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**EU, Austria, Czech Republic, Denmark, France, Germany, Italy, The Netherlands, Sweden, United Kingdom**

# **SCREENING STUDY ON END OF LIFE TREATMENT OF WOOD FROM DOORS AND WINDOWS**

## **FINAL REPORT**

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## FOREWORD

This study has been carried out by Ramboll. It was commissioned by EuroWindoor. EuroWindoor represents the interests of European window, door and façade manufacturers within the EU and other institutions.

EuroWindoor has 17 national member associations from 13 countries. Although EuroWindoor represents the window door and façade industry as a whole, this project focuses on wooden doors and windows.

The products represented by EuroWindoor play a central role in improving the sustainability of the building environment, enabling modern low- and zero-energy buildings and improved living environments.

New wooden doors and windows entering the market today will be in place for anywhere from 15 to over 100 years. As such, the end-of-life (EoL) management of these products seems distant. However, the possibility to recycle these products at EoL is an important component of their overall sustainability.

The project maps the legal framework for EoL treatment of wooden doors and windows at the EU level and in nine European countries, as well as the anticipated political trends for the future, and through stakeholder interviews investigated the current fate of wooden doors and windows at EoL. The nine countries included are: Austria, Czech Republic, Denmark, France, Germany, The Netherlands, Italy, Sweden and the United Kingdom.

The project:

1. Outlines the situation of EU Directive and legal acts
2. Describes how EU legislation is Implemented in national law
3. Describes how waste wood from windows and doors is handled in practice
4. Evaluates the data quality on waste wood from windows and doors
5. Explores the coming relevant policy trends

The project consists of a desktop screening of EU and national policies (Directives, Regulations, etc.) for elements relevant for EoL wooden doors and windows. This is used as the basis for consultation with national authorities (one per country - typically the relevant staff in the national Environmental Protection Agency) as well as industrial actors (minimum one per country) to verify the results of the desktop study as well as obtain knowledge of the treatment routes of EoL doors and windows in the selected countries, including an evaluation of the quality and reliability of the available data.

It has not been possible to interview the Danish and Dutch national authorities. Industry actors have been interviewed in all countries.

The project provides an important knowledge base that can qualify information on timber doors and windows e.g. related to environmental product declarations, standardisation and regulation.

## SUMMARY

### European and country specific waste legislation

A specific legal framework for wood from EoL wooden windows and doors does not exist on an EU level. EoL wooden doors and windows are not categorised separately but are considered construction and demolition waste (C&D).

A general European framework on waste management applies, under which certain provisions are applicable to EoL wood to a greater or lesser extent. Because the Waste Framework Directive is a directive, these relevant provisions must be transposed and further specified under the national legal systems of Member States.

The Waste Framework Directive (WFD) 2008/98/EC is considered as the key legislation on waste at EU level.

The WFD sets out the basic requirements on waste management. Such requirements come in the form of basic principles, such as the “polluter pays principle” and the “waste hierarchy”, as well as general definitions and basic obligations for different relevant waste management actors.

The basic principle of EU waste law essentially determines that Member States must gear their national legislation on waste towards the protection of human health and the environment.

The obligation of applying the waste hierarchy entails that the Member States must reflect the established priority order in their national legislation and endeavour to stimulate waste management by national actors accordingly. Furthermore, 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. Applying the precautionary principle means that potential impacts can lead to a departure from the priority order of the waste hierarchy.

All investigated countries transposed the WFD into national basic waste law and, Austria, Germany, The Netherlands and Italy have additional specific waste laws relevant to EoL wooden doors and windows (see Summary table in Section 3.10).

### Recycling or incineration?

Only Austria has specified a particular treatment option for EoL wooden doors and windows.

With respect to the waste hierarchy, the Czech Republic, Denmark and the United Kingdom follow the European WFD principle of prioritizing recycling over incineration. France, Germany, Italy and Sweden have no specific requirements, but makes the decision on a case by case basis. The Netherlands have determined minimum treatment standards for waste wood, and Austria has, from summer 2018, decided that all wooden doors and windows must be sent for incineration with energy recovery.

### EoW waste criteria

No European EoW criteria for wood waste (or EoL wooden doors and windows specifically) exist. However, several countries have developed guidelines, quality requirements, criteria or tools to help determine if EoW status can be obtained. The EoW criteria differ among the investigated countries, and details can be found in the national fact sheets and Summary Table in Section 3.10.

#### Data quality and statistics on EoL wooden doors and windows

In general, data and statistics on EoL wooden doors and windows specifically is not available but can be improved. Some data on wood waste exist but also tends to be poor.

The predominant treatments of EoL wooden doors and windows are recycling and incineration, with notably differences between the countries. Some countries, like Germany, almost exclusively incinerate with energy recovery. Others, like Italy predominantly recycle. Minor amounts of the EoL wooden doors and windows are reused.

#### General policy developments

All countries, with exception of Czech Republic, have forthcoming policies and national waste management strategies that will most likely have an impact on the management of EoL wooden doors and windows. Many of these are linked to the European Circular Economy Action Plan.

## LIST OF ABBREVIATIONS

- ADEME:** National environment and energy management agency (France)
- AltholzV:** Federal Ordinance on waste wood (Germany) (Altholzverordnung – AltholzV 2002)
- AbfallverzeichnisV:** Waste Classification Ordinance (Abfallverzeichnisverordnung)
- AWG:** Austrian Waste Management Act (Abfallwirtschaftsgesetz)
- BAV:** Federal Association of Waste Wood Processors and Recyclers (Bundesverband der Altholzaufbereiter und -verwerter e.V.)
- BayLfU:** Bavarian State Office for the Environment (Bayerisches Landesamt für Umwelt)
- BMNT:** Federal Ministry for Sustainability and Tourism (Bundesministerium für Nachhaltigkeit und Tourismus)
- BMLFUW:** Ministry of Agriculture, Forestry, Environment and Water Management (Lebensministerium in Ministerium für ein lebenswertes Österreich)
- BSSA:** Decree on landfills and landfill bans (Besluit stortplaatsen en stortverboden afvalstoffen)
- BVSE:** Federal Association of Secondary Raw Materials and Disposal (Bundesverband Sekundärrohstoffe und Entsorgung e.V.)
- C&D waste:** Construction and demolition waste (includes refurbishment)
- CEN:** the European Committee for Standardization
- CENIA:** Czech Environmental Information Agency
- CJEU:** Court of Justice of the EU
- COM:** Communication from the EU commission
- CPR:** Construction Products Regulation (Regulation (EU) No 305/2011)
- CZSO:** Czech Statistical Office
- EA:** Environment Agency
- ECHA:** European Chemicals Agency
- EML:** Environmental management law
- EoL:** End-of-life
- EoW:** End-of-waste
- EPA:** Environmental Protection Act 1990
- EPR:** Extended Producer Responsibility
- ESO:** European sources online (online database and information service which provides access to information on the institutions and activities of the European Union)
- ETA:** European Technical Assessment



**EWC:** European waste catalogue

**FWMP:** Federal Waste Management Plan

**FWW:** Finishing work waste

**GewAbfV:** Federal Ordinance on Commercial Waste (Gewerbeabfallverordnung – GewAbfV 2017)

**HP:** Hazardous Properties

**ICPE:** Installations classified for environmental protection (Installations classées pour la protection de l'environnement)

**IED:** Industrial Emissions Directive

**ISOH:** Public Waste Management Information System (Veřejný informační systém odpadového hospodářství)

**IED:** Industrial Emissions Directive

**KrWG:** Recycling Act (Kreislaufwirtschaftsgesetz (KrWG 2012))

**LAP/LAP3:** Rural waste management plan (Landelijk afvalbeheersplan/Landelijk afvalbeheersplan 3)

**LoW:** EU List of Waste („LoW“, Decision 2000/532/EC)

**MoE:** Ministry of Environment of the Czech Republic

**NWPP:** National Waste Prevention Plan

**OSB:** Oriented Strand Boards

**PAS:** Publicly Available Specification

**PCP:** Persistent Organic Pollutants

**POP:** Persistent organic pollutants

**POP Regulation:** Regulation (EC) No 850/2004 on Persistent Organic Pollutants

**RBV:** A Recycled Construction Materials Ordinance (Recycling-Baustoffverordnung)

**RDF:** Refuse-derived fuels

**REACH:** REACH Regulation (EC) No 1907/2006

**Recycling-BaustoffV:** Recycled Building Materials Decree (Recycling-Baustoffverordnung)

**RecyclingholzV:** Ordinance of the Federal Minister of Agriculture, Forestry, Environment and Water Management, 2012 (Recyclingholz-Verordnung)

**RPS:** Regulatory Position Statement

**RVO:** The Netherlands Enterprise Agency (Rijksdienst voor ondernemend Nederland)

**RWPMP:** Regional waste prevention and management plan

**SDE+:** Stimulation of Sustainable Energy Production (Stimulering Duurzame Energieproductie (Dutch))

**SEPA:** Scottish Environment Protection Agency

**SR BTP:** Federation of the recycling players in the building industry (Syndicat des Recycleurs du BTP)

**SVHC:** Substances of Very High Concern

**SWMP:** Site Waste Management Plan

**TAB:** Technical Assessment Bodies for a Respective Product Area

**TUA:** Provisions on Waste and Contaminated Sites Management (Testo Unico Ambientale)

**UBA:** Federal Environment Agency (Umweltbundesamt)

**VFF:** Association of Window & Facade (Verband Fenster + Fassade)

**VHI:** Association of the German Wood Industry (Verband der Deutschen Holzwerkstoffindustrie e.V.)

**WFD:** Waste Framework Directive

**WMP:** Waste management plan

**WPP:** Waste Prevention Programme

**WRA:** Wood Recycler's Association (UK)

# 1. LEGAL FRAMEWORK FOR EOL WOODEN DOORS AND WINDOWS

The following analysis maps the elements of EU legislation that are relevant for the treatment and recycling of end-of-life (EoL) wooden windows and doors. A specific legal framework for EoL wood or wooden windows and doors do not exist on an EU level. Rather, the general framework on waste management applies, under which certain provisions are applicable to EoL wood to a greater or lesser extent. Because the Waste Framework Directive is a directive, these relevant provisions must be transposed and further specified under the national legal systems of Member States.

The Waste Framework Directive (WFD) 2008/98/EC provides the general legal framework on waste at the EU level. The WFD sets out the basic requirements on waste management. Such requirements come in the form of basic principles, such as the “polluter pays principle” and the “waste hierarchy”, as well as general definitions and basic obligations for different relevant waste management actors.

European Organisation for Technical Assessment (EOTA) has developed a European Technical Assessment (ETA) for old bricks. CE marking for old products can be a precedent or catalysator for the use of several other used products and materials.

Disposal of waste might become a mandatory part of Environmental Product Declarations. Therefore, it is relevant to know how wooden doors and windows waste is managed. The transportation and treatment will, to some extent, affect data for this part of the lifecycle.

The Environmental Product Declaration (EPD) is based on products being produced today. The EPD is also based on the waste system as it is today, and not what might exist in the future, when the window or door reaches EoL.

## 1.1 Relevant definitions

The WFD includes a range of legal definitions that are relevant for the subsequent analysis of other provisions or for how the treatment of EoL wooden windows takes place. These definitions, being specific, should be transposed literally into the national legal frameworks and are therefore likely to influence the legal requirement at national level considerably.

### Waste

The scope of the Directive focuses on “waste” as defined in Article 3(1) WFD:

*“any substance or object which the holder discards or intends or is required to discard”.*

Any substance or object is either waste or non-waste (non-waste including inter alia products, industrial by-products and substances or objects which have reached the “end-of-waste” status). Whereas in many cases the decision whether a substance or an object is “waste” in the sense of the WFD is easy to determine, some other cases are difficult. A substance or object that fulfils the criteria for being waste is subject to the waste legislation including waste classification (unless it is specifically excluded from the scope of the WFD).

### Hazardous waste

In addition to provisions applying to all types of waste, the WFD contains specific provisions related to the environmentally safe management of hazardous waste. Hazardous waste is defined in Article 3(2) as:

*“waste which displays one or more of the hazardous properties listed in Annex III”.*

Just as the question whether something is “waste”, the question whether it is “hazardous waste” is a crucial decision, following a binary test: waste is always either hazardous or non-hazardous.

To note that:

- Waste is either considered hazardous or non-hazardous;

- Article 7 of WFD makes reference to the established waste classification system of the List of Waste (LoW) as per Decision 2000/532/EC<sup>1</sup>. The different types of wastes in the list are defined by a six-digit code for the waste including the respective two-digit and four-digit chapter headings. Classifying waste according to the LoW means that each waste is assigned a six-digit number. For producers and holders of waste, the first step is always to correctly classify the waste at hand in line with the methodology of the LoW.
- The LoW recognises three types of entries:
  - "Absolute hazardous entries ": Wastes which are assigned to absolute hazardous entries cannot be allocated to alternative non-hazardous entries and are hazardous without any further assessment;
  - "Absolute non-hazardous entries ": Wastes which are assigned to absolute non-hazardous entries cannot be allocated to alternative hazardous entries and are hazardous without any further assessment;
  - "Mirror entries ", where waste from the same source might under the LoW be allocated to a hazardous entry or to a non-hazardous entry depending on the specific case and on the composition of the waste.
- Both Annex III to WFD, and the LOW were 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.

