (see also the following figure) within their waste prevention and management legislation and policy:

(a) prevention;
(b) preparing for re-use;
(c) recycling;
(d) other recovery, e.g. energy recovery; and
(e) disposal.

![Figure 9: Waste hierarchy, © European Commission](image)

Source: Website European Commission

Deviation from the waste hierarchy is addressed in Article 4(2) which reads

*When applying the waste hierarchy […], Member States shall take measures to encourage the options that deliver the best overall environmental outcome. This may require specific waste streams departing from the hierarchy where this is justified by life-cycle thinking on the overall impacts of the generation and management of such waste.*

(...)
Member States shall take into account the general environmental protection principles of precaution and sustainability, technical feasibility and economic viability, protection of resources as well as the overall environmental, human health, economic and social impacts, in accordance with Articles 1 and 13.

In a case on the treatment of waste prior to landfilling\(^{29}\), the CJEU underlined the importance of the waste hierarchy within EU waste law, finding that the landfilling of waste, among which bio-waste, without any pre-treatment was in contradiction with, among other provisions of the Waste Framework Directive, Article 4 on the waste hierarchy. In this regard, the court concluded that, among other provisions, Article 4 WFD requires Member States to take the necessary measures to ensure that the waste disposed of on landfills is treated in such a way as to reduce as far as possible the negative effects of that waste on the environment and on human health.\(^{30}\) In addition, referring to paragraph 2 of Article 2 WFD, the CJEU pointed out that Member States have to apply appropriate measures in order to give maximum effect to the waste hierarchy.\(^{31}\)

The wording of Article 4 WFD and the expressed aims under the CEAP imply that the obligation of applying the waste hierarchy also includes policy and legislation on HW.

**Challenges**

The collected data indicates that MS perceive the application of the waste hierarchy to HW as a challenge. In general, the extents of the obligations which arise from the application of the waste hierarchy seem to be unclear or are implemented in varying ways.

One indication is that the waste hierarchy is insufficiently reflected in the implementation of HW management, e.g. in permitting procedures; hence HW is going to low cost/quality treatment options rather than to BAT solutions in some cases.

Another indication from the collected data is that recycling may not be in all cases a better option than recovery or landfilling from an environmental point of view – and particularly not in case it leads to the perpetuation of hazardous substances in the material chain. When hazardous waste is managed and treated, two general objectives of EU waste legislation have to be balanced: a) the application of the waste hierarchy as stipulated in Article 4(1) of the WFD and b) the protection of human health and the environment as stipulated by Article 13 of the WFD.

Also the power of the market may act against the waste hierarchy. In particular in those cases where treatment operations on the lower end of the hierarchy are cheaper due to either missing enforcement of waste legislation or insufficient use of regulatory and economic instruments to internalise externalities in the different treatment operations. A particular example reported is the threat that wastes with high calorific values are rather sent for energy recovery than to material recovery albeit this would technically be possible.

Finally, the collected data implies a connection between incorrect classification of HW and the application of the hierarchy; where HW is not identified as such, it may end up in non-suitable

\(^{30}\) Ibid, par. 38 case
\(^{31}\) Ibid, par. 36 case
processes at under-regulated sites, without a proper reflection on appropriate treatment in accordance with the waste hierarchy.

With regard to the challenges above, some good practices of Member States may provide a starting point for solutions. For example, producers/collectors in the United Kingdom have to confirm in their consignment notes whether the waste hierarchy was applied when choosing the further treatment of the waste (see GP 6-5). In France, the producer is responsible for the compliance of the chosen treatment with the waste hierarchy (see GP 4-1). Germany has had guidelines published for applying the waste hierarchy to hazardous waste by the Federal Ministry of Environment, and has, through its environment agency, commissioned a comprehensive scientific study assessing potential for recycling of industrial HW (see GP 6-9). Certain MS have included in their national policies the explicit possibility for competent authorities to refuse the transfer of HW to other Member States if the treatment of the HW will be contrary to the waste hierarchy (see GP 6-8). In addition, many MS are running waste prevention campaigns aimed at reducing waste, including HW. Certain MS have introduced measures and aims which specifically aim to reduce HW. An example would be the efforts in Belgium-Walloon (see GP 6-6). Within the context of HW prevention, the developments regarding so-called “chemical leasing” may also be relevant (see GP 6-3).

More specifically with regard to the risk of perpetuation of hazardous substances in the material chain, the efforts of the EU and Dutch efforts to develop an assessment framework for the assessment of risks of recycling waste which contains (potentially) hazardous substances may be an interesting development (see GP 6-7). More good practice examples can be found in Annex 4.

Conclusions

Article 4 WFD establishes a clear obligation for MS to apply the waste hierarchy in their prevention and management legislation and policy with regard to HW. However, the exact way in which the waste hierarchy should be reflected in these instruments requires further specification. The collected data highlight various specific uncertainties which MS face in this regard.

Current MS application of the waste hierarchy is often geared towards “reminding” and incentivizing HW operators to apply the waste hierarchy. The effect of some of these measures, such as the confirmation of application of the waste hierarchy in consignment notes, could be enhanced by requiring an LCA to support the choice of treatment. Other, more obligatory measures, such as the refusal of transfers which are in violation of the waste hierarchy, could be used more widely among MS. Furthermore, early dissemination of Waste Treatment BREF may help to ensure best available technologies are known and applied to hazardous waste as soon as possible. Finally, the national strategies to prevent HW should continue to receive attention, as they constitute measures which conform to the top of waste hierarchy. In this regard, we would like to refer to the 2015 report of the EEA on the state of hazardous waste prevention in the EU [EEA 2016]. This report provides an overview of the efforts of MS to prevent HW and could serve as a source of good practices.
6 Analysis of PCB/PCB waste management practices in the selected Member States

6.1 Specific findings of PCB/PCB waste management in the selected Member States

The in-depth analysis of hazardous waste and PCB management practices are summarised for the 14 selected Member States in 14 factsheets (attached in Annex 1). A (graphical) summary for each Member State can be found in the following.
6.1.1 Belgium

**PCB containing waste generation compared to EU 28**

- **4,282 t** (10.1% of EU 28) as of 2014

**PCB treatment**

- **436 t** treated within the country
- **179 t** exported

*Data excluding selected R&D operations which are not subject to reporting according to Annex 2 WSTAK*

Source: EUROSTAT

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**Belgium PCB waste management**

**PCB containing equipment still in use**

- **13 pieces of equipment with PCB content > 500 ppm**
- **1,277 pieces of equipment with PCB content 50 - 500 ppm**

Source: Questionnaire on PCB Wastes

**PCB containing waste imports**

- **2,071 t / 2014**

Source: EUROSTAT

**PCB containing waste exports**

- **179 t / 2014**

Source: EUROSTAT

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**Roadmap**

**Best practise**

- **Flanders**: comprehensive PCB inventory
- **Wallonia**: Not identified
- **Brussels**: Not identified

**Further challenges**

- **General**
  - Some companies do not know what HW is, how it should be managed and what type of waste they can collect.
  - Bruxelles Environment has an official list with all HW collectors, who have an agreement to collect HW but it is not user friendly.
- **Flanders**
  - There are still some PCB equipment in use, but these are subject to court cases.
- **Wallonia**
  - Transformers containing PCBs have been abolished and dismantled, but the authorities still find some contaminations which are handled via excavation and treatment.

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Final Report
Support to selected Member States in improving hazardous waste management based on assessment of Member States' performance
6.1.2 Bulgaria

**PCB containing waste generation compared to EU 28**

- **15 t** (0.04% of EU 28) as of 2014

Source: EUROSTAT

**PCB treatment**

- 145 t treated within the country

Source: EUROSTAT

**Bulgaria PCB waste management**

**PCB containing equipment still in use**

There is no equipment containing PCB in use in the country. It is possible equipment containing PCBs to be identified in the future but the quantities are expected to be negligible.

Source: Questionnaire on PCB Wastes

**PCB containing waste imports**

- 0 t / 2014

Source: EUROSTAT

**PCB containing waste exports**

- 145 t / 2014

Source: EUROSTAT

**PCB treatment capacities**

- Other treatment facilities: none
- Thermal treatment: none

**Roadmap**

**Best practice**
- Due to joint efforts of both authorities and companies all registered PCB have been treated and eliminated.

**Further challenges**
- The annually updated diagnosis indicated that all inventoried PCB containing equipment had been destroyed. However, experience from other EU Member States shows that ongoing investigations on PCB from closed application lead to further identification of such equipment.
- A study has been conducted on PCB in open applications (by ARGE). It was concluded that PCB have not been used in open applications. However, experience from other EU Member States shows that ongoing investigations on PCB from open application can lead to further identification of such equipment.
6.1.3 Cyprus

PCB containing waste generation compared to EU 28

0 t
(0.0% of EU 28)

as of 2014

Source: EUROSTAT

PCB treatment

none

Source: EUROSTAT

Cyprus PCB waste management

PCB containing equipment still in use

PCB is still in use in Cyprus in transformers and capacitors, but no specific data available.

Source: Questionnaire on PCB Wastes

PCB containing waste imports

0 t / 2014

Source: EUROSTAT

PCB containing waste exports

0 t / 2014

Source: EUROSTAT

PCB treatment capacities

Other treatment facilities

none

Thermal treatment

none

Roadmap

Best practise
- Not identified.

Further challenges
- PCB waste is not considered an important issue in Cyprus. A potential field that should be considered comprises the ongoing identification and elimination of open use applications of PCBs.
6.1.4 Czech Republic

Czech Republic
PCB waste management

PCB containing waste generation compared to EU 28

86 t
(0.2% of EU 28)
as of 2014
Source: EUROSTAT

PCB treatment
No data available due to confidentiality reasons
Source: EUROSTAT

PCB containing equipment still in use

815 pieces of equipment with PCB content > 500 ppm
as of 2015

3,470 pieces of equipment with PCB content 50 - 500 ppm
Source: Questionnaire on PCB Wastes

Roadmap

Best practise
- The Czech Republic has increased capacity for Stockholm Convention implementation through establishing the National Centre for Toxic Compounds in 2008.
- Long-term experience with PCB waste management is passed on to other countries within research activities, capacity building and training programmes, mainly by comprehensive international activities of RECETOX.

Further challenges
- PCB waste is not considered an important issue in Cyprus. A potential field that should be considered comprises the ongoing identification and elimination of open use applications of PCBs.
6.1.5 France

**PCB containing waste generation compared to EU 28**

- **4,167 t**
- **9.8% of EU 28**

**PCB treatment**

- **130 t**
- **11 t**
- Exported: **1,841 t**

![Source: EUROSTAT](image)

---

**France PCB waste management**

**PCB containing equipment still in use**

- **18,114 pieces** of equipment with PCB content
  - 50 - 500 ppm

**PCB containing waste imports vs exports**

- **1,730 t** 2014
- **1,841 t** 2014

**PCB treatment capacities**

- **8**

---

**Roadmap**

- **Best practice**
  - Not identified

---

**Further challenges**

- Ongoing identification and elimination of PCB from open applications (i.e., PCB used in construction material such as paint or sealants).
6.1.6 Germany

**PCB containing waste generation compared to EU 28**

- **9,764 t** as of 2014 (22.9% of EU 28)

**PCB treatment**

- **3,404** treated within the country*
- **5,589** exported
- **2,370**

* data excluding selected R&D operations which are not subject to reporting according to Annex 2 WStrA

**Source:** EUROSTAT

---

### Germany

**PCB waste management**

**PCB containing equipment still in use**

- In general all PCB wastes have been eliminated before 31 December 2010. However, certain amounts have been discovered later.
- PCB is still in use in sealings or small capacitors.

**Source:** Questionnaire on PCB Wastes

**PCB containing waste imports**

- **1,574 t** 2014

**PCB containing waste exports**

- **2,370 t** 2014

**Source:** EUROSTAT

**PCB treatment capacities**

- **35**

**Roadmap**

**Best practice**

- After a scandal in PCB waste treatment, the responsible Land government North Rhine-Westphalia reacted with thoroughly assessing perceived shortcomings in enforcement and initiated responding measures.
- The Guideline for the assessment and remediation of PCB-containing building materials and components in buildings provides a good support for the remediation of PCB-containing building materials and components in buildings according published by DE BGBAU 1994

**Further challenges**

- The recording of PCB containing devices is regarded as a big challenge, since a complete monitoring is hardly possible
- Regarding “open” PCB applications, efforts are made to identify the dimension of the issue but overall no clear picture is available
6.1.7 Greece

### PCB containing waste generation compared to EU 28

- **46 t** (0.1% of EU 28) as of 2014

Source: EUROSTAT

### PCB treatment

- **84 t** exported

*Data excluding selected R&D operations which are not subject to reporting according to Annex 2 WStMR.*

Source: EUROSTAT

---

### Greece PCB waste management

#### PCB containing equipment still in use

- **36 pieces of equipment** with PCB content > 500 ppm as of 2014
- **423 pieces of equipment** with PCB content 50 - 500 ppm as of 2014

Source: Questionnaire on PCB Wastes

#### PCB containing waste imports

- **0 t** / 2014

Source: EUROSTAT

#### PCB containing waste exports

- **84 t** / 2014

Source: EUROSTAT

#### PCB treatment capacities

- **None** Other treatment facilities
- **None** Thermal treatment

---

**Roadmap**

- **Best practice**
  - Not identified.

---

**Further challenges**

- The Greek authorities do not have a complete picture (mapping) of PCB devices in the country (either stored or in use). It is the consultant’s assumption that PCB equipment is still in use although data are scarce.
- For public information and awareness raising, leaflets for informing stakeholders about their obligations and hazards from PCBs have been issued by the MoE. However, awareness at level of equipment holders and open applications can be improved.
6.1.8 Italy

PCB containing waste generation compared to EU 28

- 2,330 t (5.5% of EU 28) as of 2014

Source: EUROSTAT

PCB treatment

- 44 incineration D10
- 78 recovery
- 12 landfilling

* data excluding selected ROI operations which are not subject to exporting according to Annex 2 WSTAT

Source: EUROSTAT

Italy

PCB waste management

PCB containing equipment still in use

- 7,242 pieces of equipment with PCB content > 500 ppm as of 2016
- 336 pieces of equipment with PCB content 50 - 500 ppm

Source: ISFRA

PCB containing waste imports and exports

- 0 t / 2014
- 12 t / 2014

Source: EUROSTAT

PCB treatment capacities

- 10 Decontamination Mobile Units
- n.a. Other treatment facilities
- Thermal treatment

Roadmap

Best practice

- Italy possesses Decontamination Mobile Units (DMU) enabling to treat transformers during lifetime.
- Italy has published specific guidelines on criteria for the identification and utilization of best available techniques for PCB waste management.

Further challenges

- As the local authorities in the provinces are responsible for PCB waste management and inventories there is a lack of a continuous overview, as data have to be reported only on a biannual basis. For selected provinces no updated information are available on the number of PCB contaminated sites.
- Regional differences between the provinces regarding PCB waste management planning and strategy.
- Not all PCB was eliminated by the end of 2010.
- Transformers in use filled with insulating liquids contaminated by PCBs are not classified as PCBs waste, but electrical equipment in service.
6.1.9 Poland

PCB containing waste generation compared to EU 28

- **282 t**
- **(0.7% of EU 28)**

As of 2014

Source: EUROSTAT

PCB treatment

- **147 t**
- **33 t** (treated within the country)
- **42 t** (exported)

Source: EUROSTAT

Poland PCB waste management

- **802 tonnes of equipment with PCB content**

As of 2011

Source: Questionnaire on PCB Wastes

PCB containing equipment still in use

PCB containing waste imports

- **24 t**
- **1/2014**

Source: EUROSTAT

PCB containing waste exports

- **42 t**
- **1/2014**

Source: EUROSTAT

PCB treatment capacities

- **Other treatment facilities**: none
- **Thermal treatment**: 3

Roadmap

**Best practise**

- Legislation at the national level was addressed (deadline for removal of the equipment containing PCB was June 30, 2010).
- The informative program “PCB stop” was established.
- The PCB guidance document was elaborated in 1999 by the Ministry of Economy and contains principles of safe handling and disposal of equipment and waste containing PCB.

**Further challenges**

- The identification and elimination of PCB from ‘closed applications’ has been addressed but not all PCB from closed applications were identified and removed. Further identification and elimination should be pursued.
- It was not yet assessed whether PCB from ‘open applications’ are of particular concern in Poland. Considering the experience in other MSs, a high chance of PCB contaminations stemming from PCB usage in open applications has to be assumed and should be addressed in future.
6.1.10 Portugal

PCB containing waste generation compared to EU 28

178 t (0.4% of EU 28)

as of 2014

Source: EUROSTAT

PCB treatment

46

treated within the country

exported

Source: EUROSTAT

Portugal PCB waste management

PCB containing equipment still in use

9.5 tonnes of equipment with PCB content > 500 ppm

198 tonnes of equipment with PCB content 50 - 500 ppm

as of 2015

Source: Questionnaire on PCB Wastes

PCB containing waste imports

0 t / 2014

Source: EUROSTAT

Exports

46 t / 2014

Source: EUROSTAT

PCB treatment capacities

Other treatment facilities

none

only temporary storage

Thermal treatment

none

Roadmap

Best practice

- Not identified.

Further challenges

- PCB-containing equipment with concentration > 500 ppm may be occasionally found, reported and managed accordingly.
6.1.11 Romania

PCB containing waste generation compared to EU 28

329 t
(0.8% of EU 28)

as of 2014

Source: EUROSTAT

PCB treatment

34
167

treated within the country* exported

Source: EUROSTAT

6.1.11 Romania

PCB waste management

PCB containing equipment still in use

42,816
PCB in Product in use

as of 2013

Source: Questionnaire on PCB Wastes

PCB containing waste imports

896 t / 2014

Source: EUROSTAT

PCB containing waste exports

0 t / 2014

Source: EUROSTAT

Roadmap

Best practise

- Not identified.

Further challenges

- The national legislation on the management of PCB equipment fails to correctly transpose the provisions of Directive 96/89/EC.
- Existing decommissioned PCB equipment that has not been disposed of 2013.
- Lack of sufficient specific controls
- There is no representative of MoE responsible for monitoring the implementation of the policies on PCB management.
- At the national level, no awareness campaigns
- Schemes on the collection and disposal of the equipment not included in the national inventory
- Identification and elimination of PCB from 'open applications' is not addressed
6.1.12 Spain

PCB containing waste generation compared to EU 28

- 2,213 t (5.5% of EU 28)

Source: EUROSTAT

PCB treatment

- 3,172 treated within the country
- 48 exported

Source: EUROSTAT

Spain PCB waste management

PCB containing equipment still in use

- 1,143 pieces of equipment with PCB content > 500 ppm
- 24,715 pieces of equipment with PCB content 50 - 500 ppm

Source: Questionnaire on PCB Wastes

Roadmap

Best practise

- Not identified.

Further challenges

- Ongoing identification and elimination of PCB from 'closed applications'
- Identification and elimination of PCB from 'open applications' is not addressed sufficiently across all regions

PCB treatment capacities

- Other treatment facilities: 3
- Thermal treatment: none

Source: EUROSTAT
6.1.13 Sweden

PCB containing waste generation compared to EU 28

887 t
(2.1% of EU 28)

as of 2014

Source: EUROSTAT

PCB treatment

No data available due to confidentiality reasons

Source: EUROSTAT

Sweden

PCB waste management

PCB containing equipment still in use

All equipment with PCB levels higher than 500 ppm has already been decontaminated

Sweden does not have statistics for PCB products taken out of use. The hazardous waste treatment in Sweden has a capacity high enough to handle incoming PCB-waste within a reasonable time. Therefore, there are no stocks of used or waste PCB to be considered.

PCB containing waste imports

592 t / 2014

Source: EUROSTAT

PCB containing waste exports

402 t / 2014

Source: EUROSTAT

PCB treatment capacities

Other treatment facilities: no data available

Thermal treatment: 2

Roadmap

Best practice

- Sweden has implemented legislation for all aspects of HW management, which has been supplemented with information directed towards all relevant parties, available from many sources.

Further challenges

- The amount of PCB containing material in Swedish buildings is rather unknown and the elimination requires continued efforts.
6.1.14 United Kingdom

PCB containing waste generation compared to EU 28

5,075 t
(11.9% of EU 28)

as of 2014

Source: EUROSTAT

PCB treatment

- incineration D10
- recovery
- landfill

* data excluding selected R&D operations which are not subject to reporting according to Annex 2

Source: EUROSTAT

United Kingdom

PCB waste management

PCB containing equipment still in use

29 tonnes of equipment with PCB content 50 - 500 ppm

as of 2016

Source: Questionnaire on PCB Wastes

PCB containing waste imports

0 t / 2014

Source: EUROSTAT

PCB containing waste exports

0 t / 2014

Source: EUROSTAT

PCB treatment capacities

- Other treatment facilities: no data available
- Thermal treatment: 2

Roadmap

Best practise

- The UK will continue to focus on disposing of non-exempt PCB
- Specific strategies to monitor PCB levels in landfill as well as to identify sources of open application PCB to reduce overall levels.
- The UK authorities closely cooperates with registered holder of non-exempt PCB items

Further challenges

- General identification, prioritisation and elimination of PCB-containing waste mainly from open applications (both to a certain extend also from closed sources) remain an ongoing challenge.
6.2 General findings of PCB/PCB waste management across the selected Member States

6.2.1 Inventories for PCB containing equipment

Relevance

In order to allow a thorough overview on PCB containing equipment, keeping track of identified equipment or equipment suspected to contain PCB and keeping track on the status of elimination of PCB equipment, a regularly updated inventory of PCB holdings covering the whole territory of a Member State is necessary.

Legal framework

Article 4(1) of PCB Directive 96/59/EC stipulates that:

In order to comply with Article 3, Member States shall ensure that inventories are compiled of equipment with PCB volumes of more than 5 dm3, and shall send summaries of such inventories to the Commission at the latest three years after the adoption of this Directive. In the case of power capacitors, the threshold of 5 dm3 shall be understood as including all the separate elements of a combined set.

Overview on PCB inventories in the selected Member States

The following Table 6 provides for an overview on PCB inventories in the selected Member States. More detailed information can be found in the individual Member State factsheets (see Annex 1).

Table 6: Overview on inventories for PCB-containing equipment in the selected Member States

<table>
<thead>
<tr>
<th>Member State</th>
<th>Level</th>
<th>Update intervals</th>
<th>Availability</th>
<th>Additional information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium, Brussels</td>
<td>Regional</td>
<td>N/A</td>
<td>Not publically available</td>
<td>The inventory includes information on stockpiles, products and articles in use, waste and PCB contaminated through open applications</td>
</tr>
<tr>
<td>Belgium, Flanders</td>
<td>Regional</td>
<td>irregularly</td>
<td>Not publically available</td>
<td>The inventory includes information on stockpiles, products and articles in use, waste and PCB contaminated through open applications</td>
</tr>
<tr>
<td>Belgium, Wallonia</td>
<td>Regional</td>
<td>biannually</td>
<td>Not publically available</td>
<td>The inventory includes information on PCB in equipment (e.g. transformers, capacitors or other receptacles containing liquid stocks), articles, oils and waste.</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>National</td>
<td>annually</td>
<td>Not publically available</td>
<td>The inventory includes information on transformers, capacitors, rheostats, passage insulators and barrels with redundant transformer oil.</td>
</tr>
<tr>
<td>Cyprus</td>
<td>National</td>
<td>irregularly</td>
<td>Not publically available</td>
<td>The list of PCB containing devices was largely published in the PCB action plan in 2006. The inventory is currently outdated and not publically available. MARDE is currently updating it.</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>National</td>
<td>annually</td>
<td>Publically available</td>
<td>Information about PCB contaminated sites with PCB containing waste are recorded in the Monitoring system of contaminated sites (Systém evidence kontaminovaných míst – SEKM). Detailed inventory for contaminated sites with PCB was carried out between 2008 and 2011 for which data is publicly available.</td>
</tr>
<tr>
<td>Member State</td>
<td>Level</td>
<td>Update intervals</td>
<td>Availability</td>
<td>Additional information</td>
</tr>
<tr>
<td>-------------</td>
<td>--------</td>
<td>------------------</td>
<td>--------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>France</td>
<td>National</td>
<td>irregularly</td>
<td>Accessible by declarants and services of France</td>
<td>The inventory does not cover PCB in open applications. It only lists equipment containing more than 5 dm³ of fluid with a concentration of 50ppm of PCB. As well as every equipment with more than 5 dm³ of fluid that has been identified to likely be polluted with an unknown content of PCB. The information in the database are based on mandatory declarations made by the owners of the equipment. They are also responsible to keep their information up-to-date.</td>
</tr>
<tr>
<td>Germany</td>
<td>Regional</td>
<td>N/A</td>
<td>Upon request for local authorities/public</td>
<td>Inventory includes information on PCB in equipment (e.g. transformers, capacitors or other receptacles containing liquid stocks), articles, oils and waste.</td>
</tr>
<tr>
<td>Greece</td>
<td>National</td>
<td>N/A</td>
<td>Not publically available</td>
<td>The MoE called for registration of the PCB devices owners but the deadline has expired. PCB devices owners still report to the ministry even though the deadline has passed. The inventory is incomplete but has managed to capture the main actors in Greece with PCB devices. The smaller PCB owners may not have been registered. Calls for an electronic inventory are made which will facilitate the registration.</td>
</tr>
<tr>
<td>Italy</td>
<td>Regional</td>
<td>biannually</td>
<td>No, partially published</td>
<td>Transformers in service containing insulating liquids contaminated by PCBs are not always classified as equipment potentially containing PCBs waste, but electrical equipment in service. Data at larger time intervals, most recently by ISPRA in the Industrial waste management report 2017. Additionally, PCB information are partly published by the respective regional authorities within WMPs or separate summarised documents.</td>
</tr>
<tr>
<td>Poland</td>
<td>Regional</td>
<td>Annually</td>
<td>Upon request</td>
<td>The PCB inventory databases includes the name and address of the holder of the equipment or substance containing PCB, localisation of the equipment or substance containing PCB, the name of the equipment or substance containing PCB, the number of the equipment containing PCB (pieces), the total mass of the equipment (t), the mass of the substance containing PCB (t), the condition of the equipment containing PCB (i.e. operated, damaged, stored/stockpiled, designated for disposal), the planned date of removal of the equipment or substance containing PCB, the date and way of removal or replacement of PCB with the use of another substance and the cleaning or disposal of the equipment or substance containing PCB.</td>
</tr>
<tr>
<td>Portugal</td>
<td>National</td>
<td>annually</td>
<td>No, but the annual report</td>
<td>The inventory covers transformers, capacitors and similar equipment containing PCB and its oil. No information on PCB in open applications is included. The inventory can be considered as complete, since it is closed by 31st of January every year.</td>
</tr>
<tr>
<td>Romania</td>
<td>National</td>
<td>annually</td>
<td>Publically available</td>
<td>The inventory does not include information on PCB in open applications, but on transformers and capacitors. The inventory includes, per types (transformers and capacitors), the number of equipment existing in each county (in 2009) and a list of the economic operators that own equipment with PCB/PCT (in 2011)</td>
</tr>
<tr>
<td>Spain</td>
<td>National</td>
<td>annually</td>
<td>Upon request</td>
<td>The inventory does not include information on PCB in open applications. It includes information on equipment with PCB-containing fluid, PCB-contaminated equipment and doubtful</td>
</tr>
</tbody>
</table>
Conclusions

Although the PCB Directive requires Member States only to compile an inventory for selected PCB equipment, some Member States chose the option to attach information on sites contaminated with PCB and information of PCB from open applications in the same inventory.

6.2.2 General strategies/plans regarding disposal of PCB/PCB waste

Relevance

Based on the inventoried PCB holdings, strategies, plans and actions for the decontamination and disposal of PCBs and PCB-contaminated equipment are important to ensure a continuous and full elimination of PCB. In many cases, proper planning allows an analytic approach and is needed to identify potential PCB holdings, but also to ensure proper disposal.

Legal framework

Article 11 of Directive 96/59 on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCB/PCT) stipulates that:

1. **Member States shall, within three years of the adoption of this Directive, draw up:**
   — plans for the decontamination and/or disposal of inventoried equipment and the PCBs contained therein;
   — outlines for the collection and subsequent disposal of equipment which is not subject to inventory in accordance with Article 4 (1), as referred to in Article 6 (3).

2. **Member States shall communicate these plans and outlines to the Commission without delay.**

Overview on PCB strategies/plans in the selected Member States

The majority of the Member States elaborated national strategies or plans for the identification and disposal of PCB within the years that followed the adoption of the Directive (i.e. after 1999), or after the accession to the EU, in the case of the new Member States. Some Member States published a separate document whereas others integrated the strategy for PCB in the overall strategy to phase out POPs, i.e. in the National Implementation Plan for the Stockholm Convention.
The following Table 7 provides a short overview on the PCB strategy documents from the selected Member States, it summarises the content of the strategies, on which level the strategy can be found and whether guidance material for PCB holders is available. More detailed information on the strategies and guidance documents can be found in the respective factsheet of the Member States (see Annex 1).

Table 7: Overview on strategies/plans for disposal of PCB in the selected Member States

<table>
<thead>
<tr>
<th>Member State</th>
<th>Content of PCB Strategy</th>
<th>Level</th>
<th>Availability of guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium, Brussels</td>
<td>BE strategies for identification of stockpiles, products in use and wastes and sites</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Belgium, Flanders</td>
<td>BE strategies for identification of stockpiles, products in use and wastes and sites</td>
<td>N/A</td>
<td>Available</td>
</tr>
<tr>
<td>Belgium, Wallonia</td>
<td>No PCB general strategies but key info/numbers mentioned in the respective WMP;</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>BE strategies for identification of stockpiles, products in use and wastes and sites</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bulgaria</td>
<td>Before 2009: strategy for identifying stockpiles consisting of or containing greater than 0.005% (50 ppm) PCB, it includes the elements regulatory and enforcement policies, Identification of relevant sectors, Databases (electronic or paper copy), Formal communications, Informal communications. No strategy has been developed for products and articles containing more than 0.005% (50 ppm) PCB contaminated through open applications of PCB (e.g. sealants, cable-sheaths, cured caulk and painted objects) and for identifying sites with soils contaminated by greater than 0.005% (50 ppm) PCB.</td>
<td>NWPM and National Action Plan on POPs 2012-2020</td>
<td>Before 2011, available</td>
</tr>
<tr>
<td>Cyprus</td>
<td>There is a PCB management action plan that describes the actions needed to be taken, depending on the PCB concentration in each device. The action plan also lists the owners of devices with potential PCB content.</td>
<td>PCB management action plan</td>
<td>Not publically available but in PCB action plan. &amp; on website by MoE</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>The strategies include different elements, like e.g. regulatory and enforcement policies, partnerships with relevant stakeholders, identification of relevant sectors, databases, formal and informal communication as well as door to door search.</td>
<td>N/A</td>
<td>Available</td>
</tr>
<tr>
<td>France</td>
<td>Identification of equipment</td>
<td>NIP Stockholm Convention, France National Action Plan for micro pollutants, Third national plan for the environment and health</td>
<td>Available</td>
</tr>
<tr>
<td>Germany</td>
<td>Identification of stockpiles, sites, etc.</td>
<td>NIP Stockholm Convention</td>
<td>Available</td>
</tr>
<tr>
<td>Greece</td>
<td>Identification of equipment</td>
<td>Ministry of the environment commissioned a project on how to best manage PCB in the country. The report of the project is not available. However, core elements of the report and of the</td>
<td>Available</td>
</tr>
<tr>
<td>Member State</td>
<td>Content of PCB Strategy</td>
<td>Level</td>
<td>Availability of guidance</td>
</tr>
<tr>
<td>-----------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Italy</td>
<td>Identification of equipment</td>
<td>Stockholm Convention not yet ratified</td>
<td>Available</td>
</tr>
<tr>
<td>Poland</td>
<td>Strategies for identification of stockpiles, products in use and wastes, products and articles, and sites</td>
<td>PCB stop website</td>
<td>Available</td>
</tr>
<tr>
<td>Portugal</td>
<td>Inventory, decontamination or elimination (over 0.05%). Adequate treatment of PCB contamination. No identification of products and articles in use and wastes</td>
<td>NIP Stockholm Convention</td>
<td>Available</td>
</tr>
<tr>
<td>Romania</td>
<td>Before 2009 and 2012 strategies for identification of stockpiles, products in use and wastes. No strategy to identify sites contaminated with PCB</td>
<td>National Plan for Disposal of PCB Equipment; NIP Stockholm Convention</td>
<td>Available</td>
</tr>
<tr>
<td>Spain</td>
<td>Inventory Annual Update, Spain managing capability analysis, setting costs and optimize management models, national PCB Plan annual revision, provide financial help for the execution of this Plan, create the Collection, Decontamination and Elimination Project, for PCB-containing equipment with volume &lt; 5 dm3, owners List update, agreements between MAPAMA and Large Owners, plan Informative workshops in the Autonomous Communities, act as advisor for PCB-containing equipment owners, create an electronic Database with the Autonomous Communities collaboration, develop R&amp;D programmes.</td>
<td>N/A</td>
<td>Available</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>Strategy for identifying sites contaminated with PCB</td>
<td>NIP Stockholm Convention</td>
<td>Available</td>
</tr>
</tbody>
</table>

**6.2.3 Identification and elimination of PCB from ‘closed applications’**

**Relevance**

The following main types of PCB waste from closed applications exist:

- **WEEE containing PCBs**
  
  16 02 09* transformers and capacitors containing PCBs
  
  16 02 10* discarded equipment containing or contaminated by PCBs other than those mentioned in 16 02 09

- **Waste fluids and waste oils contaminated with PCBs**
  
  13 01 01* hydraulic oils, containing PCBs
  
  13 03 01* insulating or heat transmission oils containing PCBs
**Legal framework**

Equipment containing PCBs already in use is covered by specific provisions laid down in the PCB Directive 96/59/EC. According to the Directive, Member States had to take the necessary measures to ensure that used PCBs are disposed of and that PCBs and equipment containing PCBs are decontaminated or disposed of in an appropriate manner. Member States were obliged to compile inventories of equipment with PCB volumes of more than 5 dm³. Moreover, the Directive stipulates that any equipment which is subject to inventory must be labelled. Member States must prohibit the separation of PCBs from other substances for the purpose of reusing the PCBs and the topping-up of transformers with PCBs. Concerning the appropriate waste management, Member States had to take further dedicated measures.

Additionally, PCB from closed applications are considered to be POPs and thus covered by the Stockholm Convention and the UNECE POPs Protocol. The obligations deriving from these international conventions for the European Union are covered by the POP Regulation (Regulation EC (No) 850/2004) which, at the same time, sets out further obligations for Member States in addition to international implementation obligations. With respect to PCB, the POP Regulation fully prohibits the production, placing on the market and use of PCBs as such and in preparations. Further, with regard to the treatment and disposal of PCB containing wastes, Article 7 as well as Annexes IV and V of the EU POP Regulation are relevant. Following Article 7(2), wastes consisting of POPs, containing or contaminated with them, must be treated in such way as to ensure that the POP content is destroyed or irreversibly transformed. Whereas pre-treatment is allowed, disposal and recovery operations with the goal of recovery, recycling, reclamation or reuse of POPs are generally banned while particular exemptions and thresholds exist.

**Challenges**

The identification and elimination of PCB equipment (‘closed applications’) have been primarily addressed by the Member States after the PCB Directive was applicable for the respective Member State. Major shares of PCB equipment have been identified and eliminated in this period (see also chapter 6.2.5). Nevertheless, the overarching challenge in most Member States is that further identification of PCB equipment does not seem to be on top of the priorities of the competent authorities in the Member States. This means that in many cases neither targeted actions, inspections and controls, nor further awareness raising campaigns are carried out anymore in order to inform companies concerning their responsibilities for PCB equipment. By contrast, Member States actively and continuously searching for further PCB equipment report ongoing identification and elimination of such equipment which indicates that not all equipment may have been identified yet in the Member States.

Further identified challenges are that the national legislation on the management of PCB equipment did in many cases not consider the elimination deadline for all PCB equipment by 2025 as stipulated in the Stockholm Convention§. Some Member States report that identified and decommissioned PCB equipment was not yet disposed and still is temporarily stored as the disposal capacities are missing or not enough resources can be provided. Another issue Member State authorities are struggling with

§ This obligation will be added to the EU POP Regulation in 2018
is the elimination of equipment (in particular transformers) which is suspected to contain PCB but is sealed and cannot be tested on PCB concentration without destroying it.

A selected good practice for actively and continuously addressing PCB equipment is the active and intelligence-based supply chain investigation of the Chemical Compliance Team of the Environment Agency in the UK (see GP 8-1) which identifies potential holders of PCB equipment (or other hazardous substances) via a supply chain analysis and targets these holders with awareness raising measures and as ultimate solutions with on-site inspections. Another good practice example are the activities undertaken by the RECETOX centre in CZ (see GP 8-2).

Conclusions

During the project the clear impression was given that although most Member States already substantially addressed PCB from ‘closed’ applications, activities in this direction should not be abandoned as some holders of PCB equipment have not yet been identified.

6.2.4 Identification and elimination of PCB from ‘open applications’

Relevance

The following main types of PCB waste from open applications exist:

- Construction and demolition waste
  - 17 09 02* construction and demolition wastes containing PCB

Example for such wastes stemming from construction and demolition are PCB-containing sealants, PCB-containing resin-based floorings, PCB-containing sealed glazing units, PCB-containing capacitors or PCB paints.

Legal framework

PCB from open applications are considered to be POPs and thus covered by EU POP Regulation. While production, placing on the market and use of PCBs as such and in preparations is prohibited by the POP Regulation, with regard to the treatment and disposal of PCB containing wastes, Article 7 as well as Annexes IV and V of the EU POP Regulation are relevant. Following Article 7(2), wastes consisting of POPs, containing or contaminated with them, must be treated in such way as to ensure that the POP content is destroyed or irreversibly transformed. Whereas pre-treatment is allowed, disposal and recovery operations with the goal of recovery, recycling, reclamation or reuse of POPs are generally banned while particular exemptions and thresholds exist.

Challenges

In the majority of the selected Member States PCBs from ‘open applications’ (e.g. sealants for house construction and surface coatings) have not yet been actively addressed.

Firstly, it was not yet assessed whether PCB from ‘open applications’ are of particular concern, i.e. there is no research available in some Member States examining the (historic) usage of PCB products e.g. in constructions.
Considering the experience in Member States already addressing PCB from open applications it can be concluded that a high chance of PCB contaminations stemming from PCB usage in open applications has to be assumed for all Member States. However, the following aspects prevent the development of a strategy addressing PCB from open applications in many Member States:

- Limited knowledge on PCB contaminations/reservoirs in the Member State and their origin
- Limited knowledge on historic usage of PCB-containing materials in e.g. buildings and other open applications in the Member State
- Addressing multiple waste streams (e.g. from C&D waste) with a particular strategy of e.g. source separation and elimination due to a suspected but not known PCB contamination entails higher costs. In addition, knowledge about potential sources of contamination is fragmented as construction practices and materials vary to a great extent from country to country.
- Prioritization of waste streams/open applications known to be contaminated with PCB is necessary as a first step before an active strategy on elimination can be set up.
- Monitoring programmes need to be implemented and expanded to identify potential open sources of PCB, which would allow targeting them more efficiently.

Good practices to identify the overall POP/PCP contaminations in the environment can be found e.g. in DE where the Federal Environment Agency monitors the occurrence of POPs (incl. PCB) and POP candidates in biota (see GP 9-1). As PCB from open applications mainly occurs in Construction and Demolition Waste, the recently published EU ‘Construction & Demolition Waste Management Protocol’ is perceived as further good practice to allow a source separation of POP-containing wastes from construction sites (see GP 9-2). Additionally, national and regional guidelines on controlled demolition/’unbuilding’ as e.g. issued in Bavaria (DE) can be considered as good practice (see GP 9-5). Further guidelines particularly focussing on PCB in buildings or other materials/products used in construction can be found in DK and SE (see GP 9-3 and GP 9-6).

**Conclusions**

During the project the clear impression was given that only few Member States already substantially address PCB from ‘open’ applications.

### 6.2.5 Reporting on implementation and survey – Progress between 2011 and 2016

**Relevance**

Member States report to the COM on the application of the EU POP Regulation pursuant to Article 12 of that Regulation; further, they report to the Secretariat of Stockholm Convention in accordance with Article 15 of the Convention (and have to establish, and update as appropriate, National Implementation Plans pursuant to Article 7). Whereas these reports seem to suggest that the legal framework for compliance with the EU POP Regulation, as well as for compliance with the PCB Directive, seems to be well in place and applied, doubts remain about certain obligations regarding
PCB stemming from the EU acquis, and the general level of application and enforcement of the relevant legal documents.

In this context, the Commission conducted a survey in 2012/2013, and repeated the survey exercise in 2016, among the competent authorities of the Member States requesting information about current amounts of PCB equipment and PCB wastes in their territory. The responses to the survey in 2012/2013 showed the progress made in the EU towards the safe disposal of large PCB equipment, resulting in the elimination and decontamination of the large majority of large PCB equipment that existed in the EU. However, despite the efforts undertaken, significant quantities of PCB equipment are still in use, and following this survey only three Member States have achieved to decontaminate or to dispose of all pieces of large PCB equipment by the end of 2010, as required by the PCB Directive.

The survey further has indicated the lack of reliable and comparable data in the EU: reporting has been in some cases incomplete and in some cases, the number of pieces of equipment instead of the PCB content (expressed in kg or tonnes) were reported. Some Member States did not distinguish between equipment containing more than 500 ppm PCB and equipment containing more than 50 ppm PCB, as required in the Directive. In view of these inconsistencies, it is not possible to establish the precise remaining amounts of PCB equipment and PCB waste.

In the survey, MS were also invited to explain the problems they have encountered when decontaminating and disposing of PCB waste. Several MS have reported that owners had not notified the existence of PCBs, which has led to unexpected quantities of PCB wastes to be managed by the MS. In addition, legal uncertainty (such as owners of PCB wastes being involved in bankruptcy processes) and economic problems, as well as the lack of appropriate treatment facilities in some countries, have been cited as obstacles to a timely decontamination and disposal of the large PCB equipment.

The following section provides for an assessment of the Member States’ replies in the framework of the 2016 survey, including considering the progress made in comparison to the 2012/2013 survey.

Not all selected Member States completed the questionnaire for both years (2012/2013 and 2016) and thus information regarding the progress could only be assessed for a limited number of Member States, i.e. Belgium, Bulgaria, Czech Republic, Germany, Spain, France, Poland, Romania, and Sweden.

The questionnaire on PCB wastes consists of six questions and is structured as follows:

- The first question is about the current situation regarding the amount of used or waste PCBs and the equipment containing PCB, and whether the country prepared a diagnosis about the PCB stocks/elimination and what main findings were made from that diagnosis.
- The second question raises the question of responsibilities and ownership as well as the number of PCB contaminated sites. If there are contaminated sites, actions undertaken or envisaged to remediate the situation should be listed.
- The third question deals with suitable treatment facilities for PCB waste and their respective capacities and treatment mode.
- The fourth question is about the reasons for existence of PCB; it consists of three sub-questions to give a qualitative assessment. The respondent has to give detailed information why all the PCB have not been eliminated yet, if PCB is still in use in the MS and if yes, in which applications and
when will the PCB be eliminated from these applications; and finally, whether it is likely that further PCB containing wastes can be identified in the future and from which sources.

- Question five indicates information about the future actions. The respondent has to indicate whether the MS has an updated elimination plan and its time horizon. Furthermore, indicate the included measures and the predominant elimination techniques.
- Finally, the respondents are invited for providing recommendations for the management and elimination of PCB equipment according to their experience.

Summary of progress made in the Member States

In the following, the progress made between 2012/2013 and 2016 within the relevant selected Member States according to the assessment of their response to the questionnaire is briefly summarised.

Belgium, Flemish Region

Since 2011 the Flemish Region in Belgium reduced their total amount of waste containing PCB as well as the PCB quantity in waste. A PCB stocks inventory has been established at Federal level in 1986 and updated in 1999, after which date each owner in Flanders has to report remaining PCB stocks. The database in 2016 contains specific information about the amount of PCB stocks (in contrast to the 2011 reply). In 2011 the identified amounts of PCB wastes were only owned by the private sector, added by the state-owned companies in 2016 regarding the transport sector. 24 cases of contaminated sites are listed in the 2016 reply (contrasted to 2011 when no information was available). The capacities of suitable treatment facilities for PCB wastes did not change significant during 2011 and 2016. The reasons indicated for the existence of PCB wastes are the same in 2011 and 2016: most of the PCB containing equipment has been eliminated well before 2010. According to Flanders’ reply, PCB containing transformers are occasionally discovered during inspections. Regarding future actions there are no differences between 2011 and 2016. Since 2011, the focus is on the decontamination for large appliances and the incineration of small appliances. Recommendations were neither given 2011 nor 2016.

Belgium, Brussels Capital Region

For the Brussels Capital Region no information was indicated about the PCB quantity in 2011 or 2016, and the same is true for comparable information about PCB waste quantity. As in Flanders, the inventory prepared by the Federal level as updated in 1999. Since 1999 also, each owner had to report this kind of equipment to the competent authorities so the list of equipment could be updated. Concerning the responsibilities and ownership, no information is available. Compared to 2011 the number of contaminated sites with PCB did slightly increase, as did the number of investigated sites. Brussels Region informs that there is no suitable treatment facility for PCB in the Region (for 2011 and 2016), Future actions regarding the elimination have not been modified for 2016 since 2011, and recommendations were neither given 2011 nor 2016.
Bulgaria

Bulgaria informed that there are no PCB stocks left in 2016. During the inventory updates, it was also found that a special amount of PCB capacitors was missing due to robbery, illegal handling or incompliant storage. In 2016, 100% of all the available phased-out PCB containing equipment and waste containing PCB were eliminated. Regarding treatment capacities, the 2016 reply points out that due to lack of suitable facility/incinerator in Bulgaria, all available PCB equipment has been exported to EU countries. Further, Bulgaria informs they do not expect to identify further PCB containing waste in the future. All future actions mentioned in 2011 to eliminate the PCB containing wastes have been completed by 2016 and actions are not planned at this stage. Recommendations were neither given 2011 nor 2016.

Czech Republic

The total amount of PCB wastes in the Czech Republic was significantly reduced in the period from 2011 to 2016. The number of identified contaminated sites substantially increased from 332 in 2011 to 387 in 2016. As action undertaken or envisaged to remediate the situation there is no difference between 2011 and 2016. Each site is evaluated separately and solved “case-by-case” according to national guidelines. Compared to 2011, the capacity of treatment facilities has been increased in 2016. The Czech Republic states its intention that all PCB will be eliminated by 2028. The discovery of more PCB containing wastes is not expected in the future. Concerning PCBs management and future actions in 2016, there are defined as short-term activities and as long-term goals. The new WMP of the Czech Republic 2015-2024 contains objectives and measures in area of PCBs and the NIP is under revision.

Germany

In Germany, PCB waste quantity has been reduced since 2011. An investigation on PCB stocks/elimination has been performed in 2012, updating prior findings and resulting in few pieces of PCB containing equipment discovered, originating mainly from private owners but also from public owners. The number of contaminated sites has been reduced between 2011 and 2016, and all relevant sites are monitored, secured or remediated. Germany provided a comprehensive list with suitable treatment facilities in 2016 (as it had been done in 2011), but felt unable to provide figures on total capacity. Further, in general all PCB wastes have been eliminated before 31 December 2010 yet certain amounts mainly from private owners have been discovered later. No future actions are determined and no recommendations are given for 2011 and 2016.

Spain

Spain reports in the second questionnaire the situation as of December 2014. Since the report of the inventory in 2011, Spain reduced their PCB wastes in total. A diagnosis of the PCB stocks and
elimination in 2011 has been prepared based on the results of the Spanish Inventory of PCB (with stock remaining that as of 2016 is explained with economic reasons). Spain acknowledges that additionally to stocks identified, devices with PCB may be identified in future that their owners have not declared. Information concerning the responsibilities and ownership were not indicated 2011 or 2016. Contaminated sites are not specifically identified. Treatment capacities remain unchanged between 2011 and 2014. There a still PCB in use in Spain but the transformers will be disposed by the end of their useful life. A recommendation in 2011 was an EU initiative to reinforce and assist the phase-out of PCB that has not yet been phased out in Member States; this is somewhat emphasized in 2014.

France

No specific numbers are provided by France for allowing to compare the PCB waste situation 2011 and 2016. In 2016, France reported a diagnosis about the PCB stocks from 2015 which includes an annual report. The situation regarding responsibilities and ownership remains unchanged between 2011 and 2016 with the private (energy) sector holding the biggest amount. The number of identified contaminated sites increased considerably from 297 in 2011 to 506 in 2016. As future actions, France’s report of 2011 mentions an updated elimination plan concerning polluted equipment as well as a time horizon for the elimination by 2025 in accordance to the Stockholm Convention. In 2016 the focus is on a new recall campaign in the first quarter of 2017. Holders of PCB contaminated equipment have to declare and provide evidence regarding the conformity of the device. Awareness campaigns have been and are being carried out at national and local level. As recommendation in 2016, France is open to exchange experiences with other Member States.

Romania

Romania reports the situation as of December 2013. Furthermore, the inventory is based on the number of pieces of PCB equipment (and not on weight). Since 2011, the equipment containing PCB and also the used or waste PCBs has been reduced. An inventory for equipment containing PCB, and PCB waste, has been prepared in 2005 and is annually updated. Based on this inventory, the national plan for elimination/disposal of equipment with PCB has been prepared. Stocks were reduced between 2011 and 2016. Regarding the contaminated sites, there is a list of potentially contaminated sites, but no reliable information regarding contamination with PCB is indicated for 2011 or 2013. No data are reported regarding treatment capacity. The main reasons for waste equipment that was not disposed by the end of 2010 is that the holder faces uncertain juridical or economic situation. Existing PCB from transformers and capacitors will be eliminated at the end of equipment lifecycle. The national elimination plan is updated annually, based on the individual elimination plans established by the owners. Equipment in operation may be used until the end of its lifecycle, but not later than 2025, as the Stockholm Convention requires. Recommendations were neither given for 2011 nor for 2016.
**Sweden**

Sweden does not have statistics for PCB products taken out of use. Since Sweden reports that domestic hazardous waste treatment is considerable enough for handling expected incoming PCB-waste within a reasonable time, no stocks of used or waste PCB are identified or expected. Regarding the diagnosis about the PCB stocks/elimination in 2011, the Swedish legislation states that all PCB in this kind of equipment should be eliminated as soon as possible. All PCB from decontaminated equipment should be destroyed after removal. All equipment with PCB levels higher than 500ppm has been decontaminated before end of 2010. Responsibility and ownership did not change since 2011 and 2016 whereas the number of identified contaminated sites slightly increased between 2011 and 2016. All sites are monitored for remediation or other measures. A number of sites have already been remediated. PCB equipment still in use is expected to be decontaminated within a few years according to Swedish legislation; a time limit of 2010 for decontamination or disposal of such equipment has been replaced by a requirement to take such measures immediately. PCB equipment still in use is in most cases expected to be decontaminated or disposed of within a few years. It is likely that PCB can still be found in small electronic equipment. Concerning recommendations Sweden suggests reviewing the national Ordinance on PCBs to set up compulsory inventories of PCB sealants and flooring materials and remediation/decontamination of sealants and floorings containing more than 500 ppm (mg/kg) PCB product.

**Conclusion on Member States’ progress as regards PCB management**

After evaluating the available questionnaires, the nine countries which have been compared can broadly be divided into three categories:

- The first category contains one MS (Bulgaria) where it is reported that there are no PCB stocks left anymore and all remaining PCB equipment has been eliminated;
- The second identified category contains Member States which reported that already in 2011, all PCB has been decontaminated but discovered PCB equipment in the second reporting period and acknowledge that it is likely that PCB can still be found in selected waste streams. Member States of this category report that their domestic waste treatment capacity is high enough to handle incoming PCB-waste within a reasonable time. Based on this fact, these Member States do not plan special actions for the future. Part of this category are Germany and Sweden.
- The third category includes most of the Member States; although all countries have significantly reduced their amount of PCB waste, PCB and PCB stocks still do exist. The most frequently mentioned reason for the existence of PCB waste is an economic constraint. All of the countries have prepared plans regarding PCB management, which are regularly updated. The aim is to eliminate the PCB waste till 2025 to fulfil the requirements of the Stockholm Convention. The countries in this group are Belgium (Flemish and Brussels Capital Region), Czech Republic, Spain, France and Romania.
7 Recommendations for improving hazardous waste management in the EU

7.1 Recommendations for individual Member States

The individual ‘roadmaps’ (attached to this report, see Annex 2) for the 14 selected Member States take up the 3-6 major challenges in HW and PCB/PCB waste management and further describe the challenges and the main reasons behind in a structured way. Based on the particular challenges, a set of potential measures is recommended, including a brief summary on the type of instrument, responsibility, indicative time scale, estimated cost and available EU funds. To further illustrate the suggested measure, relevant good practice examples from (other) EU MS are described in the roadmaps. Lists of good practices structured alongside several categories are provided in Annex 4 for HW management and Annex 5 for PCB/PCB waste management. In addition to the identified good practices from the current study, also the good practice examples identified in the previous “Study to improve hazardous waste management based on an assessment of Member States’ performance” from 2015 have been considered for the elaboration of the roadmaps.

In the roadmap, each challenge is addressed with particular measures. However, in many cases the proposed measures will not exclusively address a single challenge but usually address several fields of HW management. Additionally, also the challenges in practice are strongly related to each other and not necessarily independent challenges.

7.2 General recommendations

Classification of hazardous waste

Effective planning and enforcement of hazardous waste management is only feasible with correct, clear and consistent classification of hazardous waste. Without an application of the hazardous waste definition which captures all relevant waste streams, Member States will not be able to estimate the type, quantity and source of waste generated within the territory or the way in which this waste will be transported, treated and/or disposed. In addition, insufficient classification of relevant waste as hazardous will create a “blind spot” for enforcement authorities. Hazardous waste doesn’t disappear from the radar; it merely never gets caught by it. The data collected during this study indicated that ensuring the classification of hazardous waste by operators poses an important challenge for Member States. Bearing in mind the identified challenges, while also taking into account the relevant good practices, we would like to recommend the following:

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33 [EC 2018b], http://ec.europa.eu/environment/waste/studies/index.htm
Create clear and harmonized guidance on waste classification\textsuperscript{34}

An important step forward for various Member States would be the creation of guidance on the correct waste classification. To enhance harmonization of application between Member States, such guidance should be in line with the soon to be published guidance on EU level. This could mean that, in various aspects, the national guidance will constitute a mere attachment to the EU guidelines on the basis of specific national circumstances or frequent questions by operators. The alignment of national guidance with the EU guidance may require updating or refining of the latter. The national guidance should be presented to operators and stakeholders as the conclusive explanatory document with regard to the definition of hazardous waste. Consequently, any conflicting legislation, guidance or standards should be amended or, if necessary, repealed.

Establish and nurture a “culture” of clarity and compliance with regard to the established guidance

As discussed above, the national guidance should be presented to operators and stakeholders as the conclusive explanatory document with regard to the definition of hazardous waste. This could require enhanced communication towards operators and stakeholders, involving awareness raising, education, knowledge transfer and a consultation (e.g. specialized helpdesk or advisors). Furthermore, measures can be taken to enhance a culture of compliance with the guidance, through the involvement of stakeholders in the awareness raising, knowledge transfer and education measures. Within this context, Member States can also target dedicated industry sectors based on intelligent assessment of different data sources (production, E-PRTR and waste data) with campaigns and inspections. Finally, certain specific measures can be taken to create more transparency in the management chain with regard to the handled waste streams. An example would be the inclusion of information on hazardous properties of waste on the consignment notes accompanying the waste movements.

To support the implementation of the above, we recommend the EU Commission takes the following measures:

- Publish (and update if needed) the EU’s guidance document on waste classification in the national languages of the Member States; promote the usage of the guidance in the Member States;

The three pillars of enforcement

\textsuperscript{34} [EC 2008], Classification of waste is to be distinguished from the issue of application of the waste definition (i.e. waste or not). Guidance on the application of the waste definition can be found in the European Commission’s Guidance on the interpretation of key provisions of Directive 2008/98/EC on waste. Waste classification becomes relevant once it is recognised that a material stream is waste. The European Commission is currently producing a new guidance on the waste classification.
Many of the identified challenges and opportunities concerning hazardous waste management in the Member States relate to the more general subject of enforcement. Within the context of this study, it is relevant to mention that effective enforcement requires sufficient oversight by competent authorities to identify and potentially sanction infringement of hazardous waste legislation. The collected data indicates that various Member States face challenges with regard to maintaining sufficient oversight on the hazardous waste management chain. Bearing in mind the identified challenges, while also taking into account the relevant good practices, we would like to make recommendations along the lines of three pillars of enforcement which the study has identified and which coincide with the chapters on inspections, shared responsibility and record keeping and tracing.

![Figure 10: The three pillars of enforcing hazardous waste legislation](image)

**Comprehensive and coordinated inspections**

In general, Member States are recommended to increase regular and strict inspections and include unannounced inspections. For the organisation of inspection activities, the tools provided by IMPEL on inspections cycles[^35], as well as the guidance on for planning of environmental inspections[^36] may offer insights. Furthermore, cross-analysis of business, chemicals and waste could enhance the effectiveness of such inspections. As a particular example, we suggest the installation of working groups comprising representatives from the competent authority, the inspection body and other organisations across thematic fields (waste, emissions, chemicals, etc.) to review datasets from different sources and reported under different legal regimes (e.g. waste statistics, data on produced goods/imports/exports, EPRTR emission data, ...) to identify suspicious industry sectors where hazardous waste generation may be comparably low. In some Member States, the availability of sufficient capacity for effective coverage of the hazardous waste management chain may be a pre-condition to the effective functioning of the inspection apparatus.

With regard to specifically the mixing ban, we would recommend ‘ex-ante’ controls (prior to permitting; permit conditions) and ‘ex-post’ by frequent unannounced site-visits;

[^35]: [IMPEL 2018a], [https://www.impel.eu/environmental-inspection-cycle/](https://www.impel.eu/environmental-inspection-cycle/)
In addition, the various inspection efforts within a specific Member State could be better coordinated among the different authorities having responsibility on waste to ensure a maximum coverage of the hazardous waste management chain, as well as the effective exchange of information and knowledge. In addition, such coordination may also enhance the harmonized interpretation and application of hazardous waste legislation by authorities. Coordination between various inspection authorities could be stimulated in an institutionalized form through working groups, but could also be achieved by dedicating capacity to this specific end.

Finally, the European Commission’s action plan to improve environmental compliance and governance aims to enhance compliance with EU environmental regulations. To this end, the plan envisages various actions in 2018 and 2019, including enhancement of inspection skills and sharing of good practices.37

**Strengthened responsibility of waste producers and other chain operators**

Enforcement of hazardous waste legislation, through increased oversight for authorities and enhanced compliance by operators can be partly achieved through strong responsibility of waste producers and other management chain operators with regard to the fate of hazardous waste. In particular, an approach where responsibility is not delegated but remains with the initial producer/the first waste holder (or any downstream holders as applicable) is considered having beneficial effects; in this case, the actor which is held responsible will always have a strong motivation for applying due diligence in selecting a reputable waste management company instead of solely considering the price. Hence, in jurisdictions that recognise such “shared responsibility”, it is common for waste producers to commission audits regarding proper waste management.

**Adoption of electronic record keeping and tracing systems**

The adoption of electronic record keeping and tracing systems offers great potential for national authorities with regard to the generation of reliable and consistent data with regard to the way in which hazardous waste is managed. The centralization of such systems will enable various authorities on the centralized and decentralized level to access and exchange information. Consequently, we recommend that such electronic systems ensure nationwide coverage. To maximize the effect of such a wide coverage the system should also provide the possibility for local authorities to access information on waste treatment operation in other regions. Finally, electronic record keeping and tracing systems could provide an extra benefit for waste management planning as a rich database on waste movements and treatment.

The Commission proposal on electronic record keeping provides a good basis and could even be extended to tracing systems in the future. The extent to which an electronic record keeping or tracing system creates administrative burden for authorities and operators is dependent on the structure and requirements of the database. This issue will be touched upon under the recommendations for the

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37 European Commission, EU actions to improve environmental compliance and governance, COM (2018) 10 final (January 2018)
Commission, as the specific requirements for the proposed electronic record keeping system are to be determined by the latter.

To support the implementation of the above, we recommend the EU Commission takes the following measures:

- **Follow up to the obligation for the Member States to set up an electronic registry and oblige actors to make data on hazardous waste available to the authorities through this register;**
- **Define minimum operating conditions for the operation of such registries, e.g. harmonise the reporting frequency; such minimum operating conditions should take into consideration the different technical and administrative capacities of the Member States;**
- **Elaborate on the interface between national HW movements and transboundary shipments, including a possible initiative, if feasible and appropriate, for linking an electronic tracing / record keeping system for wastes subject to the EU Waste Shipment Regulation.**

Stimulating the application of the waste hierarchy for hazardous waste

The treatment of hazardous waste according to the waste hierarchy may seem a challenging objective for Member States which are facing other challenges with regard to planning and enforcement of the hazardous waste management chain. However, the current developments with regard to resource efficiency and the circular economy imply increased effort by all Member States to stimulate the application of the waste hierarchy, even with regard to hazardous waste. Bearing in mind the identified challenges, while also taking into account the relevant good practices, we would like to recommend measures which could be taken by most of the Member States to increase the application of the waste hierarchy.

Figure 11: Waste hierarchy, © European Commission

**Explicit inclusion of hazardous waste prevention measures and targets in waste management plans**

As the highest level of the waste hierarchy, prevention deserves enhanced attention within the national WMPs. To this end, HW could be explicitly included in WMPs as an own category of special
concern. This may enable and stimulate national authorities to design measures which are specifically geared towards the prevention of hazardous waste and which take into account the specific characteristics and challenges of this category. Furthermore, the envisaged measures under the WMPs could be linked to ambitious but realistic targets.

Reflecting the waste hierarchy in national legislation, permitting and enforcement

A first step for Member States would be the clear anchoring of the waste hierarchy as a hard requirement in their legislation and, more specifically, permitting and enforcement systems. In general terms, this can be pursued by adopting legally binding rules (additionally or alternatively: non-binding, comprehensible guidance for business and authorities) in terms of application of waste hierarchy for HW in general and for different important HW streams. In addition, more specifically, the regular updating of permits to reflect a realistic “higher” treatment may provide additional incentives to operators to upgrade their treatment technologies. Regular updating of permits will also ensure a level playing field for all operators. A less forgoing measure to stimulate the application of higher standards of treatment would be the making public of available information on findings for treatment options for specific types of HW. Such a measure should however take into consideration commercially sensitive information.

In addition, permitting practice should consider the following aspects to enable the implementation of the waste hierarchy for hazardous waste and ensuring the best level of environmental protection:

- Actors managing hazardous waste could be obliged – where appropriate - to provide a deposit/bank guarantee upon commencement of their business to cover potential liabilities
- Publicly available overview of permitted/registered companies for transport, brokering, dealing, treating hazardous waste in each Member State, would allow for search by type of wastes and location. Additionally, an indication of up-to-date treatment prices would increase transparency.

Collection and dissemination of knowledge on potential hazardous substances in recycled material

Currently, various initiatives are being developed to map substances of concern in waste streams which may end up in recycled materials and to assess the resulting risks for human health and the environment. Some of these initiatives are being developed on the European level and their results will undoubtedly be shared with the Member States. Member States are recommended to actively participate in and contribute to such EU initiatives. Furthermore, various mappings and assessments are also being carried out on the national level. Knowledge developed in one Member State could be shared with other Member States. Furthermore, academic exchange of knowledge could play an important role in this regard.

To support the implementation of the above, we recommend the EU Commission takes the following measures:
- Stimulate the application of the waste hierarchy for hazardous waste while protecting environment and human health
- Provide framework guidance on application of the waste hierarchy, in particular for hazardous waste
- Continue the envisaged initiative under the roadmap “Analysis of the interface between chemicals, products and waste legislation and identification of policy options” and its subsequent Commission communication, inter alia develop knowledge with regard to the risk of Substances of Very High Concern in recycled materials

Hazardous waste as an integral part of waste management planning

Waste management planning is an essential tool with which Member States anchor the obligations and goals of EU waste law into their national waste management practice. Planning within the context of hazardous waste is essential since legal concepts such as the waste hierarchy are elaborated and operationalized within national waste management plans. However, the collected data in this study has shown that Member States are still facing some challenges with regard to certain required elements of the waste management plan, in particular when it comes to hazardous waste. WMPs should include at least an overview of waste generation and waste treatment modes (pre-treatment, recovery, recycling, disposal) in the recent past, as well as an overview of existing and planned treatment and disposal facilities, including their capacities, the types if waste that can be accepted and their location. In the absence of this information, it is not possible to identify trends and to assess whether the existing plants suffice to manage the waste properly now and in the future and to identify additionally needed facilities.

When it comes to planning of hazardous waste management we further recommend that Member States include measures in their waste management plans which introduce or expand separate collection for hazardous waste from households and small-scale businesses and conduct awareness raising and education for the citizens to better inform them about HW and to change their habits (see also the corresponding good practices, e.g. GP 7-5)

Hazardous waste as explicit part of waste management planning

Firstly, we recommend Member States to explicitly include hazardous waste in waste management plans as an own category of special concern or set up dedicated plans for hazardous waste management. This may enable and stimulate national authorities to design measures which are specifically geared towards the correct management of hazardous waste and which take into account the specific characteristics and challenges of this category. If the competencies are decentralised on regional level, we recommend that explicit planning and development of measures related to hazardous waste are closely coordinated and harmonised to the extent possible.

Reliable and comparable information on hazardous waste as decision basis for planning

38 http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1516900580991&uri=CELEX:52018DC0032
WMPs should include at least an overview of waste generation and waste treatment modes (pretreatment, recovery, recycling, disposal) in the recent past, as well as an overview of existing and planned treatment and disposal facilities, including their capacities, the types of waste that can be accepted and their location. In the absence of this information, it is not possible to identify trends and to assess whether the existing plants suffice to manage the waste properly now and in the future and to identify additionally needed facilities. To that end, Member States should ensure precise, reliable and comprehensive databases on hazardous waste management. In particular, Member States should identify, assess and prioritize the major hazardous waste streams generated country-wide and in regions, applying scientific standards with waste statistic data being only one of several sources, to establish a sound decision basis. With regard to the establishment of a database on waste and the collecting of information, the recommendations with regard to record keeping are also relevant.

To support the implementation of the above, we recommend the EU Commission takes the following measures:

- Strengthen the European approach on planning treatment capacities for hazardous waste based on national Waste Management Plans;
- Extend the existing guidance on waste management planning ("Preparing a Waste Management Plan. A methodological guidance note") with technical guidance on hazardous waste management planning in national languages to ensure a more coherent and appropriate planning practice in the Member States, i.e. by providing clarification what key elements should be contained in hazardous waste management and to what extent these elements have to be described to be sufficiently covered;
- Raise awareness among Member States of the need to have a thorough section on hazardous waste (including the most relevant hazardous waste streams) in the national and regional WMPs;
- Discuss the option to establish a European register for permits of hazardous waste treatment facilities.

Continued actions to identify and eliminate PCB from closed and open applications

In many Member States the identification and elimination of PCB from closed application is considered to be completed. However, this project reveals that based on experience in many Member States, efforts on identification of PCB from closed applications needs to be continued by applying targeted (supply chain based) investigations. Furthermore, efforts are required to eliminate the inventoried equipment which was allowed to be used until the end-of its lifetime considering the deadline for total elimination of PCB equipment by 2025 as stipulated in the Stockholm Convention.

Additionally, only a few Member States have already started to systematically address PCB from open applications. Considering the experience in Member States already addressing PCB from open applications it can be concluded that a high risk of PCB contaminations stemming from PCB usage in open applications has to be assumed for all Member States. Thus, the following actions are recommended for Member States not yet addressing this issue:

- Extend knowledge on PCB contaminations/reservoirs in the Member State and their origin, inter alia by improving the monitoring of PCB in the environment
- Extend knowledge on historic usage of PCB-containing materials in e.g. buildings and other open applications in the Member State
- Prioritise waste streams (e.g. address waste from construction and demolition) with a particular strategy of e.g. source separation and elimination of PCB containing waste

To support the implementation of the above, we recommend the EU Commission takes the following measures:

- Transpose the deadline to eliminate all PCB from closed applications by 2025 from the Stockholm Convention into the EU POP Regulation
- Elaborate a strategy to identify and eliminate PCB from open applications or set up guidelines for the national strategies of the Member States
- Further promote the EU Protocol on Construction and Demolition waste, as well as the upcoming guidance on 'pre-demolition audits'.
8 Information Sources


[BG Balbok 2016] Interview with company Balbok - HW collection and treatment, Ms. Ralitza Anguelova on 1 December 2016


[BG EU COM PCB wastes 2016]: Bulgaria answers to the EC questionnaire with regard to implementation of Council Directive 96/59/EC

[BG ExEA 2016] Interview with Mrs. Veselina Roshleva, 12 December 2016

[BG HCW 2015] Ordinance N 1 on collection and treatment of healthcare waste (Наредба № 1 от 09.02.2015 г. за изискванията към дейностите по събиране и третиране на отпадъците на територията на лечебните и здравните заведения)


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vznikajících ke sběru a zpracování autovraků a o informačním systému
sledování toků vybraných autovraků (o podrobnostech nakládání s autovraky)
(Directive on end-of-life-vehicles)

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kterou se stanoví Katalog odpadů, seznam nebezpečných odpadů a seznamy odpadů
a států pro účely vývozu, dovozu a tranzitu odpadů a postup při udělování souhlasu k
vývozu, dovozu a tranzitu odpadů (Katalog odpadů), ve znění pozdějších předpisů
(Waste shipment regulation)

polychlorovanými bifenyly, polychlorovanými terfenyly,
monometyltetachlorodifenylenetanem, monometyldichlordifenylenetanem,
monometyldibromdifenylenetanem a veškerými směsmi obsahujícími kteroukoliv z
těchto látek v koncentraci větší než 60 mg/kg (o nakládání s PCB) (Directive on PCB
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D,G,R, n, 2124 del 27/10/2003 “Integrazione dei criteri ed indirizzi regionali per la pianificazione e la gestione dei rifiuti in materia di apparecchi contenenti PCB/PCT non soggetti ad inventario a norma dell’art. 4, paragrafo 1, della direttiva 96/59/CE”, L’ordinanza (avente carattere di necessità ed urgenza) introduce d’imperio nei piani provinciali vigenti prescrizioni relative alla gestione degli imballaggi e dei rifiuti di imballaggio e prescrizioni relative agli apparecchi contenenti PCB/PCT

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FEAD Stakeholder consultation concerning HW management in the Member States, information provided by Elisabetta Perotta – FISE, 27 February 2015

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Answers from FISE Assoambiente concerning HW management in Italy, information provided by Elisabetta Perotta , 23 December 2016

D,P,R, n, 226 del 30/06/2004 B,U,R, n,30 del 28/07/2004 - Supplemento “Piano per la raccolta e lo smaltimento degli apparecchi contenti PCB non soggetti ad inventario”

D,G,R, n, 2946 del 05/11/2004 B,U,R, n,1 del 05/01/2005 – Supplemento “Programma per la decontaminazione e lo smaltimento degli apparecchi inventariati contenenti PCB e del PCB in essi contenuto”

Answers from ISPRA concerning hazardous and PCB waste statistics in Italy, Information provided 1 December 2016


Answers from ISPRA concerning hazardous and PCB waste statistics in Italy, Information provided 2 March 2017


Nella Regione Lazio, la Giunta Regionale ha appovota con Deliberazione n, 112 de 10/7/2002 il ”Piano di Gestione die Rifiuti della Regione Lazio”, in attuazione del D,LGS, N, 22/1997 e s,m,i, e del D,Lgs, N,209/1999 in ordine allo smaltimente die PCB/PCT


D,g,r, 6 giugno 2012 - n, IX/3596 Nuovi indirizzi tecnici per il rilascio delle autorizzazioni in merito alle attività di miscelazione dei rifiuti, anche in seguito all’emanazione del d,lgs, 205/2010, con contestuale revoca della d,g,r, 3 dicembre 2008, n, VIII/8571 recante: “Atto di indirizzo alle Province per il rilascio delle autorizzazioni in merito alle attività di miscelazione dei rifiuti”
[IT LOM 2017] Answers from region Lombardy concerning HW management, information provided by Dario Sciunnach, Silvia Cappa and Maurizio Frascarolo, 20 January 2017

[IT LOM PCB 2004] D,C,R, n, 993 del 06/04/2004 “Programma regionale per la decontaminazione e lo smaltimento degli apparecchi contenenti PCB”

[IT MAS 2015] Answers from Prof, Antonio Massaruto, University of Udine concerning hazardous waste management practices in Italy, Information provided 03,08,2015


[IT MoE 2015] E-Mail from Italian MoE from Ms, Sagnotti Giulia concerning WMP in Italy system in Luxemburg, 18 March 2015


[IT MoE 2016] Answers from Italian MoE from Ms, Giulia Sagnotti concerning hazardous waste management in Italy information provided between 14 and 16 December 2016

[IT MoE 2016a] Answers from Italian MoE from Vincenzo Fiano concerning PCB waste plans in Italy, information provided between 14 and 16 December 2016

[IT MoE 2017] Presentation by Ms, Giulia Sagnotti (Italian MoE) during the Seminar on hazardous and PCB management on September 15, 2017 in Rome


[IT REM 2015] Answers from company “Remondis” concerning hazardous waste management practices in Italy, Information provided by Ludwig Ramacher, Remondis, 17,06,2015

[IT SAR PCB 2002] D,G,R, n, 39/47 del 10/12/2002 - D,G,R, n, 12/9 dell’11/03/2004 “Programma per la decontaminazione e lo smaltimento degli apparecchi soggetti ad inventario ai sensi dell’art,3 c,1 e 2 del D,Lgs, 209/99 e dei pcb in essi contenuti e Programma per la raccolta e il successivo smaltimento degli apparecchi contenuti PCB per volume inferiore o uguale ai 5dm3, Adeguamento del piano regionale di gestione dei rifiuti-sezione rifiuti speciali”

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D,G,P, n, 1799 del 06/08/2004 “Programma per le decontaminazione e lo smaltimento degli apparecchi contenenti PCB per un volume superiore a 5 dm³ soggetti ad inventario”, (PCB Inventory)

D,G,P, n, 2914 dell’ 11/08/2004 “Approvazione del Programma per la decontaminazione degli apparecchi contenenti PCB”,


Aggiornamento al 31/12/2006 del programma di decontaminazione, raccolta e smaltimento degli apparecchi contenenti PCB soggetti ad inventario ai sensi del D,lgs 209/2009

http://www.arpa.umbria.it/resources/norme/regionali/Deliberazione%20della%20Giunta%20Regionale%20%20n.%201407%20del%203%20Settembre%202007.pdf

Aggiornamento al 31/12/2008 del programma di decontaminazione, raccolta e smaltimento degli apparecchi contenenti PCB soggetti ad inventario ai sensi del D,lgs 209/2009

http://www.arpa.umbria.it/resources/norme/regionali/Deliberazione%20della%20Giunta%20Regionale%20%20n.%201407%20del%203%20Settembre%202007.pdf

Integrazione e aggiornamento al 31 dicembre 2009 del programma di decontaminazione, raccolta e smaltimento degli apparecchi9 contenenti PCB soggetti ad inventario ai sensi del D,lgs 209/99

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Deliberazione Giunta Regionale n,977 12/9/11
"Aggiornamento al 31 dicembre 2010 del programma di decontaminazione, raccolta e smaltimento degli apparecchi contenenti PCB soggetti ad inventario ai sensi del D,lgs 209/99"

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Answers from region Veneto concerning HW management, information provided by Luigi Fortunato, 3 February 2017
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Feedback on the draft final factsheet of August 29, 2017 from Polish Ministry of the Environment representative Mrs. Monika Sklarzewska.

**[PL NWMP 2016]**

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**[PL reporting 2015]**

**[PL SARPI 2016]**
Phone call on November 24, 2016 with former employee of the HW thermal treatment installation located in Silesia region (currently SARPI Dąbrowa Górnicza)

Phone call on December 1, 2016 with Manager of the HW thermal treatment installation located in Silesia region (currently SARPI Dąbrowa Górnicza)

Site visit conducted on December 12, 2016

**[PL STAT 2017]**

**[PL STENA RECYCLING 2017]**
Phone call on March 15, 2017 with a representative of HW management company specialized in providing services for industrial facilities in Poland (Stena Recycling)

**[PL Stockholm PCB wastes]**
Electronic Reporting System of the Stockholm Convention (Third reporting)

**[PL substances 2002]**
Resolution of Minister of Economy issued on June 24, 2002 on requirements for the use and movement of the substances posing a particular threat to the environment and the use and cleaning of installations or equipment in which such substances were or are still in use (J. of L. of 2002 No. 96, item 860). Available on the Internet: http://isap.sejm.gov.pl/DetailsServlet?id=WDU20020960860, accessed November 2016

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**[PT ECODEAL 2017]** Interview with Marta Costa, Ecodeal’ Industrial Waste Responsible, concerning Hazardous Waste management in Ecodeal plant, 8 February 2017


**[PT EU COM PCB Wastes 2016]** Questionnaire on PCB Wastes in Portugal for the European Commission,


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[RO GD 173 2000] Government Decision no 173/2000 on special regime regarding PCB and other similar compounds management and control

[RO GD 856 2002] Government Decision no 856/2002 on the waste management record and approval of the waste list, including hazardous waste, as amended

[RO GO 1061 2008] Government Decision no 1061/2008 on transportation of hazardous and non-hazardous waste on Romanian territory


[RO MoE 2017a] MoE e-mail response, Ms. Mihaela Claudia Paun, Stockholm Convention Official Contact Point & National Focal Point, February 7th

[RO MoE 2017b] MoE e-mail response, Ms. Mihaela Claudia Paun, Stockholm Convention Official Contact Point & National Focal Point, March 14th 2017

[RO NEG 2017] Interview with NEG (e-mail response) regarding hazardous waste activities inspection and control, Mr. Cristian Colan, Commissioner, January 26th 2017

[RO NEPA 2016] Interview with NEPA (e-mail response) regarding hazardous waste collection and treatment in Romania, Direction of hazardous waste and chemicals, soil and subsoil, Ms. Brindusa Petroaica, December 16th 2016

[RO NEPA 2017a] NEPA e-mail responses, Ms. Brindusa Petroaica, Director of Waste Management, hazardous substance, soil and subsoil department, February 1st and February 8th,

[RO NEPA 2017b] NEPA e-mail response, Ms. Brindusa Petroaica, Director of Waste Management, hazardous substance, soil and subsoil department, March 10th 2017

[RO NWMP 2017] National Waste Management Plan, 


[RO SETCAR 2016] Interview with SETCAR SA Brăila representatives, Mr. Sandu Bălan, Mrs. Doinița Bodea, Mr. Sorin Șerban and Mrs. Mariana Filip, December 6th 2016


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FEAD Stakeholder consultation concerning HW management in the Member States, information provided by Roy Hathaway – Environmental Service Association (ESA), 05. February and 23 February 2015

Information provided by Email and via phone interview by Mr Gene Wilson from ESA, 24 June 2015, updated on 22 December 2016


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[UK TRADEBE EURITS 2015] Information provided by Email and via phone interview by Mr Andrew Crowther from TRADEBE and Mr Mike Hale from EURITS, 01 July 2015


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[UNEP ASS 2016] Consolidated Assessment of Efforts Made Toward the Elimination of PCB, UNEP/
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treatment, EUROSTAT, edition 2010
Annex 1: Factsheets on hazardous waste and PCB/PCB waste management

All factsheets on hazardous waste and PCB/PCB waste management are available as separate documents attached to this report. Table 8 below includes an overview of available factsheets and the naming of the documents. All factsheets have been reviewed and agreed by the corresponding national competent authority.

Table 8: Overview on attached factsheets on hazardous waste and PCB/PCB waste management

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<td>Belgium</td>
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Annex 2: ‘Roadmaps’ on hazardous waste and PCB/ PCB waste management

All ‘roadmaps’ on hazardous waste and PCB/ PCB waste management are available as separate documents attached to this report. Table 9 below includes an overview of available roadmaps and the naming of the documents. All roadmaps have been shared with the corresponding national competent authority and their feedback was considered. Divergent opinions between stakeholders and the authorities have been marked.

Table 9: Overview on attached roadmaps on hazardous waste and PCB/ PCB waste management

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Annex 3: Explanations on the type of instruments, estimated costs and available EU funds as used in the ‘Roadmaps’

1. Policy instruments

For the categorization of the discussed and recommended policy instruments, this report draws from the definitions used in [HOLIWASTE 2008]. The definitions of this report have, where necessary, been adapted to the specific aspects of this project underlying this report.

1.1 Legal

Legal instruments entail the making mandatory of certain actions or the refraining thereof by way of adopting legislation. On the EU level, such legislation most likely will be adopted in the form of Directives and regulations. On the Member States level, legal instruments could entail laws and underlying legislation such as bylaws. Such national legislation can be an implementation of EU directives. Current examples of legal obligations which have been implemented on the Member States level are the prohibition of mixing hazardous waste with non-hazardous waste and the obligation for operators involved in hazardous waste management to keep records. Legal instruments as understood in this report are to be distinguished from the legal basis which other policy instruments such as administrative, economic and fiscal measures require to be carried out.

1.2 Administrative

Administrative instruments as understood in this report are measures taken by a national authority which facilitate the implementation of legal, economic and fiscal instruments. This includes the running of the administrative structure, the allocation of competences to various administrative bodies and the management of administrative procedures to ensure adequate implementation and application of the legal, economic and financial frameworks through processes such as permitting, enforcement and agreements with other administrative bodies and private parties.

1.3 Informative

Informative instruments as understood in this report are measures of information dissemination with the aim of influencing the behavior of broad or more specific groups within the jurisdiction of a national authority. Groups could entail citizens, consumers or market actors. Examples of informative instruments could be subject-specific websites, telephonic and internet helpdesks and workshops.

1.4 Economic and fiscal

Economic and fiscal instruments are measures which create financial incentives for commercial and non-commercial actors to take certain actions or the refraining thereof. Examples of economic measures could be sustainable or circular procurement criteria. An example of a fiscal measure could be taxing the incineration of mixed household waste to promote after-separation and recycling of this stream.

1.5 Infrastructural
Infrastructural instruments are measures which require initiatives and/or investments to establish a desirable level of hazardous waste management infrastructure. Examples of such infrastructure could be waste collection systems, waste treatment installations and disposal facilities.

2. **Range of estimated costs**

This list provides an indication of costs in the factsheets of this report. However, such an indication may not be accurate for every discussed and/or recommended measure in the report, as the final costs are heavily dependent on the circumstances within Member States, the existing infrastructure, the extent to which a project is developed and its final magnitude.

2.1 **Low**

Low costs are investments non-structural measures, which will most likely not place a heavy burden on the (annual) budget of a national authority. Low costs will be non-structural and usually one-time investments which require no or very few follow-up or upkeep investments to keep its result functioning or relevant. Low cost investments will most likely not require European procurement procedures. Examples of low cost investments could be the drafting or adaptation of guidelines, and establishing formal/informal working groups.

2.2 **Medium**

Medium costs are investments which:

- a) are likely to place a one-time heavy, but manageable burden on the (annual) budget of a national authority, but which do not require no or very few follow-up or upkeep investments to keep its result functioning or relevant.
- b) which will most likely not place a heavy burden on the (annual) budget of a national authority, but which are structural and/or entail substantial follow-up or upkeep investments to keep their result functioning or relevant.

Medium cost investments could require European procurement procedures. Examples of Medium cost investments could be training programmes, light equipment and the adoption of existing IT systems.

2.3 **High**

High costs are investments which most likely entail structural investments which place a heavy burden on the (annual) budget of a national authority. Such a burden may be a one-time event, but could also entail substantial follow-up or upkeep investments to keep their result functioning or relevant. High cost investments will most likely require European procurement procedures. Examples of high cost investments could be the development of new infrastructure or new IT-systems.

3. **List of available EU funds**

This list provides a non-exhaustive indication of available EU funds. More information on EU funds can be found at: [https://ec.europa.eu/info/funding-tenders_en](https://ec.europa.eu/info/funding-tenders_en)
3.1 **The Structural Reform Support Programme (SRSP)** is an EU programme that provides tailor-made support to all EU countries for their institutional, administrative and growth-enhancing reforms. The SRSP support covers the entire reform process, from preparation and design to implementation of the reforms. It is demand driven and does not require co-financing from EU countries.

3.2 **The European Fund for Strategic Investments (EFSI)** is the central pillar of the Investment Plan for Europe. It aims to tackle the lack of confidence and investment which resulted from the economic and financial crisis, and to make use of liquidity held by financial institutions, corporations and individuals at a time when public resources are scarce. The Commission works together with its strategic partner, the European Investment Bank (EIB) Group. The EFSI supports strategic investments in key areas such as infrastructure, energy efficiency and renewable energy, research and innovation, environment, agriculture, digital technology, education, health and social projects. It also helps small businesses to start up, to grow and to expand by providing risk finance.

3.4 **The ISA² programme** supports the development of digital solutions that enable public administrations, businesses and citizens in Europe to benefit from interoperable cross-border and cross-sector public services. ISA² is running from 1 January 2016 until 31 December 2020. The programme was adopted in November 2015 by the European Parliament and the Council of European Union.

3.5 **The European Regional Development Fund (ERDF)** aims to strengthen economic and social cohesion in the European Union by correcting imbalances between its regions. The ERDF focuses its investments on several key priority areas. This is known as ‘thematic concentration’:

- Innovation and research;
- The digital agenda;
- Support for small and medium-sized enterprises (SMEs);
- The low-carbon economy.

3.6 **The Cohesion Fund** is aimed at Member States whose Gross National Income (GNI) per inhabitant is less than 90% of the EU average. It aims to reduce economic and social disparities and to promote sustainable development.

3.7 **The LIFE programme** is the EU’s funding instrument for the environment and climate action. The general objective of LIFE is to contribute to the implementation, updating and development of EU environmental and climate policy and legislation by co-financing projects with European added value. The European Commission (DG Environment and DG Climate Action) manages the LIFE programme. The Commission has delegated the implementation of many components of the LIFE programme to the Executive Agency for Small and Medium-sized Enterprises (EASME). External selection, monitoring and communication teams provide assistance to the Commission and EASME. The European Investment Bank will manage the two new financial instruments (NCFF and PF4EE).
Annex 4: Overview of good practices in hazardous waste management

1. Waste Management Planning

GP 1-1: Thorough planning of hazardous waste management based on an assessment of generated and forecasted HW quantities and available infrastructure in Baden-Wurttemberg (Germany)

- Number of pages: comprehensive but concise; clear structure
- Description of HW management organisation
- Description of HW generation data, including development and waste shipments, based on LOW entries
- Description of HW treatment options: incineration (per different categories of facilities), disposal, treatment, storage (table 3, p.18)
- HW generation forecast, including description of methodology
- Discussion of need for additional HW installations infrastructure and security of disposal, taking into consideration HW generation forecast

Annex: overview table on HW treatment facilities, including information on: type of facility, category, operator, location, treatment capacity and remaining landfill capacities (Annex 3, p. 29 ff.)

GP 1-2: Include HW in the Waste Management Plan (specific chapter) or a specific WMP for C&D waste and develop targets for C&D waste management (France)

- Until 2015 in France each department was in charge of elaborating a specific Plan for the Prevention and Management of CDW and Public Works, this planning document was designed to guide and coordinate all actions carried out by public authorities and private the private sector. Since the Act of 7 August 2015 the regions have the responsibility for establishing a regional plan for the prevention and management of waste including municipal waste, CDW, HW etc. In some regions, this plan is part of a regional scheme for sustainable development and territorial equality (SRADDET)
- The objective is to make progress on the knowledge of real CDW generation to better feed material needs included in CDW. Also the collaboration with the regional observatories of C&D industry shall be enforced, in particular to deepen waste diagnoses during C&D works on site.
- The plan must include a) inventory of the status quo of prevention and management of waste streams according to their origin, their nature, their composition and the modalities of their transport; b) a six-year and twelve-year forecast of trends in the quantities of waste to be treated; c) objectives for the prevention, recycling and recovery of waste, defining the national objectives in a manner adapted to the territorial particularities and the priorities to be adopted to achieve these objectives; d) planning for the prevention and management of waste in terms of six years and twelve years, notably mentioning the facilities that it appears necessary to create or adapt in order to achieve the objectives set out in c).

France has developed regulatory and technical tools to achieve the ambitious objectives of CDW recycling. The law on Green Growth has included a number of provisions for the recycling of construction waste in order to increase development of the recovery of this waste stream: 50% of the materials used by the State and local authorities for road construction sites will have to come from the reuse or recycling of construction waste in 2017, 60% by 2020.
2. Classification of hazardous waste

GP 2-1: Regional Waste Advisors (United Kingdom)
- Installation, education and certification of ‘waste advisors’ together with the Chartered Institute of Waste Management with the aim that certified actors (dealers, brokers, carriers, etc.) act as multipliers of information on correct classification and bring information to waste producers of all size.

GP 2-2: Waste Management Officer (“Abfallbeauftragter”) (Germany)
- The introduction of waste management officers is an instrument for self-regulation of the producers, i.e. the officers are either employees of the waste producing company or contracted external experts. They do not have an administrative mandate in terms of inspecting the company on behalf of the authorities.
- According to Section 60 Circular Economy Act Germany (KrWG): “The Waste Management Officer shall advise the operator and the company’s personnel on matters that could be of significance with regard to waste prevention and waste management” (see English version of KrWG here: http://www.bmub.bund.de/fileadmin/Daten_BMU/Download_PDF/Abfallwirtschaft/kreislaufwirtschaftsgesetz_en_bf.pdf)
- Tasks include: to supervise the life cycle of waste and compliance with the KrWG and the statutory ordinances, to inform and consult company personnel, to encourage the development and introduction of environmentally compatible, low-waste processes and products as well as to encourage improvements of the installation and to submit an annual written report to the operator.
- In addition to the KrWG, the duties, scopes and exemptions are regulated in the ‘Waste Management Officer Ordinance’ (AbfBeauftrV, see http://www.gesetze-im-internet.de/bundesrecht/abfbeauftrv/gesamt.pdf) which is currently (2017) under revision. The proposed amendment to the Ordinance (see pp.37-48 at http://www.bmub.bund.de/fileadmin/Daten_BMU/Download_PDF/Abfallwirtschaft/abfallrecht_ueberwachung_reg_entwurf_bf.pdf) further specifies requirements for waste management officers, e.g. an adequate education, two years of relevant practical experience and the participation in one or more training courses, approved by the competent authority. In addition, Annex 1 (p.44) further details necessary education for waste management officers (e.g. the KrWG, further waste-related regional/national/EU-ordinances, laws, provisions and guidelines, knowledge on hazardous waste, environmental impacts of waste and appropriate measures, etc.) which may serve as example for waste advisors/waste management officers in the UK.
- General rules, contents and time frames as well as information on the recognition of training/education courses e.g. for waste management officers are described in detail in the guideline “Recognition of Courses” by the German Federal Working Group on Waste (“LAGA”) (see http://www.laga-online.de/servlet/is/23875/Vollzugshilfe_Anerkennung_Fachkundelehrgaenge.pdf?command=downloadContent&filename=Vollzugshilfe_Anerkennung_Fachkundelehrgaenge.pdf)

GP 2-3: Guidance document on definition and classification of waste (to be published) (European Union)
- To provide assistance to actors in the field of (hazardous) waste management regarding the complex issue of the definition and classification of waste, a guidance document is envisaged to be published by the European Commission.
- Although the EU document is not yet available, a study undertaken by the Commission in 2015 gathered and analysed information to assist the Commission in the preparation of such a guidance document. The report contains in particular information extracted from guidance documents already existing in individual Member States (e.g. in BE, DE, ES, UK) and information submitted by stakeholders within a dedicated public.
Final Report
Support to selected Member States in improving hazardous waste management based on assessment of Member States' performance

<table>
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<tr>
<th>GP 2-4: OVAM’s guidance document for waste classification (Belgium-Flanders)</th>
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<tr>
<td>• The regional authority in Flanders OVAM developed a guidance document for the classification of wastes; targeting holders, processors, and transporters of waste, as well as Flemish administrative bodies</td>
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<tr>
<td>• Support for guidance document development in the waste sector is provided by the European Commission website <a href="http://ec.europa.eu/environment/waste/studies/index.htm">http://ec.europa.eu/environment/waste/studies/index.htm</a>, in particular in the “Study to develop a guidance document on the definition and classification of waste (2015)”</td>
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<tr>
<th>GP 2-5: Support for actors in waste management with a guidance framework (United Kingdom)</th>
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<tr>
<td>• In the UK, a holistic support framework is provided for all involved actors (e.g. waste producers, waste treatment operators) in waste management. It includes, inter alia, support for the classification of hazardous waste.</td>
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<tr>
<td>• The official website of UK’s government provides a separate section dedicated to environmental management. Within the subsection ‘Waste’ (<a href="https://www.gov.uk/topic/environmental-management/waste">https://www.gov.uk/topic/environmental-management/waste</a>) the respective governmental departments provide an extensive overview on different aspects in general waste management. The provided information is divided in different sections ranging from introductory guides to basic information on inter alia (hazardous) waste, waste movements, permits, licences, storage, treatment, end-of-waste and disposal. Additionally, information on separate waste streams such as batteries, WEEE, Packaging, waste water, radioactive waste and clinical waste is given.</td>
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<tr>
<td>• Each available section is further structured along the main aspects and contains the most important definitions, step-by-step explanations and answers to frequently asked questions. In many cases also a phone hotline is provided for direct communication with the respective UK Competent Authority to seek further advice (e.g. regarding classification of waste) or to report environmental incidents (e.g. fly tipping, littering, etc.). The technical guidance document (WM3) on the classification and assessment of waste should be separately mentioned in this context as it is seen as a helpful tool from actors in waste management inside and outside the UK.</td>
</tr>
<tr>
<td>• The online provided information is also tailored for the use of those actors involved in day-by-day waste management processes and recognizes the regional differences for England, Scotland, Wales and Northern Ireland.</td>
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<th>GP 2-6: Regional waste advisor providing a guidance document (Belgium-Brussels)</th>
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<tr>
<td>• Since 2010, there is a waste advisor responsible for the Brussels region, who gives advice to enterprises on any kind of question related to waste management. The advisor works at Chamber of Commerce of Brussels and is paid by the Region.</td>
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<tr>
<td>• The advisor supports enterprises as well as public administration and associations on waste prevention and management and is in charge of a helpdesk (<a href="mailto:info@brusselswastenetwork.eu">info@brusselswastenetwork.eu</a>), the website <a href="http://www.brusselswastenetwork.eu">www.brusselswastenetwork.eu</a>, regular newsletters and the development of tools for e.g. the promotion of good practice projects, legal obligation information, round tables on specific problems, etc.</td>
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<tr>
<td>• The advisor has developed a comprehensive document about the main points of the legislation in waste classification (<a href="http://www.brusselswastenetwork.eu/wp-">http://www.brusselswastenetwork.eu/wp-</a>)</td>
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content/uploads/2013/11/IF_DECHET_tableau_obligation_legale_BWN.pdf?aa30c6) with a focus on selective sorting: sensitisation, how to start with the waste sorting, research for WEEE collectors or others specific waste.

GP 2-7: Information campaign “Right Waste, Right Place” (United Kingdom)

- The “Right Waste, Right Place” information campaign has been put together by a group of sponsors to help businesses and establishments meet their Duty of Care obligations as practically as possible
- Duty of Care applies to any establishment or business in UK that produces, transports, treats or disposes of waste as a result of its activities
- Campaign in particular aims to support small and medium-sized businesses
- Campaign is managed by the Environmental Services Association and sponsored by the Environment Agency, Natural Resources Wales, CIWM and ESAET
- Website includes a variety of videos, case studies, a simple guide on how to comply, a detailed Q&A and lots of useful links to get answers for more specific or detailed questions
- http://www.rightwasterightplace.com

GP 2-8: Working groups reviewing waste data of specific waste streams to identify sectors with suspiciously low HW amounts (United Kingdom)

- Installation of working groups comprising representatives from the competent authority, the inspection body and other organisations across thematic fields (waste, emissions, chemicals, etc.)
- Review of datasets from different sources and reported under different legal regimes
  - national waste statistics on waste generation/treatment/import/export,
  - data on produced goods/imports/exports
  - EPRTR emission data
  - Corresponding data from “comparable” Member States
  - ...
- Objective to identify suspicious sectors where hazardous waste generation is comparably low

GP 2-9: Training for HW operators (Belgium-Brussels)

- In order to improve the general knowledge on HW management, “Brudalex” imposes training for the main HW operators (http://document.environnement.brussels/opac_css/elecfie/IF_Dechets_BRUDALEX_FR)

GP 2-10: High qualification of personnel in HW management (Belgium-Wallonia)

- The requirements for the personnel working in HW management are high and training and/or experiences are required in order to practice a profession. There are persons in charge for proper HW management at the industrial site who are also in charge of deciding on the acceptation or refusal of the treatment of HW. The key success factor is that a strict regulation is in place and a good level of training of actors involved in HW management [BE Wa OWD 2016].
3. System of waste-related inspections

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<tr>
<th>GP 3-1: Inspection plan (United Kingdom)</th>
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<tr>
<td>- Inspections are based on an inspection plan based on risk analysis. Approximately four to five inspections per year are performed on-site per waste treatment operator.</td>
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<td>- Each inspection focuses on special elements, such as traceability of kept records, emission control, correct storage of waste, mechanical integrity of the process, etc. After the inspection, there are flow charts for the authority to select the enforcement policy.</td>
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<td>- According to the inspection results, there are several options such as ‘stop treatment operations immediately’ or ‘issue advice to improve situation’.</td>
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<th>GP 3-2: Inspection activity of competent authorities (Bulgaria)</th>
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<tr>
<td>- To guarantee uniform procedures and structured inspections across the different systems, guidance plans together with a checklist were developed by the MoEW. The guidance plan provides the auditor with clear performance advises for the inspection and gives the possibility to the examined company to prepare for the requested information. The checklist guarantees that no issues will be forgotten during the audit. In this way it can be avoided that some companies are privileged or treated differently, since the scheme has to be adopted by every company, which in turn reduces also the number of complaints.</td>
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<tr>
<td>- First conducted reports showed positive results regarding compliance and implementation in the facilities.</td>
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<td>- Altogether, no higher workload for the inspectorate.</td>
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<tr>
<th>GP 3-3: Active, intelligence-based supply chain investigation of the Chemical Compliance Team (United Kingdom)</th>
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<tr>
<td>- The UK Environment Agency’s Chemical Compliance Team (CCT) aims at controlling chemical pollution at the source with an innovative approach to monitoring and enforcement. The CCT developed a campaign format that follows the principle of better regulation to minimize burden on industry. The format is flexible and adaptable to meet the specific requirements of each campaign.</td>
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<tr>
<td>- The campaign work is based on an intelligence-led, sector-based approach which aims to maximise environmental outcomes. CCT identifies a certain chemical that is of special interest (e.g. F-gases or PCB) and develops a guidance document and notice for companies. Companies that produce the chemical or that deal with it along the supply chain are identified and actively approached with information and/or information requests and, if issues are identified, specific targets are discussed with the companies.</td>
</tr>
<tr>
<td>- E.g. high-risk, large-volume users of F-gases are targeted that have a proportionately large impact or companies supposedly possessing PCB equipment are actively approached.</td>
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<tr>
<td>Further information on the campaign work regarding PCBs is described in Measure 1, problem 3 below.</td>
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<tr>
<td>- Through the active intervention by the CCT companies obtain information about a certain subject, have the possibility to react on altered circumstances (e.g. changes in legislation) and are controlled in a last step.</td>
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The CCT’s work and achievements are summarised annually in a report, e.g.: https://www.gov.uk/government/publications/environment-agencys-chemical-compliance-team-annual-report-2012-to-2013
GP 3-4: Curriculum for “Environmental Inspections” in vocational schools (Netherlands)

Vocational schools offer an “environmental inspection” curriculum, containing i.a. subjects:

- Environmental science
- Investigation methods
- Waste management
- Sustainability
- Regulations

GP 3-5: “Doing things right methodology” (European Union)

- Network for the Implementation and Enforcement of Environmental Law, IMPEL
- Explore and analyse similarities and differences in enforcement and inspections
- Exchange of best practices
  - Doing the right things methodology

GP 3-6: Working groups reviewing waste data of specific waste streams to identify sectors with suspiciously low HW amounts (United Kingdom)

- Installation of working groups comprising representatives from the competent authority, the inspection body and other organisations across thematic fields (waste, emissions, chemicals, etc.)
- Review of datasets from different sources and reported under different legal regimes
  - National waste statistics on waste generation/treatment/import/export,
  - Data on produced goods/imports/exports
  - EPRTR emission data
  - Corresponding data from “comparable” Member States
- Objective to identify suspicious sectors where hazardous waste generation is comparably low
- Targeted information AND inspection campaigns for identified sectors

GP 3-7: Interlinkage of regional authorities on national level (Germany)

- The so-called ‘Bund/Länder-Arbeitsgemeinschaft Abfall (LAGA)’ is a federal working group for waste in Germany. The working group was established in 1963 with the aim to secure a homogenous enforcement of waste legislation in Germany.
- To reach this aim, information and experience are regularly exchanged and discussed between the national (German Environmental Ministry) and regional level (Environmental Authorities of Federal States).
Additionally, a close cooperation between the LAGA and relevant associations as well as other German institutions is ensured. In order to further develop laws and to represent Germany at the European and international level, the LAGA develops positions and suggestions. Regarding practical issues of waste management within the Federal States, the LAGA elaborates instruction/information sheets and guidelines on aspects of waste management as e.g. waste classification, sampling or on general treatment of waste streams.

- The LAGA is a national organisation where representatives from the regional Federal States (environmental authorities/ministries of the 16 Federal States) and from the National Environmental Ministry work together equally. Currently, the LAGA is further organised along three committees (Product Responsibility, Waste Law and Waste Engineering).
- This approach is especially favourable in case that (hazardous) waste management is administered and enforced on regional level whereas the waste legislation is valid on national level.

### GP 3-8: Enforcement dialogue (Netherlands)

- Within the context of its strategy “a circular economy in the Netherlands by 2050” the Netherlands have decided to establish an “enforcement dialogue” between policymakers, inspectorate and entrepreneurs to discuss legal and policy obstacles for circular business cases and potential solutions.
- A clear example of such a dialogue is the international green deal the “North Sea Resources Roundabout”. In this green deal, private initiators and governmental participants will cooperate together to identify barriers and consider solutions for a limited number of specific secondary resource cases between countries.

### 4. Responsibility for (hazardous) waste management

#### GP 4-1: Shared responsibility in waste management (France)

- This measure derives from Article 15 of the WFD that treats responsibility for waste management.
- ‘Shared responsibility regime’: The waste producer shares responsibility for the ultimate fate of the waste even though the waste may be managed by intermediate actors. This is important because in many cases the producer can pass the responsibility to waste dealers or operators and simply gets rid of the problem. A consequence of this may be that the producers can avoid investigating in improvements regarding waste prevention and product design.
- The main objective of this measure is to foster self-regulation of the industry because keeping the responsibility of their produced waste they may be interested to improve also this last stage of the product life-cycle.
- France introduced further specifications in the environmental legal code.
- Controls are performed via consignment note + penalties.
- Additional duties: justification for the chosen treatment option to the competent authorities.

#### GP 4-2: Conduct awareness raising and education for the citizens to better inform them about HW and to change their habits (Bulgaria)
• In Bulgaria the waste management awareness raising is well covered at schools however, the information of adult citizens should be expanded. In addition, the information provided to children is mostly related to municipal waste in general, there should be a specific focus on HW as problematic household waste stream.

• The good practice example also stems from Luxemburg, notably the activities carried out by the SuperDrecksKëscht®. Information and advice are paramount with regard to an environmentally correct behaviour towards HW. Various activities for all ages, exhibitions, and extensive information material should be promoted – while also providing practical tips in an easily accessible form.

• As an example, the objective of the SuperSpillMobil is informing and promoting awareness regarding the environment with kids, adolescents but also adults. It is particularly popular, allowing children to learn about the protection of the environment while playing. The SuperSpillMobil is put at the disposal of communes, schools and associations for pedagogic purposes relating to the environment. It is available with competent assistance thus organisers do not need to provide for trained personnel.

• Technical data: The SuperSpillMobil is 8 meters long, 4,50 meters large and 2,20 m high. In addition, space is required for folding the side walls. The SuperSpillMobil pavilion has an overall surface of 3x3 meters an is 2,3 meters high. It is recommended to foresee additional space for the games.

5. Record keeping and tracing systems for hazardous waste

GP 5-1: Electronic record keeping system (Germany)

• The electronic record keeping system is the basis for the generation of statistical data.

• All data on HW generation and treatment is made publically available on the six-digit-code level by the national statistics agency DESTATIS. The published yearly reports contain data on HW generation according the origin of the waste.

• Reports are also available at level of each Bundesland “Sonderabfallbilanz der Bundeslaender”.

• DESTATIS reports also contain data on HW treatment according the type of waste treatment facility and according the six-digit codes of the German

NOTE: There are several electronic systems for hazardous waste management in operation or in a testing phase in different EU MS. The applied systems are quite diverse and it is difficult to present a certain system as best practice. It is recommended to consider the general summary and overview on electronic systems in hazardous waste management in the overall study’s report where this roadmap is part of.
6. Application/Implementation of the waste hierarchy for hazardous waste

**GP 6-1: Potential application of Life cycle analysis to justify the treatment option for selected waste streams (Germany)**

- When hazardous waste is managed and treated, two general objectives of EU waste legislation have to be balanced: a) the application of the waste hierarchy as stipulated in Article 4(1) of Directive 2008/98/EC and b) the protection of human health and the environment as stipulated by Article 13 of Directive 2008/98/EC.

- The German Federal Ministry for the Environment, Nature Conservation, Construction and Nuclear Safety drafted a guideline for the application of the waste hierarchy. The draft can be found at: [http://www.bmub.bund.de/fileadmin/Daten_BMU/Download_PDF/Abfallwirtschaft/krwg_leitfaden_abfallhierarchy_entwurf_bf.pdf](http://www.bmub.bund.de/fileadmin/Daten_BMU/Download_PDF/Abfallwirtschaft/krwg_leitfaden_abfallhierarchy_entwurf_bf.pdf)

- Additionally, a German study conducted on behalf of the German Environment Agency (see [https://www.umweltbundesamt.de/sites/default/files/medien/378/publikationen/texte_21_2016_evaluation_der_oekologischen_und_oekonomischen_auswirkungen_des_wegfalls_der_heizwertregelung.pdf](https://www.umweltbundesamt.de/sites/default/files/medien/378/publikationen/texte_21_2016_evaluation_der_oekologischen_und_oekonomischen_auswirkungen_des_wegfalls_der_heizwertregelung.pdf)) states that, some hazardous waste streams (e.g. selected hazardous waste streams from the chemical industry such as waste solvents) are strongly directed to disposal options such as incineration. One reason therefore obviously is to ensure phasing out of pollutant and hazardous substances. Another reason may be that these selected waste streams also show a high calorific value and thus are directed rather to incineration than to recycling operations. Technically however, in some cases, they could be treated with options higher up the waste hierarchy without compromises in phasing out the contained hazardous substances. In this context, Article 4(2) of Directive 2008/98/EC stipulates:

- When applying the waste hierarchy referred to in paragraph 1, Member States shall take measures to encourage the options that deliver the best overall environmental outcome. This may require specific waste streams departing from the hierarchy where this is justified by life-cycle thinking on the overall impacts of the generation and management of such waste.

- This is seen as a basis for a policy instrument for competent authorities, to require selected hazardous waste generators to justify the chosen treatment options for their wastes by applying a life cycle analysis of the impacts. Nevertheless, the technical and economical practicability and appropriateness of the treatment operation still have to be considered.

**GP 6-2: (Publication 35/2016): Prevention of hazardous waste in Europe – the status in 2015; selected examples (European Environment Agency)**

- Austrian initiative on banning nickel-cadmium batteries in wireless tools (2006-2011)

- Bulgarian project on preventing hazardous waste from households as part of Bulgarian-Swiss cooperation

- In France, an economic tool, i.e. a tax on waste has been introduced to discourage waste generation

- German “blue angel” for products without hazardous substances

- Ireland: BeGreen programme, including Green Healthcare programme, triple-rinsed container protocol and Farm Hazardous Waste Collections; a similar system is already in place in Cyprus for plant protection products containers

- Sweden: tax on hazardous substances and “negative” labelling of products containing hazardous substances

GP 6-3: Chemical leasing (European Union)

- Chemical Leasing is an innovative business model that aims at the efficient and sustainable use of resources.
- The business model promotes both environmental and economic aspects of chemical use through increased resource efficiency by optimising production processes, reducing chemical consumption and minimising waste generation.
- In the EU, Chemical Leasing is successfully applied in a variety of sectors and applications.
- Examples include the treatment of metal parts (degreasing, corrosion protection, coating), cleaning of bottles, pipes and vessels, wastewater treatment and the application of adhesives, paints or cleaning agents.
- Depending on the applied chemicals, it is estimated that between 10 and 90% of the generated waste from the application of chemicals can be saved (UBA 2014, Resource efficient businesses in practice by applying the alternative business model Chemical Leasing; available here). Further information and support is available at http://chemicalleasing.org/.

GP 6-4: Publication of a guidance document on the application of the waste hierarchy (Germany)

- When hazardous waste is managed and treated, two general objectives of EU waste legislation have to be balanced: a) the application of the waste hierarchy as stipulated in Article 4(1) of Directive 2008/98/EC and b) the protection of human health and the environment as stipulated by Article 13 of Directive 2008/98/EC.
- A German study conducted on behalf of the German Environment Agency (see https://www.umweltbundesamt.de/sites/default/files/medien/378/publikationen/texte_21_2016_evaluation_der_oekologischen_und_oekonomischen_auswirkungen_des_wegfalls_der_heizwertregelung.pdf) states that, some hazardous waste streams (e.g. selected hazardous waste streams from the chemical industry such as waste solvents) are strongly directed to incineration. One reason therefore obviously is to ensure phasing out of pollutant and hazardous substances. Another reason may be that these selected waste streams also show a high calorific value and thus are directed rather to incineration than to recycling operations. Technically however, in some cases, they could be treated with options higher up the waste hierarchy without compromises in phasing out the contained hazardous substances. In this context, Article 4(2) of Directive 2008/98/EC stipulates:
  - When applying the waste hierarchy referred to in paragraph 1, Member States shall take measures to encourage the options that deliver the best overall environmental outcome. This may require specific waste streams departing from the hierarchy where this is justified by life-cycle thinking on the overall impacts of the generation and management of such waste.
  - This is seen as a basis for a policy instrument for competent authorities, to require selected hazardous waste generators to justify the chosen treatment options for their wastes by applying a life cycle analysis of the impacts. Nevertheless, the technical and economical practicability and appropriateness of the treatment operation still have to be considered.
  - A guidance for the application of the waste hierarchy in particular for industrial hazardous waste for recovery has been published at:
GP 6-5: Reflection of waste hierarchy in consignment notes (United Kingdom)

Producers/collectors in the UK have to justify in their consignment notes whether the waste hierarchy was reflected when choosing the further treatment of the waste. The aim of this obligation is to remind producers/collectors for each waste movement on their duty to consider the waste hierarchy when choosing the treatment route for the waste. However, in practice this informative/awareness raising tool is seen by stakeholders as a regular ‘tick box’ with only limited success in raising awareness.

GP 6-6: Hazardous waste prevention goals (Belgium-Wallon)

- The Walloon Region of Belgium has introduced goals to reduce household purchases of potentially substitutable hazardous products by 6% and to improve the use of the correct dosage of hazardous products by households.

GP 6-7: Policy efforts for toxic-free recycling (EU and the Netherlands)

- The balance between recycling of HW and the protection of human health and the environment is closely linked to the efforts under the circular economy package to address the occurrence of hazardous substances in secondary resources.

- The current Analysis of the interface between chemicals, products and waste legislation and identification of policy options may provide a suitable context. Furthermore, the Netherlands is currently developing an assessment framework for the assessment of risks of recycling waste which contains (potentially) hazardous substances. Prior to this effort, the Dutch National Institute for Public Health and the Environment (RIVM) developed an inventory of substances of very high concern which should be taken into consideration when deciding on the desirability of recycling certain waste streams. Furthermore, the RIVM has developed a document on the application of concentration limit values upon deciding whether a certain waste stream can be safely recycled.

- It is submitted that such documents could provide basic guidance for recycling operators on the application of the waste hierarchy to the treatment of HW. Perhaps, such documents could be bundled and made available on the European level, for the benefit of a wider group of recyclers.
GP 6-8: Waste hierarchy under the waste shipment regulation

Certain MS have included in their national policies the explicit possibility for competent authorities to refuse the transfer of HW to other MS and third states, if the treatment of the HW will be contrary to the waste hierarchy. An example would be the transfer of HW to a facility which has lower treatment standards than the facilities in the country of origin. Good examples of such an explicit policy can be found in the national policies of the UK and the Netherlands. 40

GP 6-9: Research study on avoidance and recovery of hazardous waste (Germany)

- 22.3 million Mg of hazardous waste in 2014, 405 types of waste are classified as hazardous
- Priority of recovery in line with the waste management hierarchy applies according to German Circular Economy Act (KrWG)
- Processes for the degradation, conversion or separation of hazardous substances as well as suitable recovery processes were researched
- Building on the findings, the study derives recommendations for action that can help to remove the barriers currently impeding the full exploitation of recovery potential

The study can be found at: https://www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/2017-11-06_texte_100-2017_gefaehrliche-abfaelle.pdf

7. Other good practices

GP 7-1: HW collection permits (Ireland)

- HW collectors (unless exempted, as laid down in Article 30 of the Irish Waste Collection Permit Regulations) are required to hold a waste collection permit that is issued by a national authority, National Waste Collection Permit Office at Offaly County Council. Also an online register is implemented where permitted waste collector can be searched by LOW code.

GP 7-2: HW collection permit and licenses for ‘minor’ HW (Netherlands)

- Collection and transport of HW can only be carried out by companies with the VIHB (‘vervoerder, inzamelar, handelaar, bemiddelaar’) permit, granted by the NIWO (‘Nationale en Internationale Wegvervoer Organisatie’) (see http://www.niwo.nl/pagina/189/aanvragen/afvalstoffen_vihb/dutch_regulation_on_waste_english.html). The Minister of Infrastructure and Environment has designated the NIWO as the competent authority responsible for the management of applications for registration on the VIHB-list. A company must fulfil the following criteria to be registered:
  - Reliability - certificate of good reputation

• Professional competence - only if activity to be carried out is HW dealer and/or broker.

• The Human Environment and Transport Inspectorate (Inspectie Leefomgeving en Transport -ILT) grants licenses for the collection of used oils and minor HW, such as laboratory chemicals. A list of the licences can be found on the Website of the ILT (see https://www.ilent.nl/Images/meerjarenplan2014-2018_trcm334-354569.pdf). Only companies that are registered in the VIHB list are allowed to collect HW. Controls of permits issued are carried out by the authorities only every 5 years, but the companies are in charge of verifying validity of their permit.

GP 7-3: Guidance on “controlled demolition” (Germany, Bavaria)

• The Bavarian Environmental Agency has issued a guidance document for the pollution control during building demolitions “Schadstoffratgeber – Gebäuderückbau” (http://www.lfu.bayern.de/abfall/schadstoffratgeber_gebaeuderueckbau/index.htm).

• The guidance document is a free online information system of the Free State of Bavaria to support the execution as well as to ensure a proper waste separation and disposal in the building demolition.

• It contains a wealth of information on materials containing pollutants and also non-polluting materials. Although the information has been compiled with utmost care there can be no guarantee that all pollutants are covered. Due to the large number of building materials used and regional differences, the pollutant control system can never be complete.

• The register contains 68 chemical or biological / substance groups that can be clicked on which then provides the respective material data sheets containing extensive information, e.g. substance description, chemical-physical substance data, hazard classification, use in construction, and disposal. Important components which contain the selected pollutant can also be retrieved from the substance data sheets.

• In addition, an overview file contains about 70 pictures of know pollutants in high-resolution in order to facilitate the identification on the ground. By clicking on the photo the user gets a detailed description of the building material.

GP 7-4: Apply and promote the use of the “EU Construction & Demolition Waste Management Protocol” (European Union)

• Since proper management of C&D waste and recycled materials – including the correct handling of hazardous waste – can have major benefits in terms of boosting the demand for C&D recycled materials, the EU Commission has issued a “EU Construction & Demolition Waste Management Protocol” (http://ec.europa.eu/growth/tools-databases/newsroom/cf/itemdetail.cfm?item_id=8983). The Protocol fits within the Construction 2020 strategy, as well as the Communication on Resource Efficiency Opportunities in the Building Sector. It is also part of the more recent and ambitious Circular Economy Package that the European Commission has presented. The proposed actions can contribute to reaching the Waste Framework Directive target of 70% of C&D waste being recycled by 2020.
The overall aim of the Protocol is to increase confidence in the C&D waste management process and the trust in the quality of C&D recycled materials. This will be achieved by: a) Improved waste identification, source separation and collection; b) Improved waste logistics; c) Improved waste processing; d) Quality management; e) Appropriate policy and framework conditions.

The wider benefits of the Protocol include:
- Increased demand for C&D recycled materials;
- The promotion of (new) business activities and players in the waste infrastructure sector;
- Increased cooperation along the C&D waste value chain;
- Progress towards meeting C&D waste targets;
- Progress towards harmonised EU markets for C&D recycled materials (where appropriate);
- The generation of reliable C&D waste statistics across the EU;
- Reduced environmental impacts and contribution to resource efficiency.

The Protocol is targeted at industry practitioners; construction sector (including renovation companies and demolition contractors), construction product manufacturers, waste treatment, transport and logistics as well as recycling companies; public authorities at local, regional, national and EU levels; Quality certification bodies for buildings and infrastructure; and Clients of C&D recycled materials.

GP 7-5: SuperDrecksKëscht (Luxembourg)

The best-practice example comes from Luxembourg where the SuperDrecksKëscht® is collecting waste with dangerous substances from private households throughout the country – this service is free of charge and user-friendly for citizens. This allows all citizens to dispose of and separate environmentally harmful substances from household waste. Various collection systems provide for an environmentally friendly disposal of dangerous substances.

Stationary collection: Almost all recycling sites have stationary collection sites of the SuperDrecksKëscht® for Bürger where valuable and dangerous substances can be disposed of. Furthermore, some communes offer a collection of valuable and dangerous substances once a month. Regarding the temporary storage of the dangerous substances collected by SuperDrecksKëscht® a special room is foreseen which is equipped as appropriate in order to guarantee the safe storage of substances that are harmful to water as used oil for instance. Collected substances undergo a previous sorting and packaging at the collection site. In the Logistic Center of SuperDrecksKëscht® the final sorting and packaging for transport to waste disposal companies is carried out.

Qualification of staff is of particular importance for the handling of dangerous substances. Training is regularly provided by the SuperDrecksKëscht® in order to guarantee an appropriate collection. For instance for chemicals and pesticides, perfect knowledge of the substance characteristics is required to avoid any chemical reactions. To certify the adequacy of their management, recycling sites have received the SuperDrecksKëscht® collection site quality label of which the criteria are determined in quite the same way as for the label for companies.

Mobile collections are carried out 4 times a year - either with the mobile Service-Centre on central locations or as a door-to-door collection. The collection trucks come to the house and takes away dangerous waste.

In order to inform inhabitants when and which collecting system is available in the commune, the dates are announced one or two weeks in advance. The information flyer is distributed to all households and also...
contains information regarding the collected substances and details about the various activities of the SuperDrecksKëscht®. Many communes have waste calendars with the collection dates and structures.

- For larger quantities of dangerous substances as for instance in the case of moving or house cleaning, the collection service of SuperDrecksKëscht® fir Biirger can be asked to intervene.

- Collection points in apartment buildings: The collection in apartment buildings is based on the separate collection of HW on site. The SuperDrecksKëscht® provides the advisory services for the building management or co-owner community; inventory and analysis of the existing situation; compilation of a collection and processing concept taking into account the local situation; briefing of inhabitants, training of building management staff (if applicable).

- The implementation of the collection and processing of products is the task of the inhabitants, the building management, the co-owner community or an external service provider and includes. This includes the purchase of containers and shelves; mounting and maintenance of the collection site, continuous support, recycling of used products, and an annual balance sheet. Because the collection of the various waste types is difficult in apartment buildings, i.e. limited space available, three different types of collection sites are foreseen that are particularly flexible and space saving. The inhabitants can deposit up to 27 different types of waste separately without having to go to a recycling centre or a collection site.

**GP 7-6: “PGS” system: storage of packaged hazardous substances (the Netherlands)**

- Guidance sequence for companies on norms for the transportation of dangerous goods (ADR agreement)
- **PGS nr. 15**: norms regarding the storage of packaged dangerous goods (including certain categories of hazardous waste)
- Guidance regularly updated through cooperation between authorities and companies

The “PGS organisation” facilitates the updating process.

**GP 7-7: Regional guidance (Italy, regions of Veneto and Piemonte)**

- Requirements for temporary storage of hazardous waste are laid down in regional guidelines in Veneto and Piemonte.

**GP 7-8: Technical rules for installation and operation of points for collection and temporary storage of hazardous waste (Germany)**

- Requirements for collection temporary storage of small amounts of hazardous waste are laid down in technical rule TRGS 520

**GP 7-9: Applicable and controllable legal implementation of the mixing ban’ (Belgium, region of Flanders)**

Flanders presents good practice regarding the legal implementation of the mixing ban from EU level to regional level. However, local implementation into permits is in individual cases still lacking clear criteria for derogation from mixing.
• The ban on the mixing of hazardous waste is laid down in Article 18 of the WFD and not further clarified. The guidance document on the WFD further explains this Article e.g. by providing definitions for ‘mixing’, ‘blending’ and ‘diluting’ (not legally binding)

• The Flemish Materials Decree (2012) transposes the WFD and mentions the mixing ban in Article 30 §3:
  “The natural persons or entities who treat waste, cannot mix hazardous waste with other categories of hazardous waste, nor with other waste, substances or materials. Dilution of hazardous substances is also understood as mixing.”

• The Materials Decree is practically implemented in the VLAREMA legislation from 2012. Article 4.4.2. further explains the mixing ban:
  “It is forbidden to mix a waste with one or more materials with the aim to lower the concentration of one or more components present in the waste in order to:
  1° use a disposal method for the diluted waste which is not allowed for the non-diluted waste;
  2° recover a waste which normally should be disposed of;
  3° to use or transform a waste or intended raw material, in a raw material, for which the waste or intended raw material does not qualify”

VLAREMA further clarifies the mixing/dilution ban not only on treatment level, but also regarding waste shipment, collection and handling of waste, including loading and unloading (see Article 6.1.1.1. 3° VLAREMA).

GP 7-10: Public database of HW collectors and brokers (Luxembourg)

• There is an online database for HW producers/holders where they can find companies that have permits for HW collection or brokerage

• The database is updated daily in order to assure that every company listed still holds a valid permit

• The search function allows searching for collectors according to each HW code (6 digit code)

• The database is an important tool in HW management and is well used by HW producers and holders. It is available at
GP 7-11: Foster the service of pre-demolition audits (United Kingdom)

- In the UK and in Austria companies offer the service of pre-demolition audits during which the building and the components within it are audited to determine what the key demolition products are and make recommendations for their reuse (on and off-site), recycling or final disposal. The main aim of these audits is to maximise materials available for reuse and recycling and to minimise materials going to landfill. See also [http://www.wrap.org.uk/sites/files/wrap/CRWP-Demolition-Report-2009.pdf](http://www.wrap.org.uk/sites/files/wrap/CRWP-Demolition-Report-2009.pdf)

According to the EU Construction & Demolition Waste Management Protocol some main factors are important:

- Any demolition, renovation or construction project needs to be well planned and managed. Such preparatory activities are particularly crucial for larger buildings. A pre-demolition audit (or waste management audit) is to be carried out before any renovation or demolition project and for any materials to be re-used or recycled, as well as for hazardous waste. It helps to identify the C&D waste generated, implement proper deconstruction, and to specify dismantling and demolition practices.

- Public authorities should decide upon the threshold for pre-demolition audits (for example in Austria two limits for pre-demolition audits exist: 100 tons and 3,500 m³ of estimated C&D waste produced).

- A pre-demolition audit consists of two parts a) **Information collected**: Identification of all waste materials that will be generated during the demolition with specification of the quantity, the quality and location in the building or civil infrastructure. All materials should be identified and a good estimation on the quantity to be collected should be given; b) **Information about**: which materials should (mandatory) be separated at source (such as hazardous waste); which materials can/cannot be re-used or recycled; give information about how the waste (non-hazardous and hazardous) will be managed and the recycling possibilities.

- A pre-demolition audit takes full account of local markets for C&D waste and re-used and recycled materials, including the available capacity of recycling installations.

- A good pre-demolition audit is carried out by a qualified expert with appropriate knowledge about building materials, building techniques and building history. A qualified expert needs to be familiar with demolition techniques, waste treatment and processing as well as with (local) markets.

- The competent authority in Bulgaria could foster the conduction of pre-demolition audits by introducing them as best-practice example in the management of CDW. Several options are possible to encourage the implementation in the practice, e.g. simplify permit procedure for a demolition operation if an audit has been conducted or decide upon the threshold for pre-demolition audits like in Austria.
8. **Identification and elimination of PCB from ‘closed applications’**

### GP 8-1: Active, intelligence-based supply chain investigation of the Chemical Compliance Team (United Kingdom)

- The UK Environment Agency’s Chemical Compliance Team (CCT) aims at controlling chemical pollution at the source with an innovative approach to monitoring and enforcement. The CCT developed a campaign format that follows the principle of better regulation to minimize burden on industry. The format is flexible and adaptable to meet the specific requirements of each campaign.

- The campaign work is based on an intelligence-led, sector-based approach which aims to maximise environmental outcomes. CCT identifies a certain chemical that is of special interest (e.g. F-gases or PCB) and develops a guidance document and notice for companies. Companies that produce the chemical or that deal with it along the supply chain are identified and actively approached with information and/or information requests and, if issues are identified, specific targets are discussed with the companies.

- E.g. high-risk, large-volume users of F-gases are targeted that have a proportionately large impact or companies supposedly possessing PCB equipment are actively approached. 
  
  *Further information on the campaign work regarding PCBs is described in Measure 1, problem 3 below.*

- Through the active intervention by the CCT companies obtain information about a certain subject, have the possibility to react on altered circumstances (e.g. changes in legislation) and are controlled in a last step.

- The CCT’s work and achievements are summarised annually in a report, e.g.  
  

### GP 8-2: Research, international cooperation and awareness raising by the RECETOX centre (Czech Republic)

- RECETOX, the Research Centre for Toxic Compounds in the Environment, is an independent department at the Faculty of Science, Masaryk University (Brno, CZ) that is active in research, development and education in the area of environmental contamination. Originally focusing purely on POPs, it now implements the BRS and Minamata Conventions as well as SAICM in the Czech Republic ([http://www.recetox.muni.cz/index-en.php](http://www.recetox.muni.cz/index-en.php)).

- Numerous activities on PCB and POPs are carried out by RECETOX. The long-term experience with PCB waste management gathered through the work of the centre is passed on to other countries within comprehensive international activities such as research projects, capacity building and training programmes all over the world (e.g. Europe, Kazakhstan, Ghana, India).

- Some of the major activities of RECETOX include research activities on national and international level, development and implementation of capacity building and training programmes on international level, development of guidelines and training materials and the organisation of conferences, excursions, contests, exhibitions, etc. for both experts and the general public.

- Regarding PCB, research, development, monitoring and cooperation activities were carried already since 2001. Key areas include sources and releases into the environment; presence, levels and trends in human health and the environment; environmental transport, fate and transformation, effects on human health and the environment, release reduction and/or elimination, harmonised methodologies for making inventories of generating sources, analytical techniques for the measurement of releases.
Specific examples of the numerous RECETOX activities include:

- Hosting of the Stockholm Convention Regional Centre, providing support to Convention Parties in its geographical region.
- In cooperation with the Institute of Biostatistics and Analyses at the Masaryk University, establishment of the Global Environmental Assessment Information System (GENASIS) in order to set up an expert system for contamination of the environment by chemicals – particular POPs. [www.genasis.cz](http://www.genasis.cz).
- Research activities on national and international level, e.g.:
  - Since 2004, RECETOX scientists coordinated two FP5 projects, participated in three FP6 projects and implemented eight FP7 projects (isoSoil, ArcRisk, AquaRehab, EuroEcotox, TaToo, REFORM, DENAMIC and Solutions), and took part in one Marie Curie International Training Network for young scientists (CSI Environment).
  - Implementation of EU Interregional cooperation projects (MONAIRNET, SONDAR, NEEDLENET) and iCARUS project (ongoing) of the new European Framework Programme Horizon 2020.
  - Support to the European Initiative HBM4EU (The European Human Biomonitoring Initiative), aiming to create a European joint programme for monitoring and scientific assessment of human exposures to chemicals and potential health impacts in Europe (project is ongoing)
  - The ERA-PLANET "The European Network for Observing our Changing Planet" is a project aiming at strengthening the European Research Area in the domain of Earth Observation in coherence with the European participation to Group on Earth Observation (GEO) and the Copernicus. (project is ongoing)
  - Operation of several monitoring programmes, e.g. the international MONET (MONitoring NETworks) programme, aiming at the detection of environmental contaminants (toxic chemicals) in air, water, soil, and biota by passive sampling ([www.monet.recetox.cz](http://www.monet.recetox.cz)), or the European Longitudinal Study of Pregnancy and Childhood.
  - Public information and awareness raising measures (RECETOX international summer schools, capacity building workshop on POPs, mercury and hazardous waste, several conferences), including a number of dedicated portals supporting information exchange on the national level ([www.genasis.cz](http://www.genasis.cz); [www.synergie-chemie.cz](http://www.synergie-chemie.cz); [www.monet.recetox.cz](http://www.monet.recetox.cz); [www.recetox.muni.cz/NC](http://www.recetox.muni.cz/NC)).
9. **Identification and elimination of PCB from ‘open applications’**

**GP 9-1: Monitoring of POPs and POP candidates (Germany)**

- In the course of a research project on behalf of the German Environment Agency [link](http://www.bmub.bund.de/fileadmin/Daten_BMU/Pools/Forschungsdatenbank/fkz_3715_65_423_pops_eval uierung_monitoringdaten_bf.pdf) the knowledge base of specific POPs and POP-candidates, particularly dl-PCBs and selected PCB substitutes, namely SCCP, PBDE and HBCD, was investigated and presented in detail for the substances and substance groups.

- The interrelations between their sources, paths and sinks and their fate in the environment were discussed in order to comprehend their ubiquitous appearance as well as the mechanisms and paths of dispersal. The results will facilitate the identification of sources and causes of contamination, in particular of the environment, but also of food. Furthermore the results will support a more rapid clarification of contamination causes and measures to reduce the risk of exposure to POPs and their substitutes.

- Relevant federal state authorities and institutions were asked to provide data on dl-PCB, SCCP, PBDE and HBCD from monitoring programs that are appropriate for inclusion in the POP-Dioxins-Database of the German Federation and States within this project. The publications identified during the literature research were examined for appropriate measurement data and, as the case may be, the authors were asked for the original data. The focus was put on the technosphere, the air (ambient concentrations, deposition and emission) and plant biota. The data stock of the POP-Dioxins Database could be extended considerably. In total, data of around 1,800 samples were added.

- In order to identify possible causes for contamination (sources or source processes) of environment samples, the method of pattern matching of substance profiles is commonly applied. In recent years specific statistical methods were developed to improve the so called “Composition Data-Statistics” (CoDa). Nevertheless, these methods have only been applied rarely. Within the scope of this project particular focus was put on testing the applicability of these methods on the basis of the available data of the POP-Dioxins-Database.

- As regards the knowledge base on PCB reservoirs/contaminations in the environment and their origin, the aforementioned study already assessed about 70 publications from all over the world and may thus serve as first orientation for the work in the UK. The particular situation in Germany with regard to PCB contaminations in the environment from open applications can be summarized as follows: The main origin for PCB found in the atmosphere can be allocated to PCB from open applications such as joint sealers and other utilizations (paints and coatings), which to a large extend (about 50-80%) are still contained in buildings and structures and continuously emit PCB (7-12 tons/year). Also emissions from unintentionally formed PCBs from combustion plants and other thermal sources contribute to the current PCB input to the environment. However, compared to the entries from open PCB applications, the relevance of these unintentionally formed PCBs can be considered as marginal (220 kg / year). In environmental matrices (soil, air and grass) almost exclusively congener profiles of industrially produced PCBs can be found. This provides evidence for the dominance of industrially produced PCBs as emission source and the low relevance of thermally formed PCBs (see also [link](https://www.umweltbundesamt.de/publikationen/analyse-trendabschaetzung-der-belastung-der-umwelt)).

- The overall aim of this Protocol is to increase confidence in the C&D waste management process and the trust in the quality of C&D recycled materials. This will be achieved by:
  - Improved waste identification, source separation and collection;
  - Improved waste logistics;
  - Improved waste processing;
  - Quality management;
  - Appropriate policy and framework conditions.

- The protocol thereby also considers the identification and separation of hazardous C&D waste


**GP 9-3: Investigation and assessment of PCBs in buildings (Denmark)**

- This manual includes how to evaluate PCBs in buildings; it contains descriptions of the main elements of PCB renovation procedures, possible remediation processes, and practical aspects of different methods and describes working environments and waste management. The purpose is to convey knowledge about the identification of PCB in buildings and to describe how to plan remediation. Current scientific knowledge and experiences from building experts form the informative basis of this work. However, the knowledge is not fully satisfying and several investigations and studies are to be performed in this field. Constructional experts, consultants and executives build the target group for this manual


**GP 9-4: Guidance on the management of PCB-containing double glazing (Denmark)**

- This guideline provides information about PCB in building materials used mainly in the 50s, 60s and 70s. PCB was used in joint sealers at the edge of double glazing and for softening the sealing tape between the glass and the frame of the window. Furthermore, PCB containing sealant was applied in the gaps between the window shade and the wall, both inside and outside. Also between in the window frames PCB was found. This shows that the problem cannot be limited to double glazing but includes also the material that has been in contact with the adhesives and sealants containing PCBs. According to the waste order double glazing has to be collected separately but it is proven that the sorting is not sufficient to achieve the targeted sufficiency. Recently, also the handling of such contaminated waste can cause negative effects, which led the Danish Environmental Protection Agency force to pursue new studies in this area. These instructions focus on PCB containing double glazing used in windows and doors, as well as the handling of frames that have been in contact with sealants. It includes further background information for the main stakeholder groups.

http://www2.mst.dk/Udgiv/publikationer/2014/03/978-87-93178-28-1.pdf
### GP 9-5: Contaminated C&D waste – Exploration, Assessment, Treatment: Guidance on controlled ‘unbuilding’ (Germany)

- The “Pollutant Advisor Building Restructuring” is a free online information system in Bavaria to support the execution and to ensure a proper waste separation and disposal arising at building remediation. It contains a wealth of information on pollutant and non-pollutant materials. During the data collection it was tried to work with the greatest diligence, however due to the large number of building materials used and because of regional differences, the pollutant control system can never be complete. Furthermore, the inspection of the disposal routes and the decision to separate contaminated components in individual cases are subject to the competent authorities. This advisor is understood as a dynamically designed information system, which can be continually improved by users via supplementations, suggestions and corrections. There is a particular section targeting potential waste streams containing POPs and in particular PCB. Update planned for 2018.

- [https://www.lfu.bayern.de/abfall/schadstoffratgeber_gebaeuderueckbau/index.htm](https://www.lfu.bayern.de/abfall/schadstoffratgeber_gebaeuderueckbau/index.htm)

### GP 9-6: Elimination of PCB from open applications (Sweden)

- PCB as sealants in buildings erected or renovated as well as non-slip floor coating in the time from 1956 to 73
- As PCBs are leaching into the environment, total removal of exposed PCB-laden materials on building surfaces, voluntarily undertaken by the building sector
- Due to the Ordinance 2007:19/2010:963 property owners must inspect and remediate buildings and structures which were erected (or renovated) from 1956 to 73. Inspection must have been completed by 2008, remediation by 2016
- About 70-85% of the properties concerned were cleared by 2016
- 20 to 50 tonnes of PCBs are estimated to remain in sealants and floor coatings
- Some unknown PCB deposits remain
- Sufficient capacity to carry out remediation
- Capacity can relatively quickly be enlarged
Annex 6: Summary report of the project’s final workshop in Brussels on 23 October 2017

Final Workshop on ‘Support to selected Member States in improving hazardous waste management’

Brussels / 23 October 2017

Centre Albert Borschette, Room 3C, Rue Froissart 36, 1040 Brussels, Belgium

Agenda

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<td>Registration and Coffee</td>
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<td>10:00</td>
<td>INTRODUCTION</td>
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<tr>
<td>Sarah Nelen, Head of Unit, Waste Management &amp; Secondary Materials, DG Environment, European Commission</td>
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<td>Opening of the workshop</td>
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<tr>
<td>10:10</td>
<td>Ferdinand Zotz, BiPRO GmbH</td>
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<td>Background to EU project ‘Support to selected Member States in improving hazardous waste management based on assessment of Member States' performance’</td>
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<td>10:20</td>
<td>GENERAL FINDINGS OF THE STUDY</td>
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<td>Maximilian Kling, BiPRO &amp; Bärbel Birnstengel, Prognos</td>
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<td>Presentation of the general findings of the study: challenges and recommendations</td>
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<td>10:50</td>
<td>Questions &amp; Answers</td>
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<td>11:10</td>
<td>CLASSIFICATION OF WASTE</td>
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<td>Maximilian Kling, BiPRO &amp; Bärbel Birnstengel, Prognos</td>
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<td>Overview on challenges and good practices in the Member States</td>
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<td>11:25</td>
<td>Yorg Aerts, OVAM Flanders</td>
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<td>Overview on Flemish tools to support correct waste classification</td>
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<td>12:00</td>
<td>Maximilian Kling, BiPRO &amp; Bärbel Birnstengel, Prognos</td>
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<td>Overview on challenges and good practices in the Member States</td>
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<td>12:15</td>
<td>Céline Fourdrilis, French Ministry of Ecology and Solidarity</td>
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<td>Producer responsibility as important tool to enforce waste legislation in France</td>
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<td>14:00</td>
<td>Maximilian Kling, BiPRO &amp; Bärbel Birnstengel, Prognos</td>
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<td>Overview on challenges and good practices in the Member States</td>
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<td>14:15</td>
<td>Ana Cristina Carrola, Agencia Portuguesa Do Ambiente</td>
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<td>Portugal’s experience with electronic information systems for controlling hazardous waste Management – from reports to movements</td>
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<td>14:30</td>
<td>Questions &amp; Answers</td>
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<td>14:45</td>
<td>Maximilian Kling, BiPRO &amp; Bärbel Birnstengel, Prognos</td>
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<td>Overview on challenges and good practices in the Member States</td>
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<tr>
<td>15:00</td>
<td>Richard Hawkins, Environment Agency UK</td>
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<td>Active, intelligence-based supply chain investigation of the Chemical Compliance Team to identify PCB contaminated equipment in the United Kingdom</td>
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<td>15:15</td>
<td>John Lotoft, Naturvardsverket Sweden</td>
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<td>Strategies for elimination of PCBs from open applications in Sweden</td>
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<td>15:45</td>
<td>Concluding Remarks</td>
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<td>16:00</td>
<td>End of workshop</td>
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Summary of Discussion

Please consider also the PPT slides from the presenters which provide complementary information to the following summary. The slides can be found in the electronic annex to this report.

1. INTRODUCTION
   - Welcoming of participants;
   - Presentation of the background and general approach of the study;
   - Compliance Promotion Exercises will be integrated in the ‘Early Warnings’ reporting for particular waste streams to allow the EU Commission to have a more complete picture on waste management practices in the Member States.

2. GENERAL FINDINGS OF THE STUDY
   - Bipro presented the main findings of the study. The hazardous waste management situation is characterised by a broad variety among MS as regards hazardous waste generation (per capita), the main sectors producing hazardous waste and the most frequent treatment (recycling, recovery, landfilling).
   - The reliability of statistics is a challenge: there are significant statistical gaps in many MS. Moreover, the differences both in hazardous waste generation per capita and in relation to industrial production output cannot be satisfactorily explained in some cases, giving raise to concerns about classification and management practices.
   - An assessment of waste management plans shows that hazardous waste is poorly addressed in many Member States. Improving the statistical data, as well as an overview of hazardous waste generation, available treatment capacities, as well as reliable and comparable statistics on hazardous waste treatment are the necessary pre-requisite for a proper management of this waste stream.
   - In addition, Bipro presented some overarching challenges: classification of waste, enforcement of waste legislation in practice and record keeping and tracing of hazardous waste management. These issues were discussed in dedicated sessions.
   - Summary of management practices in Member States, applied measures, good practices and challenges are generally agreed with the workshop participants. Further debated subjects are summarised in the following bullets.
   - Representatives of HW treatment operators support a call for more guidance on the application of the waste hierarchy and further state that for hazardous waste the hierarchy is not decisive as decontamination and immobilization of pollutants shall be the first aim;
   - Additionally, there was a call for an EU-wide approach on waste treatment infrastructure planning to foster cooperation across regions as regards a network of treatment facilities balancing out national self-sufficiency of treatment infrastructure and regional cooperation across Member States.
   - Hazardous waste management is perceived not to be on the political agenda. This project shall contribute to change this perception.
   - Proper hazardous waste management and decontamination shall enable the Circular Economy and promote the diffusion of toxic free recyclables to increase acceptance for secondary raw materials.
   - One Member State raised the concern that the presence of hazardous substances contained in waste (even if below relevant thresholds) may still cause problems.

3. CLASSIFICATION OF WASTE
   - Bipro presented the main challenges encountered in the MS regarding waste classification:
     - Missing knowledge and/or lack of information and guidelines
     - Entries on the list of waste leave too much room for interpretation, different enforcement practices across country
     - Legislation not sufficiently implemented
     - Deliberate non-classification
   - The proposed measures to address these problems are:
- Provide (harmonised) guidance
- Enforce/promote the use if the guidance material (UK)
- Regional ‘waste advisors’ (UK)
- Holistic support framework, addressing regional differences (UK)
- Federal working group “LAGA” (DE)
- Waste Management Officers (DE)

Summary of management practices in Member States, applied measures, good practices and challenges are generally agreed with the workshop participants. Further debated subjects are summarised as follows:
- Stakeholders in the UK published a summary of typical mistakes made in waste classification, e.g. the usage of leakage assessments for testing Waste Acceptance Criteria which will be provided to the project team.
- Questions were raised on how the EU guidance on waste classification, which is about to be published in all official EU languages, and available regional guidance will be harmonized/aligned,
- One Member States asked for an inclusion of a specific paragraph in the EU guidance document aimed to clarify the issue of “relevant substances” to be searched against “total content”.
- Information on hazardous properties of waste needs to be included on the consignment notes accompanying the waste movements.
- Guidance documents were regarded only as useful to a limited extent as they are not legally binding.

4. ENFORCEMENT OF WASTE LEGISLATION – INSPECTIONS AND DEFINING RESPONSIBILITIES

- Bipro presented the pillars of enforcement:
  - Inspection activity of competent authorities
  - Strong responsibility of waste producers
  - Record keeping duties for involved actors
- The main challenges are paying sufficient attention to SMEs, inspecting the whole chain of hazardous waste management, acting against informal operators, communicating sufficiently with authorities and ensuring sufficient capacity for inspections
- Summary of management practices in Member States, applied measures, good practices and challenges are generally agreed with the workshop participants. Further debated subjects are summarised as follows:
  - Focus needs to be drawn on enforcing the mixing ban and identify illegal dilution practices.
  - Perception of stakeholders that budget cuts at competent authority level have led to decreasing environmental inspections.
  - In addition to environmental inspections, general awareness on waste legislation and the associated obligations amongst (small) waste producers and holders needs to be improved.
  - Including waste-related inspections in an overall environmental inspection system and thus holistically integrating inspections from different legal regimes would be beneficial.
  - The shared producer responsibility principle is the main tool to support authority-led inspections, as the waste producer shares responsibility for the ultimate fate of the waste even though the waste may be managed by intermediate actors, thus leading to a self-regulation of industry.
  - Non-compliant waste producers are believed to be found often in the smaller domestic industry as larger producers operating across the EU/internationally usually apply the same strict standards in all their facilities.

5. RECORD KEEPING AND TRACKING SCHEMES

- The main challenges are:
  - Limited control and tracking possibilities for competent authorities in some record keeping systems
  - Low statistical data quality
  - Missing possibility of the CA to direct specific waste streams to specific treatment routes
  - Not all actors submit records
  - The electronic system does not cover all steps
  - Existence of several electronic traceability systems, based on different criteria
  - Involved cost may hamper political will for implementation
• Summary of management practices in Member States, applied measures, good practices and challenges are generally agreed with the workshop participants. Further debated subjects are summarised as follows:
• Electronic record keeping is an important tool to improve the overview on hazardous waste streams in a Member State. However, it is essential to design the system in a way that the administrative burden and costs involved with such a system are kept within reasonable limits, in particular for small waste producers.
• Many Member States are currently developing or implementing electronic systems. These systems should be mandatory and compatible with the bigger Enterprise Resource Planning (ERP) systems of businesses. Tracking of HW is supported in systems requiring a prior authorisation of HW movements. This is for example the case in Czech Republic and for certain waste streams in Malta. Also Germany requires waste producers to have a permission before HW treatment, however certified HW treatment operators are exempted.

6. MANAGEMENT OF PCB / PCB WASTE
• The main challenges as regards PCB management are:
  • Addressing the issue of PCB from open applications
  • Ongoing identification and elimination of PCB from closed applications
  • Regional differences
• Summary of management practices in Member States, applied measures, good practices and challenges are generally agreed with the workshop participants. Further debated subjects are summarised as follows:
• The target from the Stockholm Convention to eliminate all PCB equipment until 2025 will increase the pressure to identify further PCB-containing material from closed and open applications. Additionally, this will particularly impact the equipment which are currently allowed to be operational until the end of their life.
• A difficult aspect concerns transformers which are operational and suspected to contain PCB. One Member State states that the burden for proving that the equipment does not contain PCB lies with the holder. Thereby, a strong indication is the manufacturing date. In particular transformers manufactured prior to 1996 should be strongly suspected to contain PCB.
• The costs of addressing PCB from open applications and thus mainly from construction and demolition were debated. Some Member States that are actively addressing open applications acknowledge the involved cost for the industry but emphasized that not addressing PCB from open applications would entail huge indirect costs elsewhere, e.g. by polluting food and damaging human health.

7. CONCLUDING REMARKS
Recommendations for the Member States are the following:
• Regarding the planning:
  • Include HW as a fix element in national/regional waste management planning
  • Coordinate HW management planning on national level.
  • Address the country’s/region’s major HW streams separately
• Regarding the education:
  • Education and knowledge transfer
  • Targeting dedicated industry sectors with campaigns and inspections
• Regarding the collection:
  • Require regularly reviewed collection permits
  • Support the collection of smaller HW quantities (Household, SMEs, farms) and quantities from CDW
• Regarding the record keeping:
  • Introduce electronic record keeping/tracking
  • Ensure nationwide coverage of the system and control possibilities
• Regarding the enforcement:
• Ensure a shared responsibility for the waste producer.
• Increase regular and strict inspection and include unplanned inspections; a certain degree of central coordination recommended
• Control the mixing ban within ‘ex-ante’ controls (prior to permitting; permit conditions) and ‘ex-post’ by regular site-visits
• Regarding the identification and elimination of PCBs
  • Don’t stop looking for PCB from closed application
  • Start looking for PCB in open applications

Recommendations for the EU are the following:
• Issue guidance on electronic record keeping if CE Package keeps this obligation
• Guidance on application of waste hierarchy for hazardous waste
• Discuss linkage between national HW movements and transboundary shipments
• Promotion of CDW Protocol

The presented preliminary conclusions were not opposed by the participants.
## List of participants

<table>
<thead>
<tr>
<th>Number</th>
<th>Organisation present at the workshop</th>
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<tbody>
<tr>
<td>1</td>
<td>Public Waste Agency of Flanders (OVAM)</td>
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<td>2</td>
<td>Ministry of Environment and Water, Bulgaria</td>
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<td>3</td>
<td>Department of Environment, Cyprus</td>
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<td>4</td>
<td>Ministry of Environment, Czech Republic</td>
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<td>5</td>
<td>Danish Environmental Protection Agency</td>
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<td>6</td>
<td>Ministry of the Environment, Estonia</td>
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<td>7</td>
<td>Ministerio de agricultura y pesca, alimentation y medio ambiente, Spain</td>
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<td>8</td>
<td>Municipal Waste Europe</td>
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<td>The European Chemical Industry Council</td>
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<td>Plastics Recyclers Europe</td>
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<td>European Plastics Converters</td>
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<td>European PVS Window Profiles Association</td>
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<td>19</td>
<td>Zero Waste Europe</td>
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<td>20</td>
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<td>21</td>
<td>Ministère de la Transition écologique et solidaire, France</td>
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<td>MOU, Greece (V. Liogkas)</td>
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<td>23</td>
<td>Environmental Protection Agency, Ireland</td>
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<td>24</td>
<td>Ministero dell’Ambiente e della Tutela del Territorio e del Mare, Italy</td>
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## Annex - Slides used at the workshop

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<th>Description</th>
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<td>01</td>
<td>BiPRO PROGNOS: Introduction</td>
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<td>02</td>
<td>BiPRO PROGNOS: General Findings</td>
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<td>BiPRO PROGNOS: Classification</td>
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<td>04</td>
<td>Yorg Aerts: Overview on Flemish tools to support correct waste classification</td>
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<td>BiPRO PROGNOS: Enforcement</td>
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<td>06</td>
<td>Céline Fourdrilis: Shared responsibility principle France</td>
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<td>07</td>
<td>BiPRO PROGNOS: Record Keeping</td>
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<td>08</td>
<td>Ana Cristina Carrola: Portugal’s experience with electronic information systems</td>
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<td>09</td>
<td>BiPRO PROGNOS: PCB management</td>
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<td>10 Hawkins Richard: Status of PCB management in the UK</td>
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<td>11 John Lotoft: Strategies for elimination of PCBs from open applications in Sweden</td>
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<td>12 BiPRO PROGNOS: Concluding Remarks</td>
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<td>Nicolas Humez: Improving Hazardous Waste</td>
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Final Report
Support to selected Member States in improving hazardous waste management based on assessment of Member States' performance

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