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*(Information)*INFORMATION FROM EUROPEAN UNION INSTITUTIONS, BODIES, OFFICES
AND AGENCIES

EUROPEAN COMMISSION

Commission Notice**Separate Collection of Household Hazardous Waste***(2020/C 375/01)***TABLE OF CONTENTS**

1. INTRODUCTION	2
2. BEST PRACTICES IN HOUSEHOLD HAZARDOUS WASTE COLLECTION	3
2.1. Household chemicals	6
2.1.1. Household cleaning and personal care products	7
2.1.2. Paints, varnishes, ink and glues	7
2.1.3. Household and garden pesticides	8
2.1.4. Photochemicals	8
2.1.5. Packaging	9
2.2. Domestic healthcare waste	9
2.2.1. Pharmaceutical products	9
2.2.2. Sharps and other potentially infectious waste	10
2.3. Construction and demolition waste	11
2.3.1. Asbestos waste	11
2.3.2. Treated wood	12
2.3.3. Coal tar and tarred products	13
2.4. Automotive maintenance waste	13
2.4.1. Oil filters and contaminated absorbing materials	13
2.4.2. Automotive products, surface polish, anti-freeze fluids	14
2.5. Mercury-containing waste (other than WEEE)	14
3. SUCCESS FACTORS FOR THE SEPARATE COLLECTION OF HOUSEHOLD HAZARDOUS WASTE	15
3.1. Economic incentives	15
3.2. Customised separate collection facilities	16
3.3. Awareness raising and communication	18
3.4. Enforcement	21
4. REFERENCES	22
ANNEX — Links to Good Practice Communication Examples	24

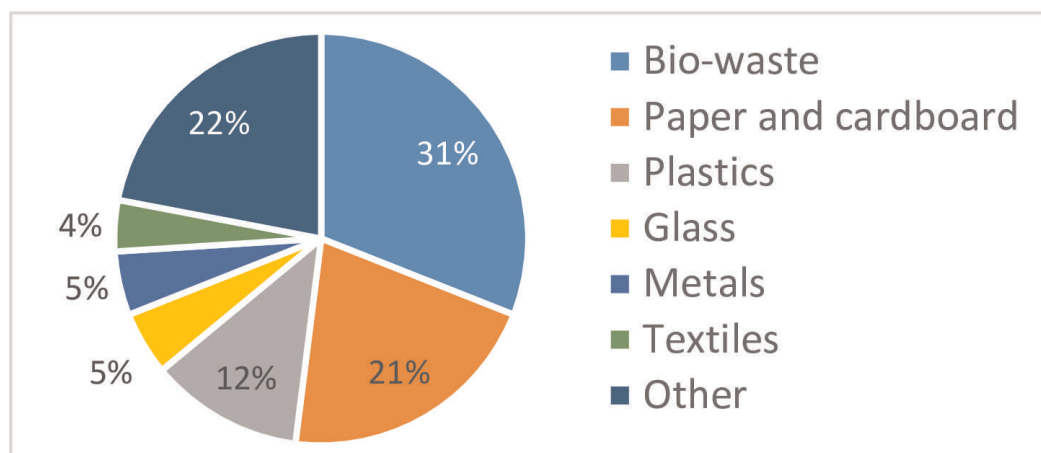
1. INTRODUCTION

These guidelines are prepared in view of Article 20(4) of Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste ⁽¹⁾ (hereafter ‘the Waste Framework Directive’) which requires the Commission to adopt guidelines on separate collection of hazardous waste fractions produced by households to assist and facilitate Member States in the implementation of the separate collection obligation set out in Article 20(1) of the Waste Framework Directive.

The main objective of this guidance is to prevent risks to human health and the environment, and in particular for waste workers, by facilitating the implementation of the separate collection of hazardous waste generated by households. Its objective is also to improve the quantity and the quality of materials for preparation for reuse and recovery, by preventing other material streams from becoming contaminated leading to waste treatment which locks in resources at the lower levels of the waste hierarchy, in line with the objectives of the Waste Framework Directive ⁽²⁾. This document aims to provide an overview of best practices in the implementation of the obligation of separate collection from across the EU, in particular at regional and local levels. Although this guidance is concerned with effective management of hazardous household waste, it should be kept in mind that prevention and reduction remain the priority, in accordance with the waste hierarchy. Therefore awareness-raising campaigns to minimise the use of hazardous products at home are essential.

These guidelines are addressed to Member States’ authorities at the local, regional and central levels, and to waste management operators. Its purpose is assisting and facilitating their task in developing and implementing separate collection programmes for household hazardous waste.

Figure 1: Composition municipal waste in Europe



Source: based on World Bank (2018) and Eurostat (2008) ⁽³⁾

Hazardous household waste (‘HHW’) typically represents about 1 % by weight of municipal waste (excluding waste of electric and electronic equipment – ‘WEEE’) ⁽⁴⁾. This amounts ⁽⁵⁾ to between 1 to 6 kg per inhabitant per year. However, country-level data are difficult to compare as countries have different reporting processes and categories (e.g. including WEEE or edible fats).

⁽¹⁾ OJ L 312, 22.11.2008, p. 3.

⁽²⁾ Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste (OJ L 150, 14.6.2018, p. 109, recital 41).

⁽³⁾ See for example Andreasi et al. (2017) for an overview of the waste composition of different waste streams.

⁽⁴⁾ Adamcová, D. et al. (2016).

⁽⁵⁾ EEA (2015) and D’emwilverwaltung (2018).

The bulk of municipal waste, of which household waste is the major source, typically comes from six waste streams (see Figure 1). Whilst HHW, as a small fraction, is captured under 'other', its significance is relatively higher due to its potential to impede high quality recycling of all other fractions, and due to safety concerns.

These guidelines do not specifically address waste streams covered by other Union waste legislation such as batteries, WEEE, waste oils or end-of-life vehicles, for which specific collection and management schemes are already in place. Lessons learnt from the operation of these more specific collection schemes, and potential synergies with them may however be relevant to the separate collection of household hazardous waste.

These guidelines are not binding. The Court of Justice of the European Union (CJEU) remains the exclusive authority to interpret EU law.

2. BEST PRACTICES IN HOUSEHOLD HAZARDOUS WASTE COLLECTION

HHW includes a wide range of materials that display diverse hazardous properties. Hazardous waste is defined in Article 3(2) of the Waste Framework Directive as 'waste which displays one or more of the hazardous properties listed in Annex III' of the Directive. Examples of this type of waste, typically generated by households include: paints and varnishes, garden pesticides, cleaning products, certain unused medicines, certain wastes from do-it-yourself house and automotive maintenance.

Waste classification criteria relating to the properties that may render waste hazardous are described in this annex and are to be used, as appropriate, when classifying waste as hazardous or non-hazardous, taking into account its origin and type and listing in the European List of Waste (Decision 2000/532/EC) ⁽⁶⁾.

The List of Waste provides a reference nomenclature for the identification and classification of waste, and is binding as regards waste which is to be considered hazardous. Waste listed therein is grouped in different chapters and sub-chapters by source and composition. Waste can be fully identified by a six-digit code. In this list hazardous wastes are marked with an asterisk (*).

The steps to be followed in assigning a waste code to any given waste stream, and the order of precedence to be applied when consulting the different chapters, is described in the Annex to Decision 2000/532/EC. Further guidance on the classification of waste and assignment of waste codes can be found in the Commission notice on technical guidance on the classification of waste ⁽⁷⁾.

Both the characteristics and the treatment of the different household hazardous waste types differ substantially from one another, but based on screening of existing best practices for collection of household hazardous waste, the following separate waste collection systems have been identified:

- periodic pick-up at a specific location (e.g. mobile collection point) or door-to-door (periodicity of two weeks or greater),
- in-shop take-back,
- deposit at civic amenity sites.

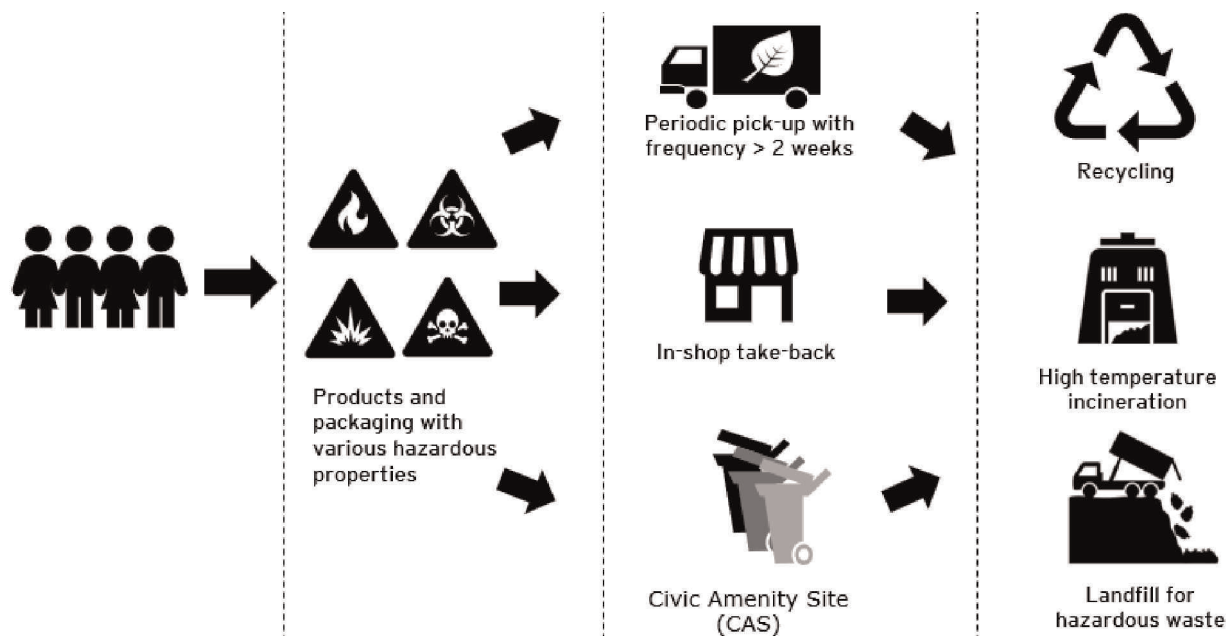
⁽⁶⁾ Commission Decision 2000/532/EC of 3 May 2000 replacing Decision 94/3/EC establishing a list of wastes pursuant to Article 1(a) of Council Directive 75/442/EEC on waste and Council Decision 94/904/EC establishing a list of hazardous waste pursuant to Article 1(4) of Council Directive 91/689/EEC on hazardous waste (OJ L 226, 6.9.2000, p. 3).

⁽⁷⁾ Commission notice on technical guidance on the classification of waste (OJ C 124, 9.4.2018, p. 1).

In the EU, about two-thirds of HHW that is separately collected is collected at civic amenity sites and the remaining third is largely collected via periodic pick-ups, in particular at mobile collection points. Collection points located in retail premises exist for some waste streams, such as batteries and WEEE ⁽⁸⁾.

Some HHW continues to escape appropriate disposal ⁽⁹⁾ and is discarded in the residual waste bin or, to a small extent, disposed in ways that can pose a significant health and environmental risk, such as flushing down the drain ⁽¹⁰⁾.

Figure 2: Separate collection and treatment schemes for hazardous household waste



Good practice example 1 ⁽¹¹⁾

The Grand Duchy of Luxembourg has an integrated waste collection system that envisages extensive and free collection facilities for HHW: 18 stationary collection points where citizens can bring their hazardous substances (i.e. one point per 35 000 inhabitants), mobile pick-ups are carried out 4 times a year and collection from homes occurs upon request. The system collects more than 5 kg HHW per inhabitant per year ⁽¹²⁾.

Communication campaigns using digital tools and specific support services are envisaged for focus groups such as for those living in apartment buildings. In the most comprehensive collection systems inhabitants of apartment buildings can deposit up to 27 different types of waste separately, including HHW.

⁽⁸⁾ http://ec.europa.eu/environment/waste/studies/pdf/household_report.pdf

⁽⁹⁾ Letcher and Vallero (2019).

⁽¹⁰⁾ https://ec.europa.eu/environment/waste/studies/pdf/household_report.pdf

⁽¹¹⁾ https://ec.europa.eu/environment/waste/studies/pdf/20180227_Haz_Waste_Final_RepV5_clear.pdf

⁽¹²⁾ D' Umweltverwaltung (2018).

Good practice example 2

Helsinki Region Environmental Services (Finland) has installed 50 containers in the metropolitan area to collect, free of charge, a wide range of waste streams including HHW. The containers are located at petrol stations, supermarkets and other shops for optimal accessibility. To ensure their security, the containers are only accessible during opening hours and the local police is involved to support unmanned facilities. The containers accept the following HHW:

- cooling, brake and clutch fluids,
- waste oils, oil filters and other oily waste,
- solvents such as turpentine, thinner, acetone (also nail polish removers),
- solvent based washing liquids,
- paints, glues, varnish, wood preservative substances,
- strong acids, such as sulphuric acid,
- pressure containers containing gas and that have contained gases,
- spray cans,
- alkaline washing liquids,
- pesticides and disinfectants,
- photography chemicals.

There are also some HHW that can only be disposed of at civic amenity sites: electric and electronic waste (free of charge), impregnated wood (free of charge) and waste containing asbestos (EUR 10 for every 100 litres, in 2015).

Good practice example 3 ⁽¹³⁾

In Odense (Denmark), every household receives a 40-litre red box for storage and transport of HHW. The box can be collected in four ways:

- collection upon request directly at the household for a fee,
- collection at apartment blocks with a mobile truck customised for HHW,
- delivery by households to one of two manned HHW reception points,
- delivery by households during certain weekends to ordinary civic amenity sites.

Odense collects 300 t/yr of HHW corresponding to about 1,6 kg per inhabitant per year. The largest part of HHW is paints and varnishes, which account for 66 to 75 % of all HHW collected. The rest is a mix of acids, pesticides, spray cans, and various other chemicals.

Since collection is managed by trained staff, the quality and homogeneity of the collected streams are high. The collection of hazardous waste is mainly financed by the general waste fee paid by all households in the municipality. The cost per inhabitant is approximately EUR 3,3 per year (based on information reported in 2014).

⁽¹³⁾ https://www.acrplus.org/images/project/R4R/Good_Practices/GP_Odense_hazardous-waste-collection.pdf

Good practice example 4 ⁽¹⁴⁾

In Paris (France), 'Trimobiles' (mobile collection points set on three-wheeled vehicles) are used, in addition to civic amenity sites and collection at the household upon request. These vehicles can be transformed in less than one hour into a mobile collection point. In 2012, the network consisted of 6 mobile collection points used at 30 different locations.

The frequency of the collection service depends on local circumstances and ranges from one to seven times a month. Each unit stays at the same location for a half day. Several waste fractions are collected including construction and demolition waste, WEEE and wood. In these mobile collection points the capture rate is high: 65 % of all collected HHW in the targeted areas. In 2017, 323 tonnes of hazardous waste were collected ⁽¹⁵⁾.

The service is provided only to households and is free of charge. The system is mainly funded by the local authorities and amounts to about EUR 2 per inhabitant per year for both the mobile collection points and the traditional civic amenity sites. The extended producer responsibility scheme for WEEE provides a small part of the overall financing. In Paris, the cost of waste collected through Trimobiles is about 300 EUR/tonne, while the cost of a traditional civic amenity site is of about 75 EUR/tonne (based on report of 2014).

Good practice example 5 ⁽¹⁶⁾

Tallinn (Estonia) uses reconditioned maritime-transport shipping containers, fitted with shelves, drawers and appropriate storage, as HHW collection points. The containers are placed at central locations to ensure proximity to citizens. This practice has increased HHW collection from 12 tonnes (0,03 kg/capita/year) in 2000 to 158 tonnes (0,4 kg/capita/year) in 2013.

The cost of one such waste collection container in 2005 varied from EUR 3 700 to EUR 4 500 depending on the size of the container (20-30 m³). The cost for managing a single collection point ranged from EUR 46 per month in 2004 to EUR 70 per month in 2013.

2.1. Household chemicals

In most Member States municipalities already collect household chemicals separately. This is usually via periodic pick-ups and civic amenity sites, and through complementary mechanisms, via distributors that do this on a voluntary basis.

The collection and treatment of hazardous household chemicals is mainly financed by municipalities. The organisation and financing of collection and treatment can also be the subject of extended producer responsibility schemes, as is the case in France since 2011. In France, a number of such sectoral schemes cover household chemicals grouped under the concept of 'Specific diffuse waste' (*déchets diffus spécifiques* ⁽¹⁷⁾), generated by households and which include pyrotechnical products, hydrocarbons, fire-extinguishers, adhesives, solvents, and common household chemicals. In the case of pyrotechnical devices, these are collected via a network of ship chandlers, under contract of the sectoral scheme Aper Pyro.

⁽¹⁴⁾ https://www.acrplus.org/images/project/R4R/Good_Practices/GP_ORDIF_mobile-civic_amenity_site.pdf

⁽¹⁵⁾ http://filer.paris.fr/parisfr/rapport_sur_le_prix_et_la_qualite_du_service_public_de_gestion_des_dechets_2017.pdf

⁽¹⁶⁾ https://www.acrplus.org/images/project/R4R/Good_Practices/GP_Tallinn_hazardous-waste-collection.pdf

⁽¹⁷⁾ <https://www.ecologique-solidaire.gouv.fr/dechets-diffus-specifiques-menagers>

Good practice example 6

In Brussels (Belgium), citizens can drop off household chemical waste at the mobile 'Proxy Chimik' truck. The truck stops periodically at some 100 locations in Brussels and stays 45 minutes at each point. The frequency of the service is once per month, or once every two months, depending on the location.

In 2012, the amount of HHW collected via this type of mobile collection was estimated at 0,4 kg per capita. Waste is checked on site before acceptance to avoid contamination and health hazards and to maximise its recovery potential (i.e. liquids and solids need to be brought separated and in their original packaging; the name of the product has to be written on the packaging). Basic chemical training to staff is provided to apply the waste acceptance criteria.

Communication includes: clear instructions to citizens, brochures, websites and mobile applications to inform citizens about the collection schedule. Public financing is provided to keep HHW collection free of charge to citizens.

2.1.1. Household cleaning and personal care products

Cleaning products and personal care products (cosmetics, hair dye, nail polish, nail polish remover, etc.), where hazardous, are addressed under the following relevant List of Waste codes:

20 01 13* – solvents;

20 01 14* – acids;

20 01 29* – detergents containing hazardous substances.

Many daily-use cleaning products in households may become hazardous waste upon their disposal as they often contain solvents, acids, bases, abrasive materials, surfactants, brighteners, and other hazardous constituents. They can be flammable or corrosive, amongst other hazards.

Separate collection facilitates the following treatment: Household cleaning and personal care products are generally incinerated. The reuse of personal care products, such as cosmetics, is not a common practice, but some NGO-driven initiatives exist.

2.1.2. Paints, varnishes, ink and glues

Paints are mixtures of solvents, pigments, minerals, resins, surfactants and other additives. A fraction of the product ends up in the sewers and surface waters following the cleaning of brushes and containers. During their use and end-of-life, solvent based paints emit volatile organic compounds to the air.

Waste paints and solvents containing hazardous substances represent a substantial part of HHW. The applicable code in the List of Waste is:

20 01 27* – paint, inks, adhesives and resins containing hazardous substances.

Good practice example 7

'RePaint' is a UK wide paint reuse network (sponsored by a large paint distributor to bring in expertise, visibility and financing) that collects leftover paint, reprocesses it into new paints and redistributes it for free or at a low price to individuals, communities and charities. Strict acceptance criteria are followed to avoid contamination (e.g. paint will only be accepted if it is still in its original container).

RePaint operates over 74 drop off points such as civic amenity sites or facilities that are run by volunteers, and redistributes over 300 000 litres of paint each year. The annual cost of operating a drop-off point is close to EUR 10 000 depending on the scale and location.

Separate collection facilitates the following treatment: The most commonly used treatment for end-of-life paint in the EU is incineration, but reuse and recycling also occur. The landfilling of paints with solvents (20 01 27*) is not permitted in accordance with Article 5(3) of Directive 1999/31/EC on the landfill of waste⁽¹⁸⁾ which prohibits landfilling of liquid waste and of waste that is classified as flammable.

2.1.3. Household and garden pesticides

Pesticides are substances that are contained as active substances in plant protection products and biocides. Even though household pesticides are formulated specifically for non-professional/home use, they contain active ingredients that are toxic to plants and animals other than their target, especially for plants (herbicides), insects (insecticides) or fungi (fungicides). Some pesticides can be persistent and bio-accumulative and can be toxic if ingested, as well as irritating to eyes and skin. Avoiding risks to health and the environment from disposal of these products depends strongly upon compliance by consumers with disposal instructions. The collection system most commonly applied in Member States for this waste is collection from households via the local civic amenity site.

The applicable List of Waste code for household waste pesticides is:

20 01 19* – pesticides.

Separate collection facilitates the following treatment: Waste household garden pesticides and chemicals are not usually suitable for recycling. Waste management schemes have in general focused on reducing their use and on their correct disposal at end-of-life. In most cases, waste pesticides are destroyed by high temperature incineration.

2.1.4. Photochemicals

This category of hazardous waste has decreased since the appearance of digital photography but some households still develop photographic film and produce prints using large amounts of hazardous chemicals. Liquid waste from the photographic process contains substances such as hydro-quinine, sodium sulphite, silver, mercuric chloride, cadmium, ferrocyanide, acids and formaldehyde. These are found in process bath wastes, colour developer wastes, bleach, fixer and fixer wastes. The applicable code in the List of Waste is:

20 01 17* – photochemicals.

Germany and Denmark require owners of photography shops to take back this waste from households free of charge. They are also responsible for its disposal.

Separate collection facilitates the following treatment: Photochemical waste is usually recycled and is financially driven by the extraction of silver. Electrolysis is a commonly used, but capital intensive method to recover silver.

⁽¹⁸⁾ Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste (OJ L 182, 16.07.1999, p. 1).

2.1.5. Packaging

Packaging waste that contains hazardous substances and mixtures (such as those listed in the sections above) is considered as hazardous waste and can be collected separately via the civic amenity site or periodic pick-ups for household hazardous waste. The following categories in the List of Waste apply:

15 01 10* – packaging containing residues of or contaminated by hazardous substances.

Further guidance on classification of containers of hazardous substances and mixtures, and on when they are to be considered 'empty', can be found in the Commission notice on technical guidance on the classification of waste ⁽¹⁹⁾. Empty packaging from households is typically collected as part of separate collection schemes or as mixed municipal waste.

2.2. Domestic healthcare waste

2.2.1. Pharmaceutical products

A variety of pharmaceuticals such as analgesics, antibiotics, hormone replacement drugs, oral chemotherapy drugs and antidepressants are commonly found in households and, according to some estimates, a significant proportion of them become waste ⁽²⁰⁾. Directive 2001/83/EC on the Community code relating to medicinal products for human use (Article 127b) ⁽²¹⁾ requires that Member States ensure that appropriate collection systems are in place for medicinal products that are unused or have expired. Member States implement this obligation by requiring pharmacies or civic amenity site ⁽²²⁾ to accept waste pharmaceutical products. Other collection locations used in the EU include nursing homes and retirement communities. Collection periods vary from one-day collection events, continuous collection or periodic collection.

The relevant List of Waste codes are:

20 01 31* – cytotoxic and cytostatic medicines;

20 01 32 – medicines other than those mentioned in 20 01 31*.

Separate collection of pharmaceutical waste is important, regardless of the classification of specific products as hazardous or non-hazardous waste, as it can reach the environment from households. For example, the discharge of effluent from urban waste water (sewage) treatment plants contains excreted pharmaceuticals as well as unused pharmaceuticals which are thrown away into sinks and toilets ⁽²³⁾. Waste water treatment plants are designed primarily to treat excreta and other conventional organic matter, and not for the removal of pharmaceuticals. Consequently pharmaceuticals, along with their residues, are increasingly found in surface waters ⁽²⁴⁾ ⁽²⁵⁾.

In order to finance collection Member States such as France ⁽²⁶⁾ and Spain ⁽²⁷⁾ have established Extended Producer Responsibility schemes for expired pharmaceutical products.

Separate collection facilitates the following treatment: collected expired medication is typically incinerated at high temperature.

⁽¹⁹⁾ Commission notice on technical guidance on the classification of waste (OJ C 124, 9.4.2018, p. 1).

⁽²⁰⁾ The German Umweltbundesamt estimates that in total about 30% of amounts sold remain unused and are discarded.

⁽²¹⁾ Directive 2001/83/EC of the European Parliament and of the Council of 6 November 2001 on the Community code relating to medicinal products for human use (OJ L 311, 28.11.2001, p. 67).

⁽²²⁾ Health care without harm (HCWH). Europe has produced a database that aims to provide an overview of current and past initiatives by local, regional, and national NGOs, European projects, and national/regional authorities of EU Member States to tackle pharmaceuticals in the environment and pharmaceutical waste: http://saferpharma.org/pie-initiatives-database/?_sft_area_of_interest=unused-expired-pharmaceutical-disposal-practices

⁽²³⁾ OECD 2019 - <https://www.oecd.org/chemicalsafety/pharmaceutical-residues-in-freshwater-c936f42d-en.htm>

⁽²⁴⁾ <https://www.ncbi.nlm.nih.gov/pubmed/29890607> and <https://doi.org/10.1016/j.scitotenv.2012.04.028>

⁽²⁵⁾ aus der Beek, T. et al. (2016).

⁽²⁶⁾ Ademe (2017).

⁽²⁷⁾ <https://www.sigre.es/>

Good practice example 8

In France, an extended producer responsibility scheme for pharmaceutical products is implemented through the organization 'Cyclamed' which coordinates the separate collection of pharmaceuticals. Cyclamed organises awareness campaigns for patients and partnerships with all actors in the pharmaceutical supply chain. Over 21 000 pharmacies, 200 distributors and 190 laboratories participate in the system. Cyclamed succeeds in collecting 62 % of the unused medication. The total collected volume is 10 500 tonnes, or 162 g per inhabitant per year.

The total cost of the collection system is around EUR 10 million which comes from a contribution by the producers of EUR 0,0032 per medication box, excluding VAT. About 50 % of the cost is related to waste disposal (250 EUR/tonne) including the incineration cost (120 EUR/tonne), storage and transport ⁽²⁸⁾. The procurement of the collection boxes given to the pharmacies accounts for about 25 % of total costs, communication for 10 % and overall management for 5 %. The remainder covers studies, research and miscellaneous costs.

2.2.2. Sharps and other potentially infectious waste

Infectious waste is waste containing viable microorganisms or their toxins which are known, or reliably believed, to cause disease in man or other living organisms (Annex III of the Waste Framework Directive). This type of waste is normally generated in hospitals, laboratories and related healthcare facilities. However, similar waste may result from self-treatment and self-monitoring by patients at home, without the intervention of healthcare personnel. This may include used needles used by patients to treat specific disorders, including diabetes, and waste from self-test diagnostic devices for transmissible infectious diseases. Information on different categories of infectious agents, as well as on categories of healthcare waste are provided by the World Health Organisation ⁽²⁹⁾. Specific national rules on collection and treatment of such waste apply generally to waste generated in healthcare facilities, such as hospitals, laboratories and veterinary clinics, but not to healthcare waste generated at home, for which generally no separate collection schemes exist other than for used pharmaceuticals (as described above).

There is no suitable List of Waste code for separately collected infectious municipal waste. Currently, and in application of the methodology in the annex to Decision 2000/532/EC, the possible codes in the List of Waste applicable to such waste generated in households are:

- 20 03 01 – mixed municipal waste;
- 20 03 99 – municipal wastes not otherwise specified.

⁽²⁸⁾ https://www.cyclamed.org/wp-content/uploads/2019/09/CYCLAMED_INFOGRAPHIE_2018-3-1024x1024.jpg

⁽²⁹⁾ WHO, 2014. Safe management of wastes from health-care activities, https://www.who.int/water_sanitation_health/publications/wastemanag/en/

Good practice example 9

France has established an extended producer responsibility scheme for certain potentially infectious medical products, in particular sharps, test kits and end-of-life medical devices. Organisation 'DASTRI' has been set up to fulfil this obligation on behalf of producers. It provides dedicated containers called 'Needle Boxes' which have to be returned to pharmacies that are collaborating with DASTRI.

In 6 years, 12 million sharps containers have been distributed to patients and in 2018, 83 % of the sharps have been safely collected and treated.

As a result of the COVID-19 pandemic, which was declared in March 2020, some Member States or their regions have put in place specific collection arrangements ⁽³⁰⁾ for mixed waste from households with COVID-19 affected patients. In general, however, as stated in the guidance ⁽³¹⁾ issued by the European Centre for Disease Prevention and Control (ECDC) and further reflected in guidance issued by the Commission services ⁽³²⁾, such waste is collected together with the unsorted municipal waste fraction, without further specific collection measures in place.

Separate collection facilitates the following treatment: Infectious waste is generally treated by incineration by waste operators authorised to accept infectious waste. Alternatively infectious waste can be treated by steam sterilisation or by chemical treatments. A comprehensive review ⁽³³⁾ of technologies for the treatment of healthcare waste was published by the World Health Organisation in 2019.

2.3. Construction and demolition waste**2.3.1. Asbestos waste**

The term asbestos describes a group of naturally occurring mineral silicate fibres of the serpentine and amphibole series. Asbestos is a hazardous mineral with a fibrous structure, which produces severe, potentially fatal, long term health effects, including cancer, when inhaled. It was widely used in the past for insulation and other purposes, owing to its resistance to fire and heat.

Asbestos is a substance classified as a category 1 carcinogen ⁽³⁴⁾ and, according to Annex III to the Waste Framework Directive, waste which contains such a substance and exceeds a concentration limit of 0,1 % is classified as hazardous. A number of List of Waste entries apply to asbestos-containing waste that can be generated in households, either as the result of demolition or renovation works, or as a result of discarding certain (old) equipment:

- 16 02 12* – discarded equipment containing free asbestos;
- 16 02 15* – hazardous components removed from discarded equipment;
- 17 06 01* – insulation materials containing asbestos;
- 17 06 05* – construction materials containing asbestos.

⁽³⁰⁾ A review by Member State/region can be found in the COVID19 web of ACR+, <https://www.acrplus.org/en/municipal-waste-management-covid-19>

⁽³¹⁾ <https://www.ecdc.europa.eu/en/publications-data/infection-prevention-control-household-management-covid-19>

⁽³²⁾ Waste management in the context of the coronavirus crisis (April 2020), https://ec.europa.eu/info/sites/info/files/waste_management_guidance_dg-env.pdf

⁽³³⁾ https://www.who.int/water_sanitation_health/publications/technologies-for-the-treatment-of-infectious-and-sharp-waste/en/

⁽³⁴⁾ Regulation (EC) No. 1272/2008 of the European Parliament and of the Council of 16 December 2008, on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 (OJ L 353, 31.12.2008, p. 1).

Although production of asbestos is banned in the EU by the restriction under entry 6 of Annex XVII to REACH ⁽³⁵⁾, it is still widely present in a range of materials and products with long life cycles, e.g. materials found in buildings such as in concrete, roofing, insulation, pipes, etc. Citizens engaging in Do-It-Yourself activities also deliver (bound, non-friable) asbestos waste to civic amenity sites in different countries. It should be noted that all Member States have in place legislation strictly regulating the protection of workers from the risks related to exposure to asbestos at work, pursuant to Directive 2009/148/EC ⁽³⁶⁾. Work involving asbestos-containing materials should only be carried out by trained professionals and should not be undertaken as a Do-It-Yourself activity.

Good practice example 10

London (UK) provides an on-demand collection service for wrapped asbestos. Citizens can ask for one subsidised yearly collection of 15 m³ of asbestos (or seven builders' rubble bags) collected at home without charge. To optimise the cost efficiency, the service is outsourced to competitively selected private contractors.

Good practice example 11

The Region of Flanders (Belgium) strives to become 'asbestos safe' by 2040. One of the policy measures allows households to bring their non-friable (bound) asbestos generated by Do-It-Yourself renovation work to a civic amenity site, or request a pick-up at home using registered bags that can be bought upfront from the municipality. When households bring such asbestos to the civic amenity site, it is free of charge up to 200 kg/inhabitant or 1 m³ or 10 roof plates per year. A co-financing formula lowers the service fee for citizens to only EUR 30 for one bag which has the capacity to collect about 20 corrugated roof plates. Results show that the amount of asbestos delivered at civic amenity sites stays the same, even when the possibility is given to have the asbestos waste collected from home, indicating there is no shift from civic amenity sites to door-to-door collection. This shows that collection at home is important to accelerate the removal of asbestos waste from houses.

Separate collection facilitates the following treatment: Although alternative treatment methods exist ⁽³⁷⁾, landfilling asbestos waste is still the best available technique. Before landfill, additional stabilisation measures can be taken to reduce the risk of release of fibres.

2.3.2. Treated wood

Wood waste is generated by household renovation and repair works involving structural and non-structural elements, for instance, window and door frames, separation walls and roof elements, wood from awnings, garden fences and other outdoor wooden structures. In order to prevent the wood from degrading it is impregnated with wood preservatives. Some widely used preservatives such as chromated copper arsenate [CCA], creosote and pentachlorophenol have been severely limited or banned, but disposal of the wood that was treated with them is still necessary ⁽³⁸⁾ ⁽³⁹⁾. The corresponding List of Waste code for this household waste is:

20 01 37* – wood containing hazardous substances.

⁽³⁵⁾ Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC (OJ L 396, 30.12.2006, p. 1).

⁽³⁶⁾ Directive 2009/148/EC of the European Parliament and of the Council of 30 November 2009 on the protection of workers from the risks related to exposure to asbestos at work (OJ L 330, 16.12.2009, p. 28).

⁽³⁷⁾ State of the art: asbestos – possible treatment methods in Flanders: constraints and opportunities (2016) <https://www.ovam.be/sites/default/files/atoms/files/State%20of%20the%20art%20asbestos%20waste%20treatment.pdf>

⁽³⁸⁾ https://www.researchgate.net/publication/279340427_Regulations_in_the_European_Union_with_Emphasis_on_Germany_Sweden_and_Slovenia

⁽³⁹⁾ A detailed study for the German Environmental Agency (Giegrich et al., 1993) concluded that arsenic is the most important contributor to the carcinogenicity of landfill leachate.

Typically, households can bring treated wood to a civic amenity site.

Separate collection facilitates the following treatment: The preferred treatment method of CCA-treated and other treated wood is incineration, with state-of-the-art air pollution control given the volatility of arsenic in flue gas.

2.3.3. Coal tar and tarred products

Coal tar was commonly used as a binder in road construction, prior to being superseded by bitumen. Wooden railway sleepers were also treated with coal tar creosote, as a preservative, for many decades. Today the use of creosote to treat wood is highly restricted and regulated under Regulation (EC) No 1907/2006 (REACH) ⁽⁴⁰⁾, Annex XVII, entry 31.

Waste containing coal tar is classified as hazardous because it contains significant amounts of polycyclic aromatic hydrocarbons (PAHs), a group of carcinogenic compounds. Asphalt waste containing coal tar is considered to be hazardous waste when the level of coal tar is > 0,1 %. The term coal tar describes a number of complex substances, derived from coal, which are classified as carcinogens of category 1A in annex VI of the CLP Regulation ⁽⁴¹⁾ and which, according to Annex III of the Waste Framework Directive, classify as waste as hazardous if the concentration equals or exceeds 0,1 %. Used railway sleepers are known to have been reused in gardens to stabilise walls or ground, and are dealt with in the section above on wood waste. Coal tar can also be found in products like coal tarred board or roofing felt which was used, e.g., as part of roofs at garden houses. Some of these may give rise to considerable amounts of hazardous waste, when being repaired or replaced.

The applicable codes in the List of Waste are:

- 17 03 01* – bituminous mixtures containing coal tar;
- 17 03 03* – coal tar and tarred products;
- 20 01 37* – wood containing hazardous substances (see Section 3.3.2 above).

Typically, households can bring this waste to a civic amenity site.

Separate collection facilitates the following treatment: Depending on the regulations and infrastructure in the country, this waste category is either thermally treated (incineration) or, although less favoured according to the waste hierarchy, deposited in landfills.

2.4. Automotive maintenance waste

2.4.1. Oil filters and contaminated absorbing materials

Oil filters from cars can become part of household waste when Do-It-Yourself motorists service their own cars. These activities may also generate other oil-impregnated waste such cloths and gloves. It is estimated that in the UK alone, 1 100 tonnes ⁽⁴²⁾ of waste oil is disposed of every year in such spent filters, often as mixed municipal waste. The applicable codes in the List of Waste are:

- 15 02 02* – absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by hazardous substances;
- 16 01 07* – oil filters.

⁽⁴⁰⁾ See note 35.

⁽⁴¹⁾ For instance high temperature coal tar pitch [EC: 266-028-2].

⁽⁴²⁾ http://ec.europa.eu/environment/waste/studies/pdf/household_report.pdf

Such waste could be brought to authorised establishments that generate such waste as part of their professional activity, such as automobile repair workshops and parts stores (this may involve payment of a fee) or to a civic amenity site using specialised receptacles for collection to prevent leakage and facilitate further transport.

Separate collection facilitates the following treatment: Used oil filters are recyclable because they are made of steel. Any oil remaining in them can be recovered using oil filter presses.

2.4.2. *Automotive products, surface polish, anti-freeze fluids*

Many of the substances and mixtures used in cars, or for cleaning and maintaining them, are hazardous to human health and the environment. For example, the primary ingredient in anti-freeze is ethylene glycol, a toxic substance. Anti-freeze, like other liquids in the car such as brake fluids or lubricating oil need to be changed periodically. Applicable List of Waste codes are:

- 16 01 13* – brake fluids;
- 16 01 14* – anti-freeze fluids containing hazardous substances;
- 20 01 26* – oil and fat other than those mentioned in 20 01 25.

Improper management of waste oil includes pouring it down drains, onto soil, burning in bonfires or in oil burners, and disposing of it together with spent filters via the residual waste bin. Such waste could be brought to authorised establishments that generate this waste as part of their professional activity such as automobile repair workshops, parts stores or petrol stations.

Separate collection facilitates the following treatment: Used antifreeze can be recycled and its original properties restored. Recycled antifreeze can be used as engine coolant or the ethylene glycol can be extracted and reused in the plastics industry. Motor oil can be treated and regenerated into base oil or used as fuel. However much oil is lost, mostly through burning during its use phase.

2.5. **Mercury-containing waste (other than WEEE)**

Mercury is highly toxic to humans and animals when inhaled or ingested. It is also toxic to aquatic organisms. Mercury-containing waste from households includes old mercury batteries and mercury thermometers. These are covered by the following entries in the List of Waste:

- 20 01 21* – fluorescent tubes and other mercury containing wastes;
- 20 01 33* – batteries and accumulators included in 16 06 01, 16 06 02 or 16 06 03 and unsorted batteries and accumulators containing these batteries.

The total consumption of mercury in measuring devices in 2007 in the EU27 was estimated at between 7 and 17 tonnes. The main applications were sphygmomanometers, home barometers, fever thermometers and thermometers for laboratory and industrial applications. The placing on the market of mercury-containing measuring devices is now banned under Regulation (EC) No 1907/2006 (REACH) ⁽⁴³⁾ (Annex XVII, entry 18a) and the mercury consumption for equipment sold to the general public (such as fever thermometers and barometers) ceased in 2009 ⁽⁴⁴⁾.

Most Member States collect this equipment together with other types of hazardous waste and separate it out for recycling afterwards. However, a substantial part of mercury in thermometers and other measuring equipment used in households is still improperly disposed of via mixed residual waste.

⁽⁴³⁾ See note 35.

⁽⁴⁴⁾ http://ec.europa.eu/environment/chemicals/mercury/pdf/study_report2008.pdf

Separate collection facilitates the following treatment: Mercury containing waste should be recycled or treated in a facility permitted to treat hazardous waste. Mercury recovery units exist, for example, in Germany, France, Austria, and Sweden. Trade in mercury is highly regulated and controlled under Regulation (EU) 2017/852 on mercury ⁽⁴⁵⁾. Waste containing mercury is generally treated and stabilised before it is permanently disposed in underground storage facilities such as salt mines or in specially engineered landfills.

3. SUCCESS FACTORS FOR THE SEPARATE COLLECTION OF HOUSEHOLD HAZARDOUS WASTE

Approaches to the organisation of separate collection have been analysed in many studies ⁽⁴⁶⁾. Successful separate collection systems have been shown to follow an integrated approach that addresses the following four elements: they provide economic incentives, they envisage clear rules on legal enforcement, they provide a customised separate collection infrastructure and they actively and regularly engage in communication with the target audience (households generating waste). These elements have been observed to be common to all separate collection schemes, including those for household hazardous waste.

Analysis of best practices in Member States has led the Commission to identify the following factors as contributing significantly to the effectiveness of the separate collection schemes, in particular for HHW, in terms of the amounts of collected waste.

3.1. Economic incentives

The instruments listed below are commonly assessed as successfully promoting separate collection, including separate collection at source by citizens, in Europe.

Extended Producer Responsibility (EPR) shifts the financial and/or operational responsibility of waste management from municipalities to the producers of goods. EPR contributes to better sorting and recycling by providing the adequate infrastructure and necessary communication, and by financing the net cost of operating the collection service and further treatment according to the waste hierarchy, as well as awareness-raising. EPR has shown its merits for the recycling of many waste streams, such as packaging, electronics, batteries and vehicles.

The Waste Framework Directive, revised in 2018, sets out the general principles to be followed when implementing EPR schemes in its Articles 8 and 8a. An important feature is the modulation of fees paid by the producers in function of sustainability criteria, taking into account for instance the durability, reparability, reusability, recyclability or the presence of hazardous substances of their products. In the case of household hazardous products, 'eco-modulation' could support improvements at the level of the design of the product in order to reduce its hazardousness (qualitative prevention), to increase (quantitative) waste prevention, its recyclability or its reusability.

Pay-As-You-Throw (PAYT) requires households to pay when disposing of mixed waste. This is typically implemented via labelled waste bags that have to be procured upfront or by means of street containers that will only unlock after identification of the user by a personal card. It is critical for mixed waste to be comparatively expensive, whilst recyclable and other sorted streams can be deposited at (almost) no charge. This gives a clear incentive to sort waste at source.

By virtue of the strength of financial incentives, PAYT has proved to be an effective tool to enhance separate collection at source.

⁽⁴⁵⁾ Regulation (EU) 2017/852 of the European Parliament and of the Council of 17 May 2017 on mercury, and repealing Regulation (EC) No 1102/2008 (OJ L 137, 24.5.2017, p. 1).

⁽⁴⁶⁾ See, among others, OECD (2012), WRAP (2014), UNEP (2016) and EEA (2019).

Good practice example 12

Flanders⁽⁴⁷⁾ (Belgium) is a frontrunner in source separation thanks to its PAYT system. The variable part of the municipal waste tax paid by households, has to stay between 0,1 and 0,3 EUR/kg for residual waste or between EUR 0,75 and EUR 2,25 for a bag of 60 litres. PAYT typically works via registered bags or bar-coded bins. For apartment buildings and very densely populated areas, (underground) public containers that automatically open after payment or identification via badge can be used.

Landfill and incineration taxes and fees do not affect citizens directly, but incentivise municipalities and waste management operators to improve the effectiveness of waste sorting, collection and recycling in their area. These taxes and fees⁽⁴⁸⁾ help to internalise the external costs from disposal (carbon dioxide and methane emissions, air and groundwater pollution) and the external benefits from recycling (energy savings, reduction of environmental and health impacts of virgin resource extraction).

In a deposit-refund system, the consumer pays a deposit when buying a product such as a bottled drink and receives a refund when returning the container⁽⁴⁹⁾. The system is applied typically to beverage packaging but also exists for returnable products such as propane gas cylinders for outdoor cooking. Owing to the financial incentive, deposit-refund systems induce an almost immediate increase of recycling rates to levels above 90 %.

Of the above instruments, the first three (EPR, PAYT and taxes on landfilling and incineration) are considered to be key economic instruments to incentivise application of the waste hierarchy as reflected in Annex IVa of the Waste Framework Directive.

Good practice advice:

- providing safe disposal options for HHW at a low or zero cost to households increases collection rates,
- where appropriate, making producers responsible for the management of HHW via EPR ensures sustainable financing of the collection facilities and, with effective eco-modulation, may also incentivise design changes to minimise the end-of-life management costs of products.

3.2. Customised separate collection facilities

There is a wide variety of ways to collect different waste streams.

- (1) Door-to-door collection (single stream or co-mingled stream) is especially suited for urban regions with a high population density, where transport distances are small. It is commonly used for different waste streams such as for (frequent) collection of dry recyclables and biowaste, but rarely for household hazardous waste (presumably due to low volumes, diversity of waste types and increased risk of depositing HHW in kerb-side).
- (2) Periodic pick-ups typically apply to waste streams such as green waste, HHW and bulky waste. By organizing periodic pick-ups, municipalities offer a service to households while keeping the frequency of collection low, e.g. once a month. The location can be flexible (e.g. mobile trucks can periodically pick up HHW at central locations) or be done on demand (e.g. home collection of packaged bound asbestos). These are mostly organised or facilitated by municipalities, but are sometimes outsourced to private waste management operators. Municipalities can limit the amount of waste per household to be collected by the municipal services (e.g. 2 m³ per year of bulky waste), and introduce identity controls to ensure that collection is limited to private households, excluding commercial or other activities.

⁽⁴⁷⁾ Besluit van de Vlaamse Regering tot vaststelling van het Vlaams reglement betreffende het duurzaam beheer van materiaalkringlopen en afvalstoffen (Vlaema) bijlage 5.1.4.

⁽⁴⁸⁾ See for an extensive discussion of green taxation at <https://ex-tax.com/>

⁽⁴⁹⁾ See ACR+ (2019) for an overview of existing deposit-refund systems in Europe.

- (3) Street containers or 'bring systems'. Municipalities, organizations implementing extended producer responsibility obligations or other waste operators place street containers or 'bring systems' to collect a range of waste streams: residual waste, certain household hazardous waste, kitchen waste, paper and cardboard, plastics, metals, glass packaging, textiles. By putting bins or containers at central public locations, households can drop off their waste any time, whilst optimizing the logistics compared to door-to-door collection.
- (4) Take-back facilities – organizations implementing extended producer responsibility obligations provide in-shop take-back facilities for a range of waste streams: beverage packaging, WEEE, batteries and HHW. Take-back facilities offer user-friendly solutions for consumers, whilst optimizing the logistics compared to door-to-door collection.
- (5) Civic Amenity Sites – provide a solution where users can drop off almost all waste intended for recovery or disposal, whilst the staff present on the collection site can provide assistance and control the quality of the incoming waste. Since the civic amenity site is focused on collecting household waste, waste produced as a result of a professional activity should be diverted from the civic amenity site, for example by applying the requirement of identification with an ID-card and prohibition of large volumes.

Good practice example 13

In the Netherlands an indicative number of 60 000 inhabitants per civic amenity site is recommended ⁽⁵⁰⁾. In the region of Flanders (Belgium) a municipality can choose between a population standard or a distance standard. The first implies one civic amenity site per municipality of minimum 10 000 inhabitants and one extra civic amenity site per 30 000 inhabitants ⁽⁵¹⁾. Alternatively, in an inter-communal association, all civic amenity sites are accessible to all citizens of the different municipalities of the association and 90 % of the inhabitants should have access to a civic amenity site within 5 km. Cities usually choose the distance standard and therefore the number of facilities per number of inhabitants will typically be lower due to the high population density.

It should be noted that, although the analysis of best practice in different territories shows that there is no 'one-size-fits-all' waste separate collection system, there are a limited number of common elements that, in different combinations, define a model separate collection system. These elements are presented and discussed in this guidance. Flexibility in how these elements are fine-tuned and combined allows for optimisation, taking into account local circumstances, such as the population density, housing typology, climate, storage space limitations, collection in historic city centres, etc.

Good practice advice:

- Implementing a combination of different separate collection systems will generally result in greater collection efficiency, catering for different waste streams and disposal behaviour/preferences of the population.
- Civic amenity sites are the most common collection facilities for the large diversity HHW streams. Their user-friendliness is important to increase the volumes of HHW collected: long opening hours, accessible location and a high-density civic amenity site grid.
- Periodic pick-ups, on-demand pick-ups and mobile collection points are an important addition to regular civic amenity sites, as they allow households to dispose of their waste closer to home. They are also useful to overcome space constraints in highly populated areas. Innovative collection facilities (e.g. trimobiles as used in Paris or customised shipping containers as used in Tallinn) can provide efficient and cost-effective collection solutions.
- Door-to-door collection generally achieves the highest collection rates, especially in highly populated areas. But the costs are also higher than for other collection types.
- Collection points and take-back obligations in shops, pharmacies and other professional facilities for certain waste can be part of the collection network to make it easier to dispose of waste properly, instead of via mixed municipal waste or flushing into the sewage network.
- For certain HHW, such as asbestos, local authorities can minimise health risks and illegal disposal by providing stream-specific services, e.g. collection of bound asbestos at home via the provision of standardised packaging.
- Providing adequate training to the staff operating civic amenity sites, in particular on waste acceptance criteria which should be administered in all civic amenity sites, helps to improve the sorting, and subsequently the quality of the recovered materials.
- Establishing a system to determine the amount of separately collected HHW, and calculating the quantity collected and collection costs per inhabitant per year, is an effective way to monitor the performance of the collection scheme, to set targets and to assess its evolution over time.

3.3. Awareness raising and communication

Communication is critical to inform and motivate households to sort waste at source. Communication is necessary to inform citizens about how to sort and to build a support base, but is rarely sufficient in itself to change the sorting behaviour of a community. Therefore, communication should be accompanied by economic incentives and enforcement to be successful.

⁽⁵⁰⁾ Amsterdam (2015).

⁽⁵¹⁾ OVAM (2010).

Good practice example 14

Ljubljana (Slovenia) stands out with a 73 % collection rate of recyclables, thanks to a door-to-door collection system of bio-waste and recyclable waste supported by civic amenity sites. Dry recyclable waste is collected more often than residual waste in order to incentivise sorting at source. Use of social media and SMS communication on collection dates, customised to the profile of each citizen, have been important to achieve this high collection rate. Snaga, the public waste management company, also uses social media (internet, SMS-service, Facebook, Twitter) to improve the user friendliness of collection services. Underground collection units in the city centre facilitate collection without visual nuisance.

The following elements should be taken into account in developing impactful communication. Households may receive information about waste sorting from a variety of sources, such as EPR organisations, local authorities and national and regional governments. In order to maximise the impact of such communication and create synergies it is advised:

- to align them in the scope and content,
- that communication campaigns should occur simultaneously via different channels: TV, radio, social media, websites, newspapers, local magazines, etc.,
- that the message and language must be adapted to each target group and special efforts should be made to reach vulnerable households which often have limited access to information,
- to define indicators and to use them to periodically measure the level of awareness. This allows campaigns to be evaluated and refined and to determine future communication priorities,
- to provide clear indications on waste collection bags and at waste collection points to reduce the amount of non-target materials.

Good practice example 15

As indicated in example 8, Cyclamed⁽²⁾ is the EPR organization that coordinates and finances the collection of expired (or unused) medicines in France. Its communication strategy aims to ensure that consumers sort and return unused medicines to pharmacies, and that they dispose the packaging and prescriptions leaflets in the paper recycling bin. A 62 % collection rate was achieved in 2018. The communication activities target consumers and involve pharmacies, distributors and municipalities.

Communication actions, undertaken in 2018, included:

- A short film (< 80 seconds) – available via the web and displayed in TV screens in pharmacies. The film explains the sorting instructions in a simple and humorous way.
- Spotfilms (12 seconds) – for TV, social media and electronic billboards (e.g. at pharmacies) to maintain awareness.
- Posters, flyers and infographics – available at the website and displayed at pharmacies and municipal sites. Key figures and visual sorting instructions are provided to motivate consumers to sort.
- Banners – with key message that pharmacies or other actors can easily use on their websites.
- An illustrated comic book – including some ‘games’ that can be filled in.
- Stickers – with a key sorting message (< 15 words) for pharmacies and delivery vans of distributors.
- Website – with focus pages for the target groups and partners: consumers, pharmacies, distributors and municipalities. The website has interactive features such as a geolocation of pharmacies that participate and accept expired medication, quizzes and testimonials.
- Social media – a blog, presence in Facebook and Twitter. The number of followers is measured to assess the impact.
- Mobile app – with a search engine for medications that is kept up to date. Push messages that can be customised to the user’s needs and sorting instructions.
- Newsletter – for pharmacies, with news on the collection scheme but also with many other articles to increase the relevance and coverage. The impact is measured by an external company via surveys at pharmacies.
- Publicity – in the journal of French pharmacists calling for ‘collection ambassadors’.
- Regular meetings – with the sector federations to keep awareness up to date, gather feedback to improve the service and ensure buy-in of all supply chain partners.
- Other campaigns – support of campaigns and events organised by the relevant competent authorities and other EPR organizations to stress the importance of separate collection of all waste streams.
- Customised information for municipalities and presence at events organised by municipalities.

Good practice advice:

- All actors involved in the management of HHW (e.g. local authorities, waste operators and organisations implementing EPR obligations on behalf of producers) should provide clear, consistent and detailed instructions for the prevention, identification, sorting and disposal of HHW (including via improved labelling of hazardous products). The messages should be simple to avoid confusion of consumers faced with a broad range of HHW.
- Locations and opening hours of civic amenity sites and other HHW collection points should be broadly communicated via different channels including social media, ensuring the message reaches all segments of the population.

⁽²⁾ Cyclamed (2019).

- Involving local stakeholders (e.g. neighbourhood associations) and social groups in the collection of HHW brings about better awareness and citizen engagement.
- Supporting educational programmes in particular targeting children, who are good ambassadors for sound waste management practices. By educating children about the importance and practice of HHW collection (via courses, site visits, etc) their parents and elders will also be indirectly incentivised to sort waste.
- Providing information to citizens about the harmful consequences to public health and the environment of improper disposal of household hazardous waste can encourage good sorting and disposal behaviour.

3.4. Enforcement

Improper collection and sorting degrade the quality of collected waste for recovery. Household hazardous waste, collected as part of mixed household waste or other non-hazardous waste, negatively impacts the potential for high quality recycling of that waste. Although communication helps households know how to sort their waste properly, some level of incentives, or control and enforcement is required. In practice, the competent authorities can carry out the following control actions:

- Visual inspection of transparent waste collection bags: bags should be marked as non-compliant and left at the pick-up point if the bag contains materials that are not part of the relevant separate collection system.
- Weight-based check: weight not characteristic for the specific waste stream can trigger a check, e.g. if the waste collection receptacle for aluminium and plastic packaging or biowaste is uncharacteristically heavy it may indicate presence of non-targeted materials, e.g. soil.
- Fines: In addition to refusal to pick up bags or bins containing improperly sorted waste, administrative fines are an effective instrument to promote correct separate collection at source. Fines also help to avoid that the refused bags remain uncollected in the public space. Fines should however supplement adequate economic incentives, persuasion and communication; it cannot replace them.

The regrettable occurrence of uncontrolled and illegal abandoning of waste (fly-tipping) circumvents the incentives for correct waste collection and prevention and creates substantial nuisance and environmental and public health damage. Implementing a strategy for enforcement and prevention of uncontrolled and illegal abandoning of waste is a cornerstone of successful waste management. With better incentives to properly deal with HHW, this practice is reduced, rendering remaining enforcement actions more effective.

National or regional governments can further enhance performance by benchmarking municipalities and promoting the sharing of good practices on enforcement. The benchmarking needs to be executed vis-à-vis municipalities or regions with similar characteristics. For example, Flanders (Belgium) has clustered its municipalities in 16 groups that have different targets for separate collection ⁽⁵³⁾. Characteristics for the clustering include, *inter alia*, age of population, migration, tourism and level of urbanization. Methodologies to benchmark the performance of municipal waste management systems can be found in literature ⁽⁵⁴⁾.

⁽⁵³⁾ OVAM (2019).

⁽⁵⁴⁾ Lavigne et al. (2019).

Good practice example 16

In the Grand Duchy of Luxembourg, the waste management law of 21 March 2012 obliges apartment buildings to have separate waste collection facilities. SuperDrecksKëscht®, the integrated waste collection system, provides free advisory services for building managers to support local implementation: on-site visits for analysis of the existing situation, recommendations for sorting infrastructure and support for communication to residents. This legal obligation supported by an integrated approach has contributed to high collection rates ⁽⁵⁵⁾.

Good practice advice:

- Implementing a legal obligation to put in place suitable waste sorting infrastructure in apartment buildings incentivises building managers and owners to take action. Combining such an obligation with hands-on support services (on-site visits, communication templates) has proved to be a powerful means of promoting sorting of HHW in apartment blocks to avoid its improper disposal.
- Monitoring the concentrations and types of mis-sorted HHW in residual waste bags enables waste operators to identify priorities to focus their enforcement and communication efforts.
- By investigating fly-tipped waste, the identity of the offender can sometimes be found and be a basis for enforcement action. The setting of fines and the perception of the risk of being fined induces behavioural change.

4. REFERENCES

ACR+ (2019) Deposit-refund systems in Europe

Adamcová, D. et al. Household Solid Waste Composition Focusing on Hazardous Waste. Pol. J. Environ. Stud. Vol. 25, No. 2 (2016), 487-493. <http://www.pjoes.com/Household-Solid-Waste-Composition-Focusing-on-Hazardous-Waste,61011,0,2.html>

Adème (2017) Les filières à responsabilité élargie du producteur. <https://www.conibi.fr/uploads/pdf/comm/FILIERES-REP-EDITION2017.pdf> https://www.ademe.fr/sites/default/files/assets/documents/responsabilite_elargie_du_producteur_rep_memo2017_010401.pdf

Amsterdam (2015) Afvalketen in Beeld

Andreas Bassi, S., Christensen, T.H., Damgaard, A. (2017) Environmental performance of household waste management in Europe – an example of 7 countries, Waste Management, 69, 545-557. <https://www.sciencedirect.com/science/article/pii/S0956053X17305342>

aus der Beek, T. et al. (2016), 'Pharmaceuticals in the environment. Global occurrences and perspectives', Environmental Toxicology and Chemistry, Vol. 35/4, pp. 823-835. <http://dx.doi.org/10.1002/etc.3339>

Bio Intelligence (2012). Use of economic instruments and waste management performances

Cyclamed (2019) Rapport annuel 2018

D'environmentverwaltung (2018) Plan national de gestion des déchets et ressources

Dijkgraaf, E., Vollebergh, H. (2004) Burn or bury? A social cost comparison of final waste disposal methods, Ecological economics, 5, 233-247

Dubois, M. (2013) Disparity in European taxation of combustible waste, Waste Management 7, 1575-1576

European Commission (2002a), Study on hazardous household waste (HHW) with a main emphasis on hazardous household chemicals (HHC)

European Commission (2002b) Costs for municipal waste management in the EU

EEA (2015) Prevention of hazardous waste in Europe

EEA (2019) Paving the way for a circular economy, Insights on status and potential. <https://www.eea.europa.eu/publications/circular-economy-in-europe-insights>

Eurostat (2008) Municipal solid waste composition EU 27

⁽⁵⁵⁾ LU Environment Agency 2015.

Giegrich J., Mampel U., Franke B., Müller F., Knappe F. (1993) Eintrag organischer und anorganischer Schadstoffe in den Abfall über Produkte (Introduction of organic and inorganic pollutants into waste via products). Ifeu-Institut für Energie- und Umweltforschung Heidelberg GmbH. F+E-Vorhaben Nr. 10310602 under contract with Umweltbundesamt Berlin; Heidelberg, December 1993

Lavigne, C., De Jaeger, S., Rogge, N. (2019) identifying the most relevant peers for benchmarking waste management performance: A conditional directional distance Benefit-of-the-Doubt approach, *Waste Management*, 89, 418-429

Letcher, T. M., & Vallero, D. A. (Eds.) (2019), *Waste: A handbook for management*. Academic Press.

Nainggolan, D. et al. *Ecological Economics* 166 (2019) 106402. Consumers in a Circular Economy: Economic Analysis of Household Waste.Sorting Behaviour

OECD (2012) Sustainable materials management, Making better use of resources. <https://www.oecd.org/env/waste/smm-makingbetteruseofresources.htm>

OVAM (2010) Uitvoeringsplan milieuverantwoord beheer van huishoudelijke afvalstoffen

OVAM (2018) Huishoudelijk Afval en gelijkaardig bedrijfsafval

OVAM (2019) Plaanpassing Uitvoeringsplan huishoudelijk afval en gelijkaardig bedrijfsafval goedgekeurd door de Vlaamse Regering op 17 mei 2019

START project (2008). Management Strategies for Pharmaceuticals in Drinking Water. <http://www.start-project.de>. Quoted in: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866706/pdf/ehp-118-a210.pdf>

UNEP (2016) Guidelines for Framework legislation for Integrated Waste Management. <https://stg-wedocs.unep.org/handle/20.500.11822/22098>

Besluit van de Vlaamse Regering tot vaststelling van het Vlaams reglement betreffende het duurzaam beheer van materiaalcringlopen en afvalstoffen (Vlarema) bijlage 5.1.4 <https://navigator.emis.vito.be/mijn-navigator?wold=44718>
- <https://www.ovam.be/sites/default/files/atoms/files/Minimum-%20en%20maximumtarieven%202019%20voor%20huisvuil%20en%20grofvuil.pdf>

Worldbank (2018) What a waste 2.0

WRAP (2014) Waste Regulations Route Map. <http://www.wrap.org.uk/sites/files/wrap/Route%20Map%20Revised%20Dec%202014.pdf>

ANNEX

Links to Good Practice Communication Examples

There are many examples of engaging communication available on the web:

- http://www.epa.ie/pubs/reports/waste/wpp/Household_%20hazardous_waste_booklet.pdf
 - <http://www.snaga.si/en/separating-and-collecting-waste/hazardous-household-waste>
 - <https://communityrepaint.org.uk/help-support/paint-calculation/>
 - <https://communityrepaint.org.uk/i-have-leftover-paint/give-leftover-paint-new-life/>
 - https://www.ademe.fr/sites/default/files/assets/documents/produits-chimiques-donnees2015-synthese_8907.pdf
 - <https://www.aha-region.de/entsorgung/oeffnungszeiten/?L=0>
 - <https://www.aha-region.de/entsorgung/sonderabfall/>
 - https://www.arp-gan.be/pdf/memo_tri.pdf
 - <https://www.cityoflondon.gov.uk/services/waste-and-recycling/commercial-waste/hazardous-waste-collection>
 - <https://www.est-ensemble.fr/decheteries-mobiles>
 - <https://vanha.hsy.fi/en/residents/sorting/instructions/hazardouswaste/Pages/default.aspx>
 - <https://vanha.hsy.fi/en/residents/sorting/wasteguide/Pages/default.aspx>
 - <https://www.kierratys.info/>
 - <https://www.odensewaste.com/awareness-raising/awareness-raising/>
 - <https://www.offaly.ie/eng/Services/Environment/News-Publications/Free-drop-off-event-07th-July-2018.pdf>
 - <https://www.sdk.lu/images/SDK-EN/PDF/Infolyer-Residenzen-en-web.pdf>
 - <https://www.sdk.lu/index.php/en/reverse-consumption/ecological-waste-management-in-the-house/stationary-collection>
 - <https://www.tallinn.ee/eng/A-Guide-to-Sorting-Waste>
 - www.dastri.fr
 - www.raportaredeseuri.ro
 - <http://geodechets.fr>
 - www.vaarallinenjate.fi (in Finnish and Swedish)
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