The WFD includes a possibility for Member States to deviate from Annex III of the WFD (Article 7(3) of the WFD), in the cases where

"a Member State has evidence to show that specific waste that appears on the list as hazardous waste does not display any of the properties listed in Annex III, it may consider that waste as non-hazardous waste."

#### Re-use

Re-use is defined by the WFD as any operation by which products or components that are not waste are used again for the same purpose for which they were conceived;

#### Preparation for re-use

Preparation is defined by the WFD as checking, cleaning or repairing recovery operations, by which products or components of products that have become waste are prepared so that they can be re-used without any other pre-processing

#### Recovery

Recovery is defined by the WFD as any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy. Annex II sets out a non-exhaustive list of recovery operations;

#### Recycling

Recycling is defined by the WFD as any recovery operation (i.e.: legally, "recycling" is a sub-category of "recovery") by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations;

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<sup>1</sup> Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/C of the European Parliament and of the Council

### No definition for wood waste

The WFD does not include an explicit definition of wood waste. As such, wood waste can be considered to fall under the broader definition of waste. However, in terms of waste stream identification, the LoW can be used to arrive at a more precise description of the stream of EoL wooden windows and doors.

Most relevant would be the LoW waste codes which fall under the general code for construction and demolition waste (C&D waste) (chapter 17); this term (as does chapter 17) includes both waste generated during demolition and renovation activities. Classification depends inter alia on the origin of the waste and whether waste wood is collected separately or mixed with other material. Possible LoW codes include:

- Wood (17 02 01)
- glass, plastic and wood containing or contaminated with hazardous substances (17 02 04\*)
- Mixed fraction of C&D waste (17 09 04, or 17 09 03\* if containing hazardous substances)
- Municipal waste wood (20 01 38, or 20 01 37\* if containing hazardous substances)
- Bulky waste (20 03 07)

## **1.2 Relevant obligations for the management and treatment of wood waste**

The WFD entails a list of obligations for the treatment and recycling of wood waste and, by extension, EoL wooden windows and doors. However, the WFD, being an EU Directive, does not place many direct and specific obligations on waste treatment and recycling operations. Rather, the WFD provides more general requirements which Member States must transpose and specify within their national legal frameworks. The following section provides an overview of obligations which, when transposed into national legislation, are likely to affect waste wood treatment and recycling. The sections of this report concerning the national legal frameworks subsequently provide a more specific overview of treatment and recycling requirements.

### Obligations applicable to waste management

*Article 13 WFD* determines that Member States shall take the necessary measures to ensure that waste management is carried out without endangering human health, without harming the environment and, in particular:

- a) without risk to water, air, soil, plants or animals;
- b) without causing a nuisance through noise or odours; and
- c) without adversely affecting the countryside or places of special interest.

This is a basic principle of EU waste law, which in essence determines that Member States must gear their national legislation on waste towards the protection of human health and the environment. As will become apparent below, this principle functions as a basic tenet for other principles and obligations, determining their interpretation and application on EU and national level.

*Article 4 WFD* states that the following waste hierarchy shall apply as a priority order in 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.

The obligation of applying the waste hierarchy entails that the Member States must reflect the established priority order in their national legislation and endeavour to stimulate waste management by national actors accordingly.

The obligation to apply the waste hierarchy is not an absolute one however. Paragraph 2 of Article 4 WFD provides that, 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.

Furthermore, Paragraph 2 provides that 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. Consequently, the obligation to apply the waste hierarchy should not lead to adverse impacts on human health and the environment. Due to the applicable precautionary principle, potential environmental impacts can lead to a departure from the priority order of the waste hierarchy.

The producer of waste and any holder of the waste are *responsible* for waste treatment, including to have the treatment carried out by a dealer or by an establishment (*Article 15 WFD*). For the situation where the waste exhibits persistent organic pollutants (POP, see in more detail below), the discretion of the producer/holder is restricted, See section 0 on POPs waste.

*Article 23 WFD* determines that Member States shall require any establishment or undertaking intending to carry out waste treatment to obtain a permit from the competent authority. Such permits must at least specify:

- a) the types and quantities of waste that may be treated;
- b) for each type of operation permitted, the technical and any other requirements relevant to the site concerned;
- c) the safety and precautionary measures to be taken;
- d) the method to be used for each type of operation;
- e) such monitoring and control operations as may be necessary;
- f) such closure and after-care provisions as may be necessary.

In addition, Paragraph 4 of Article 23 states that it shall be a condition of any permit covering incineration or co-incineration with energy recovery that the recovery of energy take place with a high level of energy efficiency.

The obligation for Member States to require a permit for waste treatment operations, as well as specific elements that such permits must contain, have the potential to significantly influence the treatment options for EoL wooden windows and doors. However, the extent to which the required permits will be of influence depends on the manner of implementation by the Member States. In this regard, we would like to refer to the chapters on national legal frameworks for waste management.

#### *Obligations applicable to hazardous waste management*

For the case that waste is hazardous, a number of specific obligations apply.

- **Production, collection, transportation, storage and treatment** of hazardous waste shall be done in an environmentally sound manner; tracking systems shall be introduced by the Member States (*Article 17 WFD*);
- **Labelling and packaging** obligations during collection, transport and temporary storage (*Article 19 WFD*);

The establishments or undertakings that produce 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, must *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. The records must be preserved for a certain time and made available, on request, to the competent authorities (*Article 35 WFD*);



**Mixing of hazardous waste is prohibited** as a principle, and only allowed subject to the conditions of Article 18(2) WFD (see Box below).

- Possible implications of the mixing ban laid down in Article 18 of the WFD:
- *A detailed legal interpretation of the mixing ban as defined in Article 18 of the WFD can be found in section 5 of the European Commission's "guidance on the interpretation of key provisions Directive 2008/98/EC on waste"<sup>2</sup>. This document lays down in which cases mixing of waste is forbidden, in which cases it is allowed and what the requirements for compliant mixing are.*
- *Referring to the mixing ban and separate collection of wood waste, it should be noted whether hazardous fractions e.g. of C&D waste have to be collected separately, and whether they have to be separated from a mix if the waste was initially generated as mixed waste, depends on national law. For example, in Germany, there is a starting point in principle an obligation to keep the hazardous fractions from C&D waste separate, but deviations may frequently occur in practice depending on the specific circumstances. Whether this practice will change against the recently adopted new regulations on separate collection of C&D waste (through the new German Gewerbeabfallverordnung) remains to be seen.*
- *In general, the concentration limits for the classification of waste as hazardous refer to the state of the waste as it is when the classification of the waste is undertaken.*
- *Additionally, it should be noted that Article 7(4) of the WFD explicitly bans a dilution or mixing of the waste with the intention to lower the initial concentrations of the hazardous substances.*

The mixing ban has to be distinguished from an obligation to collect separately certain fractions of waste, such obligation being for instance included in the recently revised German Gewerbeabfallverordnung (Ordinance on Commercial Waste), with some exemptions. Then again, a strict interpretation of the mixing ban would be that the ban applies to hazardous waste as soon as a substance or object for the first time fulfils the definition, e.g. in case of construction and demolition waste, as soon as one part of the building structure is initially removed. Thus, a joint collection in one container of such waste if considered hazardous together with other hazardous or non-hazardous waste could infringe the mixing ban in this interpretation.

**Permit conditions** should in all cases reflect the types and quantities of waste that may be treated and the appropriate operating conditions (Article 23 WFD); as applicable, such conditions are likely to be subject of modification should hazardous waste be treated. Permit exemptions that may be granted to hazardous waste installations are more restrictive (Article 25 WFD) than those for installations dealing with other wastes (Article 23 WFD).

Moreover, treatment-related legal documents such as the Landfill Directive or the provisions on waste incineration facilities in the Industrial Emissions Directive 2010/75/EU (IED), make important distinction between hazardous and non-hazardous waste; obviously, the requirements for treating hazardous waste are stricter. The IED is also of relevance for the management of hazardous waste 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 hazardous waste (Article 11 (e) IED); further, treatment installations for hazardous waste are within the scope of the IED if exceeding the thresholds of its Annex 1.

### 1.3 Recycling and the end-of-waste criteria

The end-of-waste-status is of particular interest for recycling activities since it defines the moment where a waste leaves the waste status. Within the context of the treatment options for EoL wooden windows and doors, these criteria are crucial for identifying the processes required to produce a material or object which is legally considered to be a product. In turn, such an assessment will enable the assessment of the feasibility of the treatment option recycling in general, as well as specific recycling options.

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<sup>2</sup> [http://ec.europa.eu/environment/waste/framework/pdf/guidance\\_doc.pdf](http://ec.europa.eu/environment/waste/framework/pdf/guidance_doc.pdf)



### Basic approach

Article 6 WFD determines that certain specified wastes shall cease to be waste within the meaning of point (1) of Article 3 when it has undergone a recovery, including recycling, operation and complies with specific criteria to be developed in accordance with the following conditions:

- a) the substance or object is commonly used for specific purposes;
- b) a market or demand exists for such a substance or object;
- c) the substance or object fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products; and
- d) the use of the substance or object will not lead to overall adverse environmental or human health impacts.

The approach of the WFD with respect to setting criteria and taking decisions on end-of-waste (EoW) is twofold:

- For certain specified waste streams (e.g. iron scrap, copper scrap, glass cullets, etc.), EoW criteria can be set at EU level by committee procedure (Article 6(2) WFD);
- Where no such criteria have been set at EU level, such as for waste wood, Member States may decide according to Article 6(4) WFD at national level and on a case-by-case basis whether certain waste has ceased to be waste. This can relate to classes of materials recovered from waste or to single case decisions. (Note this is proposed to be modified via the current Circular Economy Package#). Germany for example did not define national specific end-of-waste criteria for wood waste on national nor on regional level, thus decisions are made on a case-by-case basis. According to interviews with the authorities no initiatives in this direction are currently planned.

### Moment of end-of-waste in recycling processes

The definitions of waste and EoW, recovery and recycling have to be understood in a coherent way. The moment when a material or substance reaches EoW, and the completion of recovery and recycling processes are identical. The WFD definition of recovery does not only include processes where a material is actually substituting other materials, but also processes preparing a waste material in such a way that it does not anymore involve waste-related risks and is ready to be used as a raw material in other processes. Generally speaking, the point of completion of a recovery operation may be considered at the moment where a useful input for further processing, not representing any waste-specific risks to health and the environment, is available. Specific legislation on EoW criteria may determine a particular point where waste becomes non-waste (see below).

### Applicability of product regulations such as REACH

At the moment of leaving the waste status, the substance or object is fully subject to all applicable product related requirements. This is in particular the case for all requirements of EU chemicals legislation REACH. REACH considers waste in the sense of the definition of the WFD no substance, mixture or article (Article 2(2) REACH), however, at the moment where waste ceases to be waste, applicable product legislation such as REACH becomes fully applicable (see Section 2.1 on REACH).

### End-of-waste possible for hazardous waste

Note that the Court of Justice of the EU (CJEU) had to decide the possibility of hazardous waste being recycled and thus leaving the waste status in the ruling of case C-358/11 (Lapin elinkeino-, liikenne- ja ympäristökeskuksen liikenne ja infrastruktuuri –vastualue v Lapin luonnonsuojelupiiri ry). The case dealt with compliant treatment of wood waste (old telecommunications poles) which, for their previous use had been treated with a CCA (copper-chromium-arsenic) solutions, the use of wood treated with such solutions being subject to a restriction entry in Annex XVII to REACH. The Court held explicitly that:

*"European Union law does not, as a matter of principle, exclude the possibility that waste regarded as hazardous may cease to be waste within the meaning of Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives if a recovery operation enables it to be made usable without endangering human health and*

*without harming the environment and, also, if it is not found that the holder of the object at issue discards it or intends or is required to discard it within the meaning of Article 3(1) of that directive (...)*"

#### **1.4 Incineration as recovery or disposal operation**

"Recovery" and the opposite term "disposal" (negatively defined as operations which are not recovery) form together "waste treatment" (see Article 3(14) WFD and definitions). Therefore, any waste treatment can only be either a recovery operation or a disposal operation.

The distinction between recovery and disposal is not always easy, particularly since an operation may have both a disposal and a recovery component. In a nutshell, disposal operations primarily result from waste management operations based on getting rid of waste, whereas the principal result of a recovery operation is "waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy."

It is the task of the Member States to apply this concept in practice. Cases of doubt may – via diverse procedural means – be subject to a decision of the CJEU, which has the competence to deliver binding interpretation of EU law.

Member States may set in their national law criteria for demarcation of recovery and disposal, but these criteria must comply with those laid down in EU law.

##### *D- and R codes of Annex I and II*

Annex I and II contain non-exhaustive lists of disposal and recovery operations. Already with respect to the lists contained in a previous version of the WFD, the CJEU had found that the list has followed the purpose to put together the most common used disposal and recovery operations, but not to make a closed list of all treatment operation. Certain treatment methods are not specified, and the entire list is open to adaptation to scientific and technical progress. The concept of previous WFD has been emphasized by the WFD 2008/98/EC and the Directive 2018/851/EU contains the same approach.

##### *Two entries possible*

Incineration of hazardous or non-hazardous waste can be classified as disposal incineration of waste on land (operation D 10) or as recovery (using principally as a fuel or other means to generate energy, operation R 1). In line with the principles outlined above, the classification depends on whether the operation at hand meets the "recovery" definition.

##### *Incineration in facilities dedicated to incineration of MSW*

In 2008, criteria have been included in (\*) to R1 of Annex II pertaining to incineration facilities dedicated to the processing of municipal solid waste. Guidance exists regarding the "R 1 formula" at EU level (see <http://ec.europa.eu/environment/waste/framework/pdf/guidance.pdf>). Note that these criteria do not apply to the classification of incineration facilities for hazardous waste. Depending on the permit situation, a facility for incineration of MSW may incinerate also hazardous waste.

##### *Treatment in facilities dedicated to incineration of hazardous waste*

Regarding incineration (or co-incineration) of hazardous waste in dedicated hazardous waste incineration facilities, and under what conditions it is to be considered as a recovery operation, note that the definition of recovery now used in the WFD has to a large degree been developed through the CJEU case law not least with respect to the incineration / co-incineration of waste, where the approach of substitution as a precondition for recovery was developed inter alia in the cement kiln ruling (C-228/00 Commission vs Germany (2002)).

Experience shows that there does exist a variety of different approaches in the Member States, sometimes even differently applied in the same region.

## 1.5 Future developments EU waste law and policy

### Sorting of construction and demolition (C&D) waste and the circular economy package

The recent amendment of the WFD by means of Directive 2018/851 includes an amendment to Article 11 concerning re-use and recycling. The amendment entails the replacement of the first Paragraph of Article 11 WFD with a new text, including the following element:

*"Member States shall take measures to promote selective demolition in order to enable removal and safe handling of hazardous substances and facilitate reuse and high quality recycling by selective removal of materials, and to ensure the establishment of sorting systems for construction and demolition waste for at least the following: wood, mineral fractions (concrete, bricks, tiles and ceramics, stones), metal, glass, plastics and plaster"*

Article 11 WFD, as amended by Directive 2018/851/EU might, if actively implemented by Member States, stimulate the separate removal of wooden windows and doors from structures subject to C&D. This in turn, might lead to an increased mono-stream of EoL wooden windows and doors which can be reused, prepared for reuse and recycled. However, due to the broad wording of the proposed amendment, as well as its reliance on implementation by Member States, the consequences cannot be foreseen with certainty.

## 2. LEGAL FRAMEWORK PRODUCTS

The legal framework for product legislation is relevant for the recycling of EoL wooden windows and doors, as the products resulting from recycling operations will transition from the scope of waste legislation to the scope of product regulations. Furthermore, the criteria under Article 6 WFD by which is determined whether the products resulting from the recycling of EoL wooden windows and doors reach end-of-waste status (i.e. get to transition to the scope of product regulation) require inter alia compliance of the product with applicable product legislation and technical standards. Therefore, when assessing the legal options for the recycling of EoL wooden windows and doors, it is relevant to provide an overview of relevant and/or likely product regulations on EU level which will become applicable.

### Article 6 WFD and the Circular economy package

It is also relevant to assess whether the European Commission`s efforts within the context of EU action plan for the Circular Economy could affect the application of Article 6 WFD and thus the potential end-of-waste status of hazardous waste. In December 2017, the Member States reached a preliminary agreement on the Commission amendment proposals for various waste legislation, including the WFD. The text of the amendments includes various amendments to Article 6 WFD on end-of-waste. The following amendments are relevant within the context of this report:

- I. the introductory phrase of paragraph 1 is amended to *"Member States shall take appropriate measures to ensure that waste which has undergone a recycling or other recovery operation is considered to have ceased to be waste if it complies with the following conditions"*. This new phrasing of the introductory phrase, as opposed to the more general phrasing *"Certain specified waste shall cease to be waste"* implies a more active role for Member States to ensure that there is certainty regarding the applicability of the end-of-waste status for materials which indeed meet the four criteria laid down by Article 6 WFD. This could move Member States to become more active in drafting national end-of-waste criteria or the issuing of administrative decisions on the applicability of the end-of-waste status of certain materials. This is in contradiction within the Circular Economy Action plan, which also seeks to establish uniform EoW criteria (paragraphs 2, 3 and 4, bullet III below). From the perspective of waste management actors, the change in phrasing can be interpreted as a "right" to gain clarity from competent authorities regarding the status of a material stream, or at least an active effort by authorities to that end.

- II. Criterion A of Article 6 is amended to *"the substance or object is to be used for specific purposes"*. This new phrasing, as opposed to the old phrasing *"the substance or object is commonly used for specific purposes"*, will provide more opportunity for innovative recycled materials with specific new or less common applications to gain end-of-waste status. Important in this regard are the words *"is to be"*, which imply that the recycler has to provide certainty that the substance is indeed used for the specifically envisaged use.
- III. Paragraphs 2, 3 and 4 are replaced by the following new Paragraph 2 which provides the European Commission with the competence to establish end-of-waste criteria for specific waste streams through implementing acts. The new Paragraph further mentions that *"those detailed criteria shall ensure a high level of protection of the environment and human health and facilitate the prudent and rational utilisation of natural resources."*

Furthermore, the Paragraph lists certain elements which the end-of-waste criteria must include:

- a) permissible waste input material for the recovery operation;
- b) allowed treatment processes and techniques;
- c) quality criteria for end-of-waste materials resulting from the recovery operation in line with the applicable product standards including limit values for pollutants where necessary;
- d) requirements for management system to demonstrate compliance with the end-of-waste criteria, including for quality control and self-monitoring, and accreditation, where appropriate;
- e) requirement for a statement of conformity.

Finally, Paragraph 2 states that

*"when adopting acts in accordance with this paragraph, the Commission shall take account of the relevant criteria established by the Member States in accordance with paragraph 4 of this Article and it shall take as a starting point the most stringent and environmentally protective of those criteria."*

The phrasing of the new Paragraph 2 enables the European Commission to adopt end-of-waste criteria on EU level through a faster and potentially less political process. This might lead to more end-of-waste criteria on EU level. However, the new phrasing also lays down very specific requirements which the Commission has to take into account when drafting end-of-waste criteria. For EoL wooden windows and door recyclers and their EU representatives, these criteria could provide a clear framework for discussing specific criteria with the EU Commission.

#### Communication on interface of chemicals, product and waste legislation

In January 2018, the EU Commission published, as part of the Circular Economy Package, a "Communication on the implementation of the circular economy package: options to address the interface between chemical, product and waste legislation"<sup>3</sup> (COM(2018) 32 final).

The Communication explores, on the basis of a more elaborate Staff Working Document, the four most critical issues identified in the way the legislation on chemicals, products and waste work together and how these are hampering a circular economy development, as follows:

- Information on presence of substances of concern is not readily available to those who handle waste and prepare it for recovery
- Waste may contain substances that are no longer allowed in new products
- EU's rules on end-of-waste are not fully harmonised, making it uncertain how waste becomes a new material and product

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<sup>3</sup> See <https://ec.europa.eu/docsroom/documents/27321>

- On this basis, the COM poses specific key questions on how these issues can be overcome and indicates the actions that it initiates:
- Rules to decide which wastes and chemicals are hazardous are not well aligned and this affects the uptake of secondary raw materials

Specific key questions are posed on how these issues can be overcome; actions that the Commission will already now initiate are described for each of the four areas.

## 2.1 REACH

REACH Regulation (EC) No 1907/2006 aims at improving the protection of human health and the environment from the risks that can be posed by chemicals. As a regulation, REACH sets out obligations that are directly applicable in all Member States.

The scope of REACH relates to "substances as such, in mixtures and in articles". Waste as defined in the WFD are not considered substances, mixtures or articles under REACH (Article 2(2) REACH). Obviously, this only applies as long as substances or objects are considered waste and ceases to apply when meeting end-of-waste-criteria. Thus, unless explicitly exempted, substances in products that have successfully undergone a recycling procedure are fully subject to REACH requirements when being placed on the market.

### Key instruments

Key mechanisms of REACH, besides evaluation, and communication of substance information, are:

#### Registration

Title II of REACH (Article 5-24) requires that information is collected on the properties and uses of substances that are manufactured or imported above one tonne a year, and the hazards and potential risks presented by the substances need to be assessed. This information is communicated to European Chemicals Agency ECHA through an electronic registration. Registration applies to substances on their own, substances in mixtures and certain cases of substances in articles. It is based on the "one substance, one registration" principle, meaning that manufacturers and importers of the same substance have to submit their registration jointly. Under conditions of Article 2(7) (d) REACH, substances as such, in mixtures or articles subject to recycling/recovery process are exempted from registration.

#### Restrictions to the use of substances (Article 67).

A substance on its own, in a mixture or in an article, for which Annex XVII of REACH contains a restriction shall not be manufactured, placed on the market or used unless it complies with the conditions of that restriction. These restrictions are introduced when there is an unacceptable risk to human health or the environment (Article 68). For instance, placing on the market of wood treated with creosote is subject to a restriction (Annex XVII REACH, entry 31).

#### SVHC and authorisation

REACH introduces the concept of SVHC (Substances of Very High Concern). Substances are identified as SVHC following a graded approach, first on the so-called "candidate list", and ultimately listed on Annex XIV in which case an authorization is needed in order to place it on the market for a use or use it (Article 56). An example for substances used as wood preservatives which are listed in Annex XIV of REACH are acids generated from chromium trioxide and their oligomers (Annex XIV, entry 17).

## 2.2 Persistent organic pollutants (POP) Regulation

Persistent Organic Pollutants (POP) are chemical substances which persist in the environment, bioaccumulate through the food chain, and pose a risk of causing adverse effects to human health and the environment. Regulation (EC) No 850/2004 on Persistent Organic Pollutants (hereafter: POP Regulation) is relevant as product legislation because EoL wood might contain certain persistent organic pollutants.

### Legal framework

The aim of POP Regulation is to protect human health and the environment from persistent organic pollutants by prohibiting, phasing out as soon as possible, or restricting the production, placing on the market and use of substances subject to the legal documents under international law, specifically:

- The Stockholm Convention on Persistent Organic Pollutants, and/or
- the 1998 Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on Persistent Organic Pollutants,"

and by minimising, with a view to eliminating where feasible as soon as possible, releases of such substances, and by establishing provisions regarding waste consisting of, containing or contaminated by any of these substances. An example of a wood preservative subject to POPs regime is PCP.

Regarding the management of EoL wooden doors and windows, the impact of POPs Regulation is twofold:

- Firstly, at the stage of waste management. If wood waste exceeds one of the relevant thresholds of Annex V to POPs Regulation (POPs waste), the obligations as per Article 7(2) of the Regulation are triggered whereby POPs waste without undue delay and in accordance with Annex V in such a way as to ensure that the POP content is destroyed or irreversibly transformed so that the remaining waste and releases do not exhibit the characteristics of POP (in practice: wood waste needs to be incinerated);
- Secondly, should waste be subject to recycling, when placing on the market, the restrictions of Annex I of POPs Regulation need to be met, similar to restrictions under REACH (see above).

## 2.3 Biocidal Products Regulation (BPR, Regulation (EU) 528/2012

The Biocidal Products Regulation (BPR, Regulation (EU) 528/2012) concerns the placing on the market and use of biocidal products, which are used to protect humans, animals, materials or articles against harmful organisms like pests or bacteria, by the action of the active substances contained in the biocidal product. The BPR aims to improve the functioning of the biocidal products market in the EU, while ensuring a high level of protection for humans and the environment. BPR stipulates that all biocidal products require an authorisation before they can be placed on the market, and the active substances contained in that biocidal product must be previously approved. The BPR also contains provisions related to "treated articles".

However, it is important to note that BPR does not apply to traces of biocides which can be found in waste in cases where the now-waste during its lifecycle had been treated with biocides. Consequently, the definition of "treated articles" reads "any substance, mixture or article which has been *treated* with, or *intentionally* incorporates, one or more biocidal products" (Article 3(1) lit. (l) BPR; emphasis added).

## 2.4 Construction Products Regulation (CPR)

Regulation (EU) No 305/2011 laying down harmonised conditions for the marketing of construction products is another product Regulation which might become relevant with regard to the option of recycling EoL wooden windows and doors into construction products. Therefore, a brief discussion of its main requirements is warranted.

### Legal framework

The CPR lays down conditions for the placing or making available construction products on the market by establishing harmonised rules on how to express the performance of construction products in relation to their essential characteristics and on the use of "CE marking" on those products.

Article 3 in CPR states that the basic requirements for construction works set out in Annex I shall constitute the basis for the preparation of standardisation mandates and harmonised technical specifications. Paragraph 2 of Article 3 states that the essential characteristics of construction products shall be laid down in harmonised technical specifications in relation to the basic requirements for construction works. Therefore, the basic requirements for construction works and the essential characteristics of construction products which derive from it provide important product standards for EoL wooden windows and doors recycled into construction products.

Article 4 CPR determines that when a construction product is covered by a harmonised standard or conforms to a European Technical Assessment that has been issued for it, the manufacturer shall draw up a declaration of performance when such a product is placed on the market. Paragraph 3 of Article 4 further determines that by drawing up the declaration of performance, the manufacturer shall assume responsibility for the conformity of the construction product with such declared performance. In the absence of objective indications to the contrary, Member States shall presume the declaration of performance drawn up by the manufacturer to be accurate and reliable.

Article 6 CPR states that the declaration of performance shall express the performance of construction products in relation to the essential characteristics of those products in accordance with the relevant harmonised technical specifications. Paragraph 2 of Article 6 then lays down specific information to be included in the declaration of performance.

Finally, it is important to note that Annex I CPR lays down basic requirements for construction works with regard to the following aspects:

- Mechanical resistance and stability
- Safety in case of fire
- Hygiene, health and the environment
- Safety and accessibility in use
- Protection against noise
- Energy economy and heat retention
- Sustainable use of natural resources

### Consequences for treatment options

When reviewing the most suitable options for reuse, preparation for reuse and recycling for EoL wooden windows and doors, it is advisable to assess whether any harmonised standards<sup>4</sup> under Union harmonisation legislation (ESO, CEN, Cenelec) are applicable to the envisaged products of the recycling operation. A first overview of the existing standards can be found on the website of the European Commission, including EN14351-1 for windows and external doors and En 14351-2 (not published yet) for internal doors<sup>5</sup>. If no harmonised standards under Union harmonisation legislation exist, then the European Technical Assessment (ETA) provides an alternative.

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<sup>4</sup> According to Article 1 CPR, 'harmonised standard' means a standard adopted by one of the European standardisation bodies listed in Annex I to Directive 98/34/EC, on the basis of a request issued by the Commission, in accordance with Article 6 of that Directive;

<sup>5</sup> [https://ec.europa.eu/growth/single-market/european-standards/harmonised-standards/construction-products\\_en](https://ec.europa.eu/growth/single-market/european-standards/harmonised-standards/construction-products_en)

Article 19 CPR states that, following a request for a European Technical Assessment by a manufacturer, a European Assessment Document shall be drawn up and adopted by the organisation of Technical Assessment Bodies (TABs)<sup>6</sup> for any construction product not covered or not fully covered by a harmonised standard, for which the performance in relation to its essential characteristics cannot be entirely assessed according to an existing harmonised standard, for reasons listed under (a)-(c) of the Article. The procedure for requesting a European Technical Assessment is described on the website of the European Commission.<sup>7</sup>

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<sup>6</sup> Technical assessment bodies for a respective product area. For a list of TABs, see: <http://ec.europa.eu/growth/tools-databases/nando/index.cfm?fuseaction=notifiedbody.notifiedbodies&num=TAB&text=Technical%20Assessment%20Body>

<sup>7</sup> [https://ec.europa.eu/growth/sectors/construction/product-regulation/european-assessment\\_de](https://ec.europa.eu/growth/sectors/construction/product-regulation/european-assessment_de)



## 3. SUMMARY OF NATIONAL LEGISLATION AND IMPLEMENTATION

### 3.1 Austria

The Austrian legal framework for EoL wooden doors and windows is defined by the general waste law, as well as specific legislation on waste wood and on recycling of construction products.

The following specific treatment categories are identified:

- Re-use or preparation for re-use: It is expected that EoL wooden doors and windows usually to be considered waste in Austria. Thus, the decision for the producer/holder of waste wood would be between recycling and incineration. To this end, legislation provides for waste wood fractions eligible for recycling; others are to be incinerated.
- Recycling: In the Ordinance on recycling of waste wood, EoW for recycled wood is addressed; recycled wood products must meet the quality requirements in the relevant Annex.
- Recovery: Incineration of waste wood is subject to subsidies as biomass.

Currently, an amendment of the Ordinance on recycling of waste wood is on-going; changes are planned to be effective from summer 2018. The amendment will mean that all EoL wooden doors and windows (including interior doors) have to be sent to incineration with energy recovery and that recycling is no longer allowed.

### 3.2 Czech Republic

The Czech Republic has a comprehensive waste related legal framework, where relevant EU legislation has been implemented into national legislation. The legal framework leaves room for voluntary industry agreements.

Waste wood is in general divided into two basic types - the so-called "dead" wood and "new" wood, whereas EoL windows and door are allocated to "dead" wood. Currently there is no specific regulation for waste wood in place and thus no fraction specific targets for separate collection and recycling/recovery defined. In the legislation waste wood is considered as a mixed waste fraction like biodegradable municipal waste, construction & demolition waste and packaging waste. EoL doors and windows are classified as construction & demolition waste. Requirements on the management of EoL doors and windows are in general affected by the 5-step waste hierarchy, the general objectives of the Waste Prevention Program, the Secondary raw material policy and the 70% recycling target for construction and demolition waste.

EoL windows and doors are partly collected separately on construction sites but are to a large extent still part of mixed C&D waste. The total amount collected separately is unknown, as EoL windows and doors are statistically recorded together with other waste wood types from C&D activities. Waste wood – and among this EoL windows and doors - is in the Czech Republic recycled, incinerated with energy recovery and still also to a certain extent landfilled. In case of recycling there is an increasing demand for some classes of waste wood by key manufacturers of wood-based panels like Kronospan and Egger, who currently import large quantities of waste wood.

### 3.3 Denmark

The main legal framework is the Danish Waste order / Affaldsbekendtgørelsen [DK DWO 2012] and the Danish Environmental Protection order / Miljøbeskyttelsesloven [DK DPO 2012]. The Resource Strategy Denmark without waste 2013, together with the resource plan for 2013 - 2018, forms the basis for managing waste management in Denmark.

The municipalities have the main responsibility regarding waste and they have an important role in the realization of the government's waste policy "Denmark without waste 2013-2018". The Municipal Associations (Kommunernes Landsforening) and the Ministry of the Environment have an agreement that secures the enforcement of the waste management plan.

Building materials, such as doors and windows, that can be reused directly without processing or preparation are legally not defined as waste and therefore not covered by the Waste Legislation.

Denmark follows the German legislation on wood waste (A1-A2-A3-A4) and the waste hierarchy in Denmark is a priority tool. Waste prevention must be prioritized in the following order: re-use, recycling and then other recovery. Landfilling is the lowest priority and therefore avoided if it is possible.

The next national waste plan is due to be completed in the beginning of 2020.

On June 7, 2017, the Government Advisory Board published 27 concrete recommendations to strengthen Denmark's transformation into circular economics. Some of these are relevant for EoL wooden doors and windows. It is expected that some of these recommendations will be included in the next national waste plan 2020, but no decision has been made yet.

### **3.4 France**

French legislation does not provide a specific legal framework for the management of EoL wooden windows and doors. The main national regulations and initiatives that go above and beyond the requirements of WFD are the followings:

- Producers and holders of paper, metal, plastic, glass and wood waste must sort and collect separately these 5 types of waste to promote their re-use and recycling.
- Prior to demolition of some special categories of buildings, project owners must conduct a survey of the waste resulting from the work.
- Any distributor of building materials, products and equipment intended for professionals, who operates a store with a surface area of at least 400 square meters and with annual revenue of at least 1 million euros, must provide a take back service for waste resulting from the same types of building materials, products and equipment that it sells to professionals.
- French authorities officially distinguish between "Explicit end-of-waste procedure", which is mandatory for materials resulting from waste treatment facility to leave their waste status, and "Tacit end-of-waste recognition" which applies to production facility using waste as a substitute for raw materials.
- French authorities signed 2 green deals with stakeholders to promote the recovery of construction and demolition waste wood in cement industry and to improve the recycling of waste flat glass from the demolition and replacement window industry.

A new "*Roadmap for the circular economy*" was presented in April 2018 including the following measures:

- Improving separate collection of construction and demolition waste to limit landfill. The implementation of Extended Producer Responsibility (EPR) chains will be one the solutions to be studied;
- Reviewing the current regulatory system concerning "Waste diagnoses before demolition" by mid-2019, to increase the re-use and the recovery of building sector's waste.
- Simplifying the end-of-waste criteria and procedures, especially for the wood sector.

### 3.5 Germany

The German legal framework for EoL wooden windows and doors is determined by general waste law, as well as specific legislation on waste wood and on C&D waste management.

The following specific treatment categories are identified:

- Re-use or preparation for re-use: It is expected that EoL wooden windows and doors usually to be considered waste in Germany. Thus, the decision for the producer/holder of waste wood would be between recycling and incineration.
- Recycling: Waste wood Ordinance applies for waste wood fractions eligible for recycling; others are to be incinerated. It is important to distinguish between windows and exterior doors (which are to be incinerated) and interior doors (which are eligible for recycling). It is estimated that today more than 90% of EoL wooden windows and doors is incinerated with energy recovery; this figure may decrease in future when recycling increases.
- Recovery: Incineration of waste wood is not subsidised as biomass.

An amendment of the Waste Wood Ordinance has been announced by the Federal Government.

### 3.6 Italy

The main legal framework for waste management in Italy is provided by the D.Lgs. 3 April 2006, n. 152, "Norme in materia ambientale", while specific dispositions regarding recycling, incineration, energy recovery and landfilling are to be found in separate decrees. No dedicated legislation on wooden waste currently exists, at national nor at regional level.

The responsibility of waste management planning in Italy falls within the regions; for this reason, specific legislation may exist at regional level which regulates the management of specific waste streams. EoL wooden doors and windows are identified in Italy as C&D waste. In this regard, many regions have defined guidelines for the application of the "selective demolition" which aims at improving the quality of the waste separated on site.

Interviews regional authorities and industry associations indicate that wooden waste from EoL wooden doors and windows is to a large degree recycled, almost exclusively to produce chipboard panels. Eurostat waste statistics indicates Italy recycles approximately 80% of wood waste across all consumption categories [IT Eurostat 2018]. This option is supported by favourable economic conditions, having a much lower cost compared to other treatments/disposal methods. A minor share of wooden waste is sent to incineration for energy recovery, which represents the second most used treatment option, even if with a very low relevance.

### 3.7 The Netherlands

The Dutch legal framework for EoL wooden windows and doors is largely determined by the Environmental Management Law (EML) and Dutch spatial planning law. The national waste management strategy, LAP3, in interaction with the EML, provides a categorization of wood waste in A-, B- and C-wood, for which it establishes minimum treatment standards. These minimum treatment standards are the most important factor to take into account when assessing the legal feasibility of a treatment option in the Netherlands. Important in this regard, is the fact that minimum standards could be raised over time, which might influence the treatment options for EoL wooden windows and doors again.

The following specific treatment categories are identified:

- Re-use or preparation for re-use: this depends on the legal classification of the EoL wooden windows and doors. If the EoL wooden windows and doors are classified as waste, re-use will have to be preceded by preparation for reuse, which is a waste treatment opera-

tion. In this regard, it is important to note that there is a considerable chance EoL wooden windows and doors are classified as waste.

- Recycling: the EoW criteria of article 6 WFD have to be taken into account, bearing in mind the Dutch interpretation and application of these criteria.
- Recovery: it is relevant to assess whether streams of EoL wooden windows and doors can be categorized as biomass. This would exclude the stream from the legal regime for waste incineration, if incinerated in installation specifically for biomass. Furthermore, there might be a possibility that the EoL wooden windows and doors, if categorized as biomass, become economically more attractive, due to current subsidy policies in the Netherlands. However, due to the likely treatment of EoL wooden windows and doors with paint, varnish and glue, the categorization as biomass is questionable.

Finally, it should be noted that the Dutch strategy for a circular economy in the Netherlands by 2050 provides various interesting objectives that could influence the legal framework for EoL wooden doors and windows in Netherland. Therefore, it is advisable that these developments are followed.

### **3.8 Sweden**

Sweden does not have any legislation that goes above or beyond the WFD relevant for treatment of wooden doors or windows. There is no requirement in any of the Swedish legislations regarding sorting of wood (besides impregnated/pressure treated wood) and windows containing PCB. Sweden's new national waste management plan will be published summer 2018. The plan is expected to include initiatives regarding the C&D sector, but no additional information was provided by the expert at the Swedish EPA.

The main flow of wooden doors and windows go through the municipalities, where it is sorted as wood (wooden doors), non-combustible (wooden doors with glass and wooden windows), hazardous waste (doors and windows containing PCB) or, in rare cases, suitable for reuse. If sorted as wood, the waste is crushed and sent off to be incinerated. In rare occasions the wooden waste is recycled into particleboard.

The main part of the doors and windows goes through the fraction non-combustible. The waste sorted as non-combustible is separated from the glass. The glass is then used as construction material or landfilled. The remaining organic parts in the non-combustible waste fraction is later crushed and incinerated. If the wooden doors or windows contain PCB they are handled and disposed of as hazardous waste. It is required that the doors and windows reused in new buildings can match current energy requirements from the Building Regulation.

### **3.9 United Kingdom**

The devolved legislatures of the United Kingdom do not provide a specific legal framework for the management of EoL wooden windows and doors. The main national regulations and initiatives that go above and beyond the requirements of WFD are the following:

- Any persons that imports, produces, carries, keeps, treats or disposes of controlled waste or has control of such waste has an obligation to comply with the duty of care regime. Such persons must take all reasonable steps to:
  - Prevent unauthorised or harmful deposit, treatment or disposal of waste;
  - Prevent a breach by any other person (e.g. operator of a waste treatment, recovery or disposal activity) to meet the requirement of an environmental permit;
  - Prevent the escape of waste from their control; and
  - Ensure that waste is transferred to a suitably authorised person/business and accompanied with a Waste Transfer Note (Consignment Note for hazardous wastes) which

provides an accurate description of the type and quantity of waste. Such documents must be made available at the request of the regulating authority.

- Project owners on construction and demolition sites are encouraged to prepare Site Waste Management Plans (SWMPs) to identify waste streams and to develop re-use, recycling and reduction targets at the project level. Although considered good practice, the preparation of SWMPs is now voluntary as the regulation was repealed in 2013.
- Wood entering the waste stream is first classified as hazardous or non-hazardous (following guidance prepared by the Environment Agency (EA)) and then graded into four discrete grades (Grades A to D) based upon the degree of chemical treatment, physical condition and other characteristics. The grades dictate how waste wood is regulated (e.g. storage and processing activities) and the suitable end-use markets to which it can be supplied.
- Regulatory Position Statement (RPS) 207 published by the EA allows treated or mixed waste wood which could be classified as hazardous or non-hazardous and has not been assessed in line with EA guidance, to continue to be classified as non-hazardous waste. Such waste must be destined for IED Chapter IV compliant boilers or panel board manufacturing. The RPS does not apply to waste wood that is known to be hazardous. From November 2018, all unassessed waste wood from mixed wood sources (irrespective of whether it is untreated (e.g. Grade A and B)) must be classified as hazardous waste and handled accordingly.
- Quality Protocols have been established at the national level to provide guidance on End of Waste (EoW) status for certain waste materials; allowing such materials to be removed from regulatory waste management controls. A Quality Protocol has been established for the production and use of quality compost from source-segregated biodegradable wastes (e.g. Grade A waste wood). A free self-assessment tool has also been developed to assist with anyone managing waste to determine whether it meets EoW or by-product status; this tool is based on case law in England and Wales only.

### 3.10 Summary table of national differences with respect to EoL wooden doors and windows

	Austria	Czech Republic	Denmark	France	Germany	The Netherlands	Italy	Sweden	United Kingdom
<b>Basic waste law</b>	Waste Management Act of 2002 (Abfallwirtschaftsgesetz); Waste Management Act Amendment of 2010	Waste Act (Sb-185 2001) [CZ WA 2001], published in 2001 and replaces the first act of 1991	Danish Waste Order /Affaldsbekendtgørelsen [DK DWO 2012]  Danish Environmental Protection order / Miljøbeskyttelsesloven [DK DPO 2012].	Articles L. 541-1 to L. 541-50, Environment Code;  Articles R. 541-7 to R. 541-97, Environment Code.	Federal Circular Economy Law (Kreislaufwirtschaftsgesetz – KrWG 2012, as amended)	Environmental Management Law (Wet milieubeheer)	D.Lgs. 3 April 2006, n. 152, "Norme in materia ambientale"	Plan- och bygglag (2010:900) (Planning and Building Act)  Miljöbalk (1998:808) (the Swedish environmental code)  Avfallsförordning (2011:927) (the national ordinance on waste)  The National Waste Management plan	The Environmental Protection Act 1990 (as amended)  The Waste (England and Wales) Regulations 2011 (as amended)
<b>Specific waste law</b>	1) Recycled Construction Materials Ordinance 2015 (Recycling-Baustoffverordnung / RBV)  2) Ordinance on recycling of waste wood for the purpose of use in manufactured wood products 2012 (Verordnung über das Recycling von Altholz in der Holzwerkstoffindustrie / RecyclingholzV).	In the Czech Republic a specific regulation for waste wood does not exist, at national nor at regional level.	No specific waste law for EoL wooden windows and doors	French legislation does not provide a specific legal framework for the management of EoL wooden windows and doors.	1) Federal Ordinance on waste wood (Altholzverordnung – AltholzV 2002, as amended)  2) Federal Ordinance on Commercial Waste (Gewerbeabfallverordnung – GewAbfV 2017)	Sectorplan 36 (waste wood) of the national waste management plan (landelijk afvalbeheerplan)	<u>Landfilling:</u> - D.M. 27/09/2010: criteria for the eligibility of waste in landfill; - D.Lgs. 36/2003: implements the Directive 1999/31/EC on landfills. <u>Incineration and energy recovery:</u> - D.M. 14/02/2013, n.22: regulates the EoW criteria for specific types of refuse-derived fuels (Rdf); - D.Lgs. 11/05/ 2005, n. 133: implements the Directive on the incineration of waste <u>Recycling:</u> - D.M. 5 February 1998: identifies the non-hazardous waste subject to simplified recovery procedures.  At regional level, specific legislation exists which regulates the management of specific waste streams. See factsheet for details.	No specific waste law for EoL wooden windows and doors.  In Sweden both discarded wooden doors and wooden windows are classified as C&D waste. If only a few doors or windows are discarded, they can be considered household waste.	No specific waste law for EoL wooden windows and doors

	Austria	Czech Republic	Denmark	France	Germany	The Netherlands	Italy	Sweden	United Kingdom
<b>Waste hierarchy</b>	<p>Today: Waste wood 17202 (including EoL wooden windows and doors) can be sent to recycling or incineration with energy recovery (decision based on contamination / quality).</p> <p><u>From summer 2018:</u> All EoL wooden windows and doors (including interior doors) shall be sent to incineration with energy recovery</p>	<p>The waste hierarchy applies in general, and there is currently no specific definition for the application of the waste hierarchy regarding waste wood treatment.</p>	<p>The waste hierarchy in Denmark is a priority tool.</p> <p>There is no specific requirement in the Legislation for the sorting of wood (besides impregnated wood), but individual municipalities can set separate regulations on sorting and treatment.</p>	<p>No specific waste hierarchy requirements for EoL wooden windows and doors.</p>	<p>Waste wood category A II: material recycling and energy recovery, ranked equally, decision of waste producer / holder</p> <p>Waste wood category A IV: energy recovery only</p>	<p>Sectorplan 36 (waste wood) of the national waste management plan determines minimum treatment standards for wood categories A, B and C.</p>	<p>No specific decree or other legal provision is in place which defines the best option to be adopted for the management of wooden waste with reference to the waste hierarchy.</p>	<p>No specific waste hierarchy requirements for EoL wooden windows and doors.</p>	<p>The waste hierarchy applies in general, and there is currently no specific definition for the application of the waste hierarchy regarding wood waste.</p>

	Austria	Czech Republic	Denmark	France	Germany	The Netherlands	Italy	Sweden	United Kingdom
<b>End-of-waste</b>	<p>Framework: section 5 of Waste Management Act 2002; RecyclingholzV: EoW for recycled wood is addressed in section 8 - &gt; recycled wood products must meet the requirements of Annex 3 (quality requirements for recycled wood products)</p>	<p>The Czech Republic is following EU legislation in the area of "end of waste". Only in case that no legislation on European level will be available, the transition of recycled construction and demolition waste into a product may be defined by national Czech legislation.</p>	<p>There are no national EoW criteria for wood waste.</p>	<p>Based on jurisprudence, and according to a notice published in the Official Journal of 13 January 2016, French authorities officially distinguishes between:</p> <p>"Explicit end-of-waste procedure" (described above) which is mandatory for materials resulting from waste treatment facility to leave their waste status</p> <p>"Tacit end-of-waste recognition" which applies to production facility using waste as a substitute for raw materials. Substance or article manufactured with the use of waste implicitly leaves the waste status on conditions that it remains similar to the substance or article that would have been produced without the use of waste, and complies with product regulations (such as REACH or POP regulations).</p> <p>Wood-based panel manufacturers using waste wood as raw materials benefit from this "tacit end-of-waste".</p>	<p>Section 5 of KrWG allows for different levels to set such criteria; task for the owner/holder of material to determine whether it is waste or whether the general criteria of section 5 KrWG (those taken from Article 6 WFD) are given; no specific EoW criteria for waste wood identified; requirements of AltholzV to be taken into account</p>	<p>Application of end-of-waste criteria of Article 6 Waste Framework Directive according to national policy. See factsheet for more information.</p>	<p>EoW criteria have been identified with regard to the production of refuse-derived fuels (rdf) in the D.M. 14 February 2013, n.22</p>	<p>Quality Protocols have been established at the national level to provide guidance on how to recover certain waste materials and remove it from the regulatory waste management controls.</p> <p>In the absence of Quality Protocols for a waste-derived product, an end of waste assessment can be undertaken to facilitate the recovery or recycling of waste for use as a resource. 'Isitwaste' is a free self-assessment tool to help determine if your material meets end of waste or by-product status; this tool is based on England and Wales case law only.</p>	



	Austria	Czech Republic	Denmark	France	Germany	The Netherlands	Italy	Sweden	United Kingdom
<b>Data quality – statistics on EoL wooden doors and windows</b>	No specific data available		There are currently no waste statistics concerning wooden waste from doors and windows.	<p>ADEME considers that knowledge of the construction and demolition waste area can be improved.</p> <p>More specific data concerning the different waste streams, especially for wood waste, could be obtained with the collaboration of the stakeholders. Thus, ReQualif report estimates the number of EoL wooden windows dismantled every year between 5 and 6 million.</p>	No specific data available	No specific data on end-of-life wooden windows and doors available. Data on waste wood generation and treatment available for 2014 and 2015. <u>Estimated</u> data for 2017 also available.	No specific data available	Insufficient statistics regarding EoL wooden doors and windows available and the data often lacks in quality.	No specific data available

	Austria	Czech Republic	Denmark	France	Germany	The Netherlands	Italy	Sweden	United Kingdom
<b>Predominant treatment of EoL wooden windows and doors</b>	<p>Treatment of all waste wood:</p> <p>40 % recycling, 60 % incineration with energy recovery</p> <p>If this also applies to EoL wooden windows and doors, is not clear; this has not been investigated/is not monitored in AT.</p> <p>From the summer of 2018 all EoL wooden doors and windows are required to be sent to incineration with energy recovery</p>	<p>Currently 60% of recycled wood in general is used to produce particle boards. Industry is planning to increase this share up to 95 %.</p> <p>Czech Republic was for many years exporting waste wood but is now importing, and data on EoL wood waste is scarce.</p> <p>Using 2012 data and assuming that 1/3 of the exported wood is recycled and 2/3 is incinerated. The EoL of wooden waste in general in 2012 was 5% landfilled, 60% incinerated, and 35% recycled. As there has since been an increase in demand for recycled wood, 40% recycled, 55% incinerated and 5% landfilled for wooden waste in general is likely.</p> <p>No data specifically on EoL doors and windows exist.</p>	<p>For construction waste in general the industry estimates that only about 2% is subjected to incineration with energy recovery, 3% to landfill, 94% to recycling and 1% reused.</p> <p>For wood waste from C&amp;D activities, it is estimated that 5% is reused, 20% recycled, 75% incinerated with energy recovery and 0% landfilled.</p>	<p>From SR BTP point of view, even if wood-based panel manufacturers and biomass combustion plants are relatively well distributed across the country, wood waste recovery and recycling routes in France are saturated.</p> <p>Consequently, a proportion of wood waste is exported for recycling or recovery mainly in Italy and Belgium or land filled.</p> <p>In general 43% of C&amp;D wood waste is recycled, 34% incinerated and 23% landfilled.</p> <p>No data specifically on EoL doors and windows exist.</p>	<p>It is estimated that more than 90% of wooden waste in general in Germany is sent to incineration with energy recovery, and that the remaining 10% is recycled.</p> <p>No data specifically on EoL wooden doors and windows exist.</p>	<p>In the Netherlands 68% of the A and B wood is incinerated with energy recovery and 32% recycled. Wood waste from C&amp;D is primarily category B.</p> <p>No data specifically on EoL wooden doors and windows exist.</p>	<p>Stakeholder interviews states that EoL wooden doors and windows are almost exclusively recycled into of chipboard panels. A minor share is incinerated with energy recovery.</p> <p>EoL wooden windows and doors mostly incinerated for energy recovery.</p> <p>Very small amount of reuse and repair of wooden doors and windows done by the municipalities at for examples the Eco park Alelyckan in Gothenburg and Eskiltunas ReTuna facility. There are also a couple of private actors working with reuse of doors and windows, e.g. Kompanjonen, Hus Till Hus and Brattöns Återbruk.</p> <p>Recycling of wooden doors and windows are rarely present. If recycled, the doors and windows are mainly recycled into particleboard [SE Svenskt trä 2003].</p>	<p>Wooden windows and doors are classified as mixed wood waste and would be destined for Chapter IV compliant incinerators for energy recovery or destined for panel board manufacturing.</p> <p>However, non-hazardous wooden windows and doors of good condition (e.g. easily removed during demolition or renovation), especially those with architectural or ornamental features, are encouraged to be re-used for other construction projects; building regulations will apply.</p> <p>In general 34% of the wooden waste in UK is recycled, 34% incinerated, 26% landfilled and 6% exported for recycling and incineration.</p> <p>No data specifically on EoL wooden doors and windows exist.</p>	

	Austria	Czech Republic	Denmark	France	Germany	The Netherlands	Italy	Sweden	United Kingdom
<b>General policy developments</b>	<p>Amendment of RecyclingholzV on-going; <b>from summer 2018, all EoI wooden windows and doors will be excluded from recycling</b> - future treatment: incineration with energy recovery only.</p> <p>Guideline explaining new provisions will also be published in 2018, including information and instructions on sorting of waste wood at construction sites and waste collection centres.</p>		<p>The next national waste plan is due to be completed by the beginning of 2020.</p> <p>On June 7, 2017, the Government Advisory Board published 27 concrete recommendations to strengthen Denmark's transformation into circular economics [DK Advisory Board recommendations 2017].</p>	<p>New "Roadmap for the circular economy" on the 23 April 2018 (<a href="https://www.consultation-economie-circulaire.gouv.fr/la-feuille-de-route-economie-circulaire">https://www.consultation-economie-circulaire.gouv.fr/la-feuille-de-route-economie-circulaire</a>).</p>	<p>The German Federal Ministry has announced a possible review of the AltholzV for the upcoming years.</p>	<p>Dutch strategy for a circular economy in the Netherlands by 2050</p>	<p>Law n. 221 of 28 December 2015, "Collegato Ambientale" includes actions aimed at promoting the circular economy.</p> <p>National Strategy for Sustainable Development 2017-2030.</p> <p>Specific targets exist with regard to wooden waste at regional level. E.g. region Emilia Romagna has defined a target for the recycling rate for wooden waste.</p>	<p>Sweden's new national waste management plan is expected to be ready in the summer of 2018.</p>	<p>The UK Government is currently implementing the EU Directive on the circular economy and is also developing a resource and waste strategy which is to be published later in 2018.</p> <p>The Wood Recyclers Association and their technical working group are committed to developing a code of practice for the assessment and classification of waste wood. The guidance documents are anticipated to be released late 2018/early 2019.</p>

## 4. NATIONAL FACTSHEETS

### 4.1 Austria

#### Main legal framework, regulations and interpretations

##### Main legal framework

##### **Waste Management Act of 2002** (*Abfallwirtschaftsgesetz*)

The EU Waste Framework Directive was implemented by amendment to the Waste Management Act of 2002 (*Abfallwirtschaftsgesetz*), in the Waste Management Act Amendment of 2010. Definitions for key terms of waste law, such as what is considered "waste", "treatment", "recovery", and "recycling", are implemented into Austrian law in line with EU law. The same is true for the concept of EoW.

##### **Recycled Construction Materials Ordinance** (*Recycling-Baustoffverordnung*)

A Recycled Construction Materials Ordinance (Recycling-Baustoffverordnung – RBV) was adopted in 2015 and entered into force on 1<sup>st</sup> January 2016. The aim of the Ordinance is, in particular, to ensure a high quality of waste generated during construction and demolition activities in order to promote the recycling of such waste. Further, RBV lays down specific requirements that need to be met during construction or demolition activities, such as the assessment of presence of pollutants, an organised and recycling-oriented demolition of structures and a duty to separate the waste generated. Furthermore, (quality) requirements for the manufacture and use of recycled construction materials are set.

##### **Ordinance on recycling of waste wood for the purpose of use in manufactured wood products** (*Verordnung über das Recycling von Altholz in der Holzwerkstoffindustrie*)

The recycling of waste wood for the purpose of use in manufactured wood products is addressed in the 2012 Ordinance of the Federal Minister of Agriculture, Forestry, Environment and Water Management on the recycling of waste wood in the wood industry (RecyclingholzV). The objectives of the Ordinance are recycling of suitable waste wood and wood, avoiding of harms to humans and the environment, and the avoidance of pollutant accumulation in the product cycle. The Ordinance lays down limits for pollutants as well as an obligation to carry out measurements. These limits are variable and depend on recycled wood content (i.e. the proportion of recycled wood on the total wood input required for the production of wood-based materials). The cleaner the recycled wood, the more recycled wood can be used for the production of wood-based materials.

##### Waste hierarchy and legal requirements for treatment

Section 3 of AWG contains the waste hierarchy as a general principle for waste policy and measures (but without itself setting out direct obligations for actors).

Especially with contaminated wastes, a deviation from the waste hierarchy might be required. One example is impregnated waste wood that is contaminated due to chemical treatment [AT BMNT 2017 Teil 1]. Today, waste wood 17202 (including EoL wooden doors and windows) is sent to either recycling or incineration with energy recovery depending on contamination / quality).

From summer 2018: All EoL wooden doors and windows (including interior doors) have to be sent to incineration with energy recovery.

## National waste management

The Federal Minister of Agriculture, Forestry, Environment and Water Management is required to draft a Federal Waste Management Plan (FWMP) at least once every six years and to publish it on the Internet, in order to implement the objectives and principles of the Waste Management Act of 2002. The FWMP 2018 serves to support achievement of the objectives and principles of the Waste Management Act of 2002. In the WMP, waste wood, bulky waste, and C&D waste are addressed in separate sections (3.1.2, 3.8, and 3.9 respectively).

Austria uses its own waste codes. The relevant overarching waste code is 17 waste wood. Sub-category 17202 – wood waste from demolition activities – includes all EoL wooden doors and windows.

There are basically two streams for collection of EoL wooden windows and doors:

- As part of commercial demolition and renovation works: EoL wooden windows and doors are usually collected in a mixed container together with other waste wood. In very rare cases, they might be collected separately; this depends on the disposal company.
- As part of private renovation works: EoL wooden windows and doors can be disposed of at civic amenity sites, recycling centres, or with bulky waste collection; mixed collection with other waste wood.

## Legal provisions - reuse and preparation for reuse

EoL wooden windows and doors is expected to usually to be considered waste. Under assumption that EoL wooden windows and doors are not re-used and not prepared for re-use and, on the flipside of the hierarchy, are not disposed of at landfills without prior treatment, the decision of a waste producer/holder is between recycling or incineration.

## Legal provisions – recycling

A Recycled Construction Materials Ordinance (Recycling-Baustoffverordnung – RBV) has been adopted in 2015 and entered into force on 1st January 2016. The aim of the Ordinance is in particular to ensure the high quality of waste generated during construction and demolition activities to promote the recycling of such waste. Further, RBV lays down specific requirements that need to be met during construction or demolition activities, such as the assessment of presence of pollutants, an organised and recycling-oriented demolition of structures and a duty to separate the waste generated. Furthermore, (quality) requirements for the manufacture and use of recycled construction materials are set.

The recycling of waste wood subjected for use in manufactured wood products is addressed in the 2012 Ordinance of the Federal Minister of Agriculture, Forestry, Environment and Water Management on the recycling of waste wood in the wood industry (RecyclingholzV). The objectives of the Ordinance are recycling of suitable waste wood and wood, avoiding of harms to humans and the environment, and avoiding pollutant accumulation in the product cycle.

Annex I specify waste wood fractions for recycling. Fractions not listed under Annex I are excluded from recycling.

The Ordinance lays down limits for pollutants as well as an obligation to carry out measurements. These limits are variable and depend on recycled wood content (i.e. the proportion of recycled wood on the total wood input required for the production of wood-based materials). The cleaner the recycled wood, the more recycled wood can be used for the production of wood-based materials.

### End-of-waste

A framework for end-of-waste is set by section 5 of Waste Management Act 2002. Section 5 empowers the Federal Minister of Agriculture, Forestry, Environment and Water Management to adopt Ordinances for defining end-of-waste, in line with criteria similar to those of Article 6 EU

<p>Waste Framework Directive.</p> <p>Both RBV and RecyclingHolzV define EoW requirements; however, the relevant provisions of RBV (section 14 and Annex 2) define EoW criteria only for other streams than waste wood (such as aggregates).</p> <p>In RecyclingholzV, EoW for recycled wood is addressed in section 8 para 1. Recycled wood products must meet the requirements of Annex 3 (quality requirements for recycled wood products). EoW is achieved by a declaration to the federal Ministry accompanied by a documentation/assessment report. EoW is only achieved in where further use is ensured. Recycled wood products may only be used in plants producing wood-based materials. Waste holders who declare the waste must report annually to the Federal Ministry on the type and quantity of the recycled wood product, the changes expected or expected to be made by the intended customers and the Results of an external control. According to section 4 para 1, waste wood fractions intended for recycling must be collected separately at the place of generation or be subject to subsequent treatment to remove pollutants.</p>
<p><b>Legal provisions - recovery (incineration with energy recovery)</b></p>
<p>Incineration of waste is governed in Austria by the Waste Incineration Ordinance (Abfallverbrennungsverordnung) 2007 as amended. The Ordinance implements the standards of the EU Industrial Emissions Directive. Incineration of untreated waste wood is not subject to the Ordinance, but hazardous wood waste or wood waste that has been treated with wood preservatives or coatings and that may contain halogenated organic compounds or heavy metals (in particular wood waste from construction and demolition waste) are in the scope of Abfallverbrennungsverordnung.</p> <p>With the Green Electricity Law (Ökostromgesetz, ÖSG) 2002/2012, a Federal system of compensation of promoting electricity from renewable energy sources has been created.</p> <p>Green electricity in the sense of the ÖSG is electrical energy from renewable energy sources, with biomass and waste with high biogenic fraction, such as waste wood among the relevant sources.</p>
<p><b>Legal provisions – landfilling</b></p>
<p>N/A</p>
<p><b>Relevant national guidelines</b></p>
<ul style="list-style-type: none"> <li>Federal Waste Management Plan 2018: waste wood, bulky waste, and C&amp;D waste are addressed in separate sections (3.1.2, 3.8, and 3.9 respectively): <a href="https://www.bmnt.gv.at/umwelt/abfall-ressourcen/bundes-abfallwirtschaftsplan/BAWP2017-Final.html">https://www.bmnt.gv.at/umwelt/abfall-ressourcen/bundes-abfallwirtschaftsplan/BAWP2017-Final.html</a>.</li> <li>Holzabfälle auf der Baustelle, Recycling-Baustoffverordnung und Trennung vor Ort, 2017, <a href="https://irp-cdn.multiscreensite.com/a300cfd3/files/uploaded/Der%20Umgang%20mit%20Holzabf%C3%A4llen%20in%20%C3%96sterreich.pdf">https://irp-cdn.multiscreensite.com/a300cfd3/files/uploaded/Der%20Umgang%20mit%20Holzabf%C3%A4llen%20in%20%C3%96sterreich.pdf</a>.</li> <li>New guideline on sorting of waste wood at construction sites and waste collection centres expected in 2018 (change of legal framework, see below)</li> </ul>
<p><b>General policy developments</b></p>
<p>Currently, an amendment of the Recyclingholzverordnung is underway; the changes are planned to take effect from summer 2018. The collection of mixed waste wood is problematic for the recycling of waste wood due to different qualities and contamination levels. Therefore, the main change will be the dedicated declaration of wood waste fractions that have to be recycled and wood waste fractions that are excluded from recycling. In future, there will be a two-container system on-site: containers for waste wood that must be sent to recycling, and containers for waste wood that must be sent to energy recovery. In the new system, EoL wooden windows and doors are excluded from recycling (except for glass part). The reason is the contamination of the bulk of EoL windows and doors. To keep the new system simple and operational in practice, interior doors that often might not be contaminated, are also excluded from recycling. Guideline ex-</p>

plaining new provisions will also be published in 2018, including information and instructions on sorting of waste wood at construction sites and waste collection centres.

### **National data availability, waste statistics and data quality**

The data quality and availability for waste wood in general is good. There is data available for several years and several subcategories. However, there is no specific data for EoL wooden windows or doors. They are part of the subcategory 'waste wood from construction and demolition waste' and it is assumed that they constitute only a very small part of all waste wood in this subcategory. The following information refers to 2015 [AT BMNT 2017, Teil 1]:

- Waste wood generation in total: 1,130,000 t
  - From municipal waste (households and similar facilities): 244,000 t
  - Other sources: 886,000 t
- Generation of waste wood from construction and demolition waste: 345,100 t

Regarding treatment, there is also only data available for waste wood in general. The following information refers to 2015:

- ~ 500,000 t incineration with energy recovery (~ 40%)
- ~ 750,000 t recycling (~ 60%)

Note: an update of statistics as described above referring to 2016 can be found in [AT BMNT 2018].

### **Treatment in reality**

In summary, EoL wooden windows and doors are collected in a mixed container with other wood waste and sent to sorting / pre-treatment plants ("Aufbereitungsanlagen"). Here, the quality/contamination of the delivered wood waste is assessed and decision for recycling or incineration with energy recovery is made. The treatment routes for EoL doors and windows are not monitored in Austria. It might be assumed that the treatment of EoL doors and windows is similar to the treatment of waste wood in Austria in general meaning that 40% of EoL wooden windows and doors is sent to recycling and 60% to incineration with energy recovery. However, from the summer 2018 a new amendment to the waste ordinance will mean that all EoL wooden doors and windows (including interior doors) will have to be sent to incineration with energy recovery.

### **Most significant national actors**

#### Associations:

- Fachverband der Holzindustrie Österreichs: <https://blog.holzindustrie.at/>
- Verband Österreichischer Versorgungsbetriebe (VOEB): <https://www.voeb.at/>
- Private disposal companies
- Rieger Austria Entsorgung und Verwertung GmbH: <http://www.rieger-entsorgung.at/de>
- Nemetz Entsorgung und Transport Aktiengesellschaft: <https://www.nemetz-ag.at>
- Wood processing industry
- EGGER Holzwerkstoffe Wismar GmbH & Co. KG: [https://www.egger.com/shop/de\\_DE/](https://www.egger.com/shop/de_DE/)
- FunderMax GmbH: <http://www.fundermax.at/de/>
- M. KAINDL KG, KAINDL FLOORING GmbH: <https://www.kaindl.com/de/>

## 4.2 Czech Republic

### Main legal framework, regulations and interpretations

#### Waste Act

The basic law for waste management related activities is the Waste Act (Sb-185 2001) [CZ WA 2001], published in 2001 and replaces the first act of 1991. The current law is focused on waste prevention, defines the hierarchy of waste management and promotes the basic principles of environmental and health protection when handling waste. The Waste Act is planned to be amended.

There is no definition of secondary raw materials in the act, but there are different waste types presented which can be regarded as secondary raw materials. These are, in particular, plastics, paper, glass and metal as well as electric and electronic devices. Wood is not mentioned among these fractions.

#### Waste management policy (WMP)

General principles of the waste management policy of the Czech Republic are

- extended producer responsibility,
- polluter pays principle
- principle of self-sufficiency and proximity.

#### Waste hierarchy

The Czech Republic has transposed EU legislation into national legislation and thus also the 5-step waste hierarchy according to the Waste Framework Directive. The binding part of the WMP emphasises on respecting the hierarchy of waste management methods.

The waste hierarchy applies in general, and there is currently no specific definition for the application of the waste hierarchy regarding waste wood treatment. It has to be noted that the Waste management plan (see next section) targets increasing material recycling of waste wood.

#### Definition of waste wood

In the Czech Republic a specific regulation for waste wood does not exist, at national nor at regional level.

Waste wood is in general divided into two basic types - the so-called "**dead**" wood („mrtvé" dřevo) and "**new**" wood ("nové" dřevo). The term "dead wood" comprises mainly of:

- old furniture (mainly within bulky waste),
- wood from demolition, reconstruction, construction activities,
- sawdust and cuttings and
- wooden doors / door frames and EoL windows. wood recycled (dřevní recyklát).

Compared with this "new wood" refers to wood chips and tree parts.

### National waste management

#### National waste management plan [CZ WMP 2014]

The Waste Management Plan (WMP) of the Czech Republic for the Period 2015 – 2024, (Plán odpadového hospodářství České republiky na období 2015 – 2024) was adopted by Government of the Czech Republic and has been valid since 1.1.2015. The WMP defines the goals and targets for different waste treatment methods according to the five-step waste hierarchy (*Binding part, chapter 3.2, principle b*). In applying the hierarchy, the best option from an en-



environmental perspective should be selected by considering the entire life cycle of products / materials. The focus should be laid down on reducing the impact of waste disposal on the environment. This may lead to some allowed deviations for specific waste streams.

The WMP defined the following key targets of waste management:

- Waste prevention and reduction of hazardous properties
- Re-use of EoL products
- Focus on quality recycling and recovery (material, energy (industrial waste), biological)
- Optimization of the management of biodegradable municipal waste
- Energy recovery from waste, particularly mixed municipal waste.
- Substantial reduction of landfilling
- Clarification of the state when waste ceases to be waste.

The WMP of the Czech Republic is the guiding document for the 14 regional waste management plans, which are all up to date. Like the national WMP, regional WMPs have also binding, analytical and directive parts.

**Waste wood** is not defined as a single specific waste stream within the NWP, but allocated to:

- biodegradable municipal waste (BRKO - biologicky rozložitelné komunální odpady),
- construction and demolition waste and
- packaging waste.

Waste wood as part of the above-mentioned fractions is always considered both as a non-hazardous and hazardous fraction.

Waste wood from wooden doors and windows is classified as construction & demolition waste according to the European waste catalogue. No specific classification or requirements for collection, treatment or disposal for wooden doors and windows could be found in the WMP.

The key objectives of the WMP with focus on the waste wood containing fractions are increase of material recycling of biodegradable waste and achievement of a 70% recycling rate for construction and demolition waste. In this regard it is explicitly mentioned, that (among others) the recycling of wood should be increased and only if it would not be possible to use the waste wood materially, then it could be incinerated with energy recovery. Consequently, in accordance with the Waste Framework Directive, landfilling of waste wood should be prevented. Against this background efficient collection of waste wood needs to be organized.

#### Waste Prevention Program [CZ WMP 2014]

The Waste Prevention Program of the Czech Republic is part of the Waste Management Plan as chapter 3.7. The key objective is to reduce consumption of primary resources and the amount of waste generated.

### **Legal provisions - reuse and preparation for reuse**

The WMP defines the principle, that preparing for re-use should be supported according to the waste hierarchy.

Specific requirements for the reuse and preparation for reuse for waste wood could not be found in legislation.

<p><b>Legal provisions – recycling</b></p>
<p><u>C&amp;D waste</u></p> <p>For C&amp;D waste the rate of preparing for re-use and the rate of recycling of construction and demolition waste and other types of their material recovery should be increased by 2020 to at least 70% by weight (EU target). The analytical part of the WMP stated that the levels of recycling and recovery of construction and demolition waste are in the long term very high (in 2012 over 90%), so that the EU targets are already fulfilled. The policy is now focussing more on the development of standards for the quality of material from recycled construction and demolition waste. Also rules for the use of processed C&amp;D waste and recycled materials from C&amp;D waste should be simplified, while maintaining a high level of environmental and human health protection.</p> <p>In 2008 a new methodological guideline for the management of waste from construction &amp; demolition activities (metodický návod pro řízení vzniku stavebních a demoličních odpadů a pro nakládání s nimi) was published, focusing more on recovery of waste from C&amp;D activities. According to the guideline, waste wood should be used as raw material for panels and, if this is possible, waste wood should serve a base material for energy production. The hazardous waste codes 17 02 04 and 17 09 03 – potentially including waste wood fractions are excluded as option for recycling [CZ MN-SO 2008].</p> <p><u>Practice</u></p> <p>Where quality allows, waste wood in the Czech Republic is used to produce chipboards and panels.</p> <p><u>EoW criteria for waste wood</u></p> <p>The Czech Republic is following EU legislation in the area of "end of waste". Only in cases where no legislation on European level exists, can the transition of recycled C&amp;D waste into a product may be defined by national Czech legislation.</p> <p>Currently there is no discussion on EoW for waste wood, and no national EoW criteria.</p>
<p><b>Legal provisions - recovery (incineration with energy recovery)</b></p>
<p>The WMP defines the guiding principle, that incineration of recyclable materials should not be supported.</p>
<p><b>Legal provisions - landfilling</b></p>
<p>The WMP defines the general principle that landfilling of recyclable materials should not be supported. A landfill tax was introduced in 1992.</p> <p><u>Construction &amp; demolition waste</u></p> <p>Specific regulations for waste wood or construction &amp; demolition waste were not found.</p>
<p><b>Legal provisions – product regulation</b></p>
<p>No specific product legislation for products made from recycled wooden windows and doors are in place.</p>
<p><b>Relevant national guidelines</b></p>
<p>See section "National waste management".</p>

## General policy developments

### Waste management strategy

Relevant policies related to the waste management strategy can be summarized in the following

- **State Environmental Policy** of the Czech Republic 2012-2020 [CZ SEP 2012] defines the plan for the implementation of effective environmental protection in the Czech Republic,
- **Raw Material Policy** of the Czech Republic 2012-2032 [CZ RMP 2012] reflects the changes in the global raw materials market and the economic developments worldwide. The key goal is to ensure the raw material security.
- **The Secondary raw materials policy** [CZ SRMP 2014] of the Czech Republic focuses on turning waste into resource and aims to create favourable conditions for the recovery of secondary raw materials from EoL products. The main objective is to replace primary resources to contribute to reducing material and energy intensity of production.  
Waste wood is mentioned as important secondary raw material mainly also from construction and demolition waste.
- **Biomass Action Plan** of the Czech Republic 2012-2020 [CZ BAP 2010] presents an analysis of the use of biomass in the Czech Republic for energy purposes. The plan is focused on agricultural waste and its use by the energy sector.
- **State Energy Policy** of the Czech Republic 2012-2040 [CZ SEnP 2004] (updated in 2017) is a strategic document defining the objectives of the state in energy management in accordance with the needs of economic and social development, including environmental protection
- **Clean Air Act** tightens the limits on the discharge of pollutants by 2022 (relevant for EoL wooden doors and window in case of thermal treatment).

### Voluntary industry agreements

Currently there are ongoing negotiations between the relevant industry actors and the Ministry of Industry to initiate a voluntary take back system for flat glass mainly from construction activities. Such an initiative might also affect the wood fraction from EoL doors and windows. The initiative is part of the Action plan within the Secondary raw materials policy. Currently the framework for such a system is drafted, based on experience in other EU member states, mainly The Netherlands [CZ VA-FG 2016], [CZ MoE 2016].

## National data availability, waste statistics and data quality

### Statistical data sources

Statistical data on HW is reported to two autonomous systems, based on different data collection methods.

- (1) Statistical data published by MoE (Ministry of Environment) via CENIA (Czech Environmental Information Agency)

CENIA manages the Public waste management information system (Veřejný informační systém odpadového hospodářství (ISOH) on behalf of the MoE and provides data to the Statistical Yearbook of the Environment (Statistická ročenka životního prostředí ČR). Data are based on the collection of administrative data from waste producers and waste processors according to national waste legislation.

- (2) Statistics published by the Statistical office

The Czech Statistical Office carries out the statistical survey on the waste generation and management every year since 1992. Data are collected by a statistical survey at enterprises based on a "rotating model" and published in a yearly report. CZSO is the responsible authority to provide data to Eurostat.

Statistical survey of the CZSO with data published by CENIA are not always comparable due to different methodology of data collection.

Statistical data availability for EoL doors and windows

There are currently no detailed (single) data for EoL doors and windows available. Data for EoL doors and windows are part of different waste codes according to the European waste catalogue (EWC), mainly within construction and demolition waste:

<b>EWC code</b>	<b>Generation 2016 in tonnes (CZSO) [CZ CZSO 2016]</b>	<b>Generation 2016 in tonnes (ISOH)* [CZ ISOH 2018]</b>
17 02 01 – wood	32 759	on request
17 0 2 04* - glass, plastic and wood containing or contaminated with dangerous substances	36 151	on request
17 09 03* other construction and demolition wastes (including mixed wastes) containing dangerous substances	6 011	on request
17 09 04 mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03	258 130	on request

\* Detailed data from the Public waste management information system ISOH are available on request and against payment.

Specific information on the treatment routes for these fractions was available in the past but are not longer publicly available.

In 2012 approximately 200 000 tonnes of waste wood were collected separately and around 50 000 tonnes treated within the CZ. Of these approximately 14 000 tonnes were recycled, 25 000 tonnes incinerated with energy recovery and 10 000 tonnes landfilled. The remaining 151 000 tonnes was exported.

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**Treatment in reality**

Information on treatment of EoL windows and doors specifically are not available.

A general assessment could be derived from information available for the general treatment of waste wood, of which EoL windows and doors are a part of. Waste wood in the Czech Republic is treated in different ways: recycled, incinerated with energy recovery and still also to a certain extent landfilled.

Based on the 2012 data presented in the previous section, and with the assumption that the that exported waste wood was not landfilled but recycled or thermally treated, and roughly assumed that 1/3 was recycled and 2/3 incinerated with energy recovery. The general waste routing of wooden waste in Czech Republic in 2012 was:

- o 35% recycled
- o 60% incinerated with energy recovery
- o 5% landfilled.

As there has since been an increase in demand for recycled wood, 40% recycled, 55% incinerated and 5% landfilled for wooden waste in general is likely.

According to the Statistical office [CZ CZSO 2016] in 2016 a total of 387 806 t of waste wood was used as secondary raw material. The share of EoL windows and doors is unknown.

Currently 60% of recycled wood in general is used to produce particle boards. Industry is planning to increase this share up to 95%. As the majority of waste wood is imported, so that there is a strong interest to increase separate collection and recycling of suitable waste wood fractions [CZ EPVRD 2018].

## Most significant national actors

### Waste wood collection and (pre)treatment

Waste wood, and among these also EoL windows and doors are collected and partly also processed in own (pre)treatment facilities by different waste management companies e.g. (not exhaustive):

- FCC Group: [www.fcc-group.eu/en/Czech-Republic/Company.html](http://www.fcc-group.eu/en/Czech-Republic/Company.html)
- Společnost SUEZ Využití zdrojů a.s: [www.sita.cz](http://www.sita.cz)
- Marius Pedersen a.s.: [www.mariuspedersen.cz](http://www.mariuspedersen.cz)
- ECOSERVIS – komplexní nakládání s odpady s.r.o.: <http://www.ecoservis.eu/>

### Use of waste wood

Company **KRONOSPAN** CR, spol. s r.o., Jihlava is the leading manufacturer of wood-based panels.

Also, company **EGGER** uses waste wood, including waste wood from construction and demolition in line with quality requirements for the production of panels.

### 4.3 Denmark

#### Main legal framework, regulations and interpretations

The main legal framework is the Danish Waste Order / Affaldsbekendtgørelsen [DK DWO 2012] and the Danish Environmental Protection Order / Miljøbeskyttelsesloven [DK DPO 2012]. The Danish Waste order includes waste management that is not regulated by other legislation, and waste classification, waste planning, waste regulations, waste management plans, waste data, waste fees, waste disposal, waste labelling, waste disposal, waste review, benchmarking of waste treatment incinerators.

The municipalities have the primary responsibility for household waste management. Recyclable commercial waste is market-exposed, meaning that recyclable materials from non-household sources is to be managed solely by private actors. The municipalities retain oversight obligations for the commercial sector. There are no national EoW criteria set for wooden waste. However, building materials (including doors and windows) that can be reused directly without processing or preparation are legally not defined as waste and therefore not covered by the Waste Legislation, but the Building legislation [Danish waste order, chapter 2, §2].

#### National waste management

The national waste strategy "Denmark without waste, recycle more incinerate less" from 2013 [DK WMP 2013] and the national waste management plan "Denmark without waste, resource plan for waste management 2013-2018" [DK WMP 2014] forms the basis for managing waste management in Denmark.

The municipalities have an important part in the realization of the national waste strategy and plan. Accordingly, an agreement between Local Government Denmark (Danish: Kommunernes Landsforening) and the Ministry of the Environment ensures that the national waste strategy and management plan are implemented at the municipal level. For many companies in the construction industry that work with reuse and recycling, the resource strategy initiatives can mean new business opportunities. The next waste management will be implemented 2020 [DK DOC 2018, New Waste Plan].

The waste hierarchy in Denmark is a priority tool and waste prevention must be prioritized, followed by re-use, recycling and then other recovery. Landfilling is the lowest priority and is therefore to be avoided if it is possible. Waste-producing companies must ensure that the source-separated waste follow the ranking in the waste hierarchy.

There is no specific requirement in the legislation for the sorting of wood (besides impregnated wood), but individual municipalities can set separate regulations on sorting and treatment.

Denmark follows the German legislation on wood waste (A1-A2-A3-A4), and the wood waste is by many Danish municipalities classified into four categories:

- 1. A1 - Clean wood;** untreated clean wood, which is only mechanically processed such as wood packaging, pallets, clean wood from demolition. The fraction may contain smaller amounts of nails, screws and metal fittings but not painting and glue. A1 wood can be re-used in constructions, recycled or used as energy recovery.
- 2. A2 - Painted and surface treated wood;** wooden waste from production, demolition such as windows, doors, plywood, MDF boards, melamine, painted or coated particleboard, other solid wood.  
A2 Wood from production can contain painting, glue and small amounts of metal fittings, nails and screws.  
The wood can be re-used in constructions, recycled or used as energy recovery.
- 3. A3 and A4 - impregnated and treated wood** There are two kinds of impregnated wood: Pressure impregnated wood and vacuum impregnated wood.  
Impregnated wood is normally found in wooden waste from fences, railway sleepers, tele-

phone masts and other outdoor wood products that during use will come into contact with soil. The wood will normally be routed for energy recovery at an approved treatment plant.

In Denmark wooden doors and windows are mainly produced from heartwood from pine trees imported from Sweden, Finland and the Baltic countries. A minor part of the imported wood is sapwood and other hard wood types, which has been vacuum impregnated. However, as a rule Denmark differentiates from e.g. Sweden and Norway by largely having phased out the pressure vacuumed wood [DK Industry interview 2018].

Wood and wooden waste, for instance doors and windows from demolition and renovation sites are generally sorted and then collected by a transporter, then prepared for re-use, recycling, shredded and used as plywood or delivered at an incinerator and used for energy recovery.

Before demolition or renovation work is started, the developer must undertake a screening in order to assess whether buildings or structures (e.g. bridges) contain PCB. The screening requirement applies to all buildings and structures that are built or renovated in the period from 1950 to 1977, demolition or renovation work that concerns more than 10 m<sup>2</sup> or produces more than 1 tonne of waste.

If the initial screening indicates that there is a risk that the building or structure - including double glazing - can contain PCB, the developer must undertake a mapping of the parts of the building that may contain PCB. The result of PCB-screening or mapping must be notified to the municipality no later than two weeks before the demolition or renovation begins. The notification must also include information on the amounts of waste and waste types, with and without PCB, produced by the demolition or renovation work as well as information on how the waste will be handled.

#### **Legal provisions - reuse and preparation for reuse**

It is difficult to determine when construction and demolition waste, such as windows and doors, is sorted correctly and non-polluted. Because of that uncertainty it is difficult to re-use doors and windows. The rules for classification of waste are quite complex. The responsibility for the classification of waste lies with the municipalities, and they make individual assessments based on the material at hand.

Double-glazed windows must be removed and manually separately (re-used, prepared for re-use or recycled, and if that is not possible otherwise follow the waste hierarchy). Sorting on-site may be omitted if the total amount of waste from the construction and demolition operation in question is less than 1 ton, or if the physical conditions render on-site sorting impossible. In those cases, sorting may take place at a stationary sorting facility approved by the municipality.

To re-use a window or door in a new building, the window or door must meet the requirements of the building regulations. In practice this means that for windows or doors, there must be a calculation, which shows the energy requirements for the window or door itself are met.

In Denmark some projects focusing on increasing re-use in building industry have been given permission to use old windows in new buildings. As a rule, the energy demands always needs to be met, but the municipalities can give dispensations. For resale of old products, the technical features may be broken. Responsibility for the technical features of the products must be assigned, but it is unclear where the responsibility lies.

CE-labelling of exterior windows and doors is mandatory in Denmark [DK CPR 2011]. In order for a product to obtain the CE-labelled, the products need to fulfill the harmonized standards. Interior doors are not currently CE-labelled, but it is expected that this will become a requirement within the next 1-2 years.

Manufacturers today produces product industrially and constantly strive to optimize production and make it more efficient. Restoration of old windows and doors will pull in the opposite direction, because it is costly to rearrange the production.

A clear legal framework for re-use of construction waste can be a catalyst for increasing re-use of windows and doors. It is the responsibility of the building owner to ensure that the building always

legally meets the requirements of the building regulations.
<b>Legal provisions – recycling</b>
<p>Currently most wooden waste for recycling is recycled into particle boards. Other recycling alternatives are niche options.</p> <p>70% of the particle boards are made from wooden waste from demolition or from local recycling centers.</p>
<b>Legal provisions - recovery (incineration with energy recovery)</b>
<p>If a municipality has an agreement with a company regarding the management of wood waste prior to recycling, incineration or disposal, the municipality must in the agreement ensure that the company documents that the waste is delivered to a facility that can recycle, incinerate or landfill wooden waste.</p> <p>Incineration of combustible waste is permitted only at approved plants. Impregnated and PCB containing wood is incinerated at waste incineration facilities with permits for hazardous waste incineration.</p>
<b>Legal provisions - landfilling</b>
<p>Since 1997 there has been a ban on landfilling of waste suitable for recycling or incineration in Denmark.<sup>8</sup></p>
<b>Legal provisions – product regulation</b>
<p>There is no specific legal product regulation regarding wooden waste.</p> <p>To use an old window or door like a new window or door requires proof of its ability to match current energy requirements from the Building Regulations. However, municipalities can give a dispensation for this requirement. It is easier to reuse interior doors, if they are not fire doors or soundproof doors.</p> <p>Paint products used for the surface treatment of windows and doors which contain biocidal products are regulated by the EU regulation No 528/2012 of May 2012 [DK BP 2012] and requires approval by the Danish Environmental Protection Agency.</p> <p>The wide use of heartwood as opposed to sapwood in the Danish windows and doors industry means that the wood requires less biocides and fungicides. This is in Denmark formalised into the 2-Øko system.</p> <p>The Danish Lead Ordinance bans the import and sale of products containing lead [DK LO 2009]. The ordinance has been in place for many years, but older windows and doors painted with paint containing lead would be banned from resale.</p>
<b>Relevant national guidelines</b>
<p>See section “National waste management”.</p>

<sup>8</sup> Fischer, C. 2012. From land filling to recovery – Danish waste management from the 1970s until today.



## General policy developments

The next national waste plan is due by the beginning of 2020. It originates from EU's revision of the 6 directives. It will contain a revised version of key definitions, it will define how to calculate recycling, increase focus on prevention at all stages of the value chain and introduce new reporting requirements for recycling.

By 2020, the way we perceive recycled waste will change. Today, recycled waste is registered as recycled after collection and before sorting. By 2020 recycled waste will be registered after sorting and before reprocessing.

On June 7, 2017, the Government Advisory Board published 27 concrete recommendations to strengthen Denmark's transformation into circular economy [DK Advisory Board recommendations 2017]. The building and construction sector is one of three priority sectors. It has not yet been clarified how these recommendations will be included in the forthcoming national legislation and waste strategy.

Some of the relevant recommendations for EoL wooden doors and windows:

- **Develop a circular building regulation**

From 2020 an information requirement will be introduced for all new buildings, with information about material content, the amount of reused, recycled and recyclable materials, as well as the amount and number of unwanted substances included in the building. From 2020, a voluntary sustainability class should be introduced, which will form the basis for a compulsory sustainability class from 2025<sup>9</sup>.

- **Develop standardized building and product labels**

It is recommended that a standardized digital building label should be developed, as well as a product database for suppliers with digital information sheets for construction products. In addition, Danish Standard (Danish: Dansk Standard) must work to establish and operate a secretariat for developing an international standard for product labels.

## National data availability, waste statistics and data quality

There are currently no specific waste statistics concerning wooden waste from doors and windows.

## Treatment in reality

In the recycling area, treatment is often ensured by the municipality having entered into agreements with private recycling companies. Most types of waste that are being recycled are reprocessed abroad, but there are several Danish companies - both public and private - who sort and pre-treat the waste before exporting abroad.

Used windows and doors from private houses often ends up at a local recycling centre.

Windows often contain a number (production year) indicating if it may contain environmentally hazardous toxins, such as PCB. On doors it is not possible to see this number as they do not necessarily contain glazing.

The windows and doors may contain some environmentally hazardous toxins that remain undiscovered due to the lack of screening before disposal. Contaminated windows and doors are not sorted out, if they are delivered as clean doors and windows.

[DK Industry interview 2018]

The C&D waste materials are sorted, and wooden doors and windows are removed either whole, or individually as the glass and wood fraction. Newer energy labelled windows can be sold for recycling, but the older windows without energy labelling cannot. The customers of the demolition

industry are primarily the commercial sector, but also household clients. Waste from both are handled as commercial waste and are disposed of after demolition and renovation activities for further processing as directed by the municipality.

All glass is routed for recycling. One recycling company is ISOVER, that processes the glass waste into glass wool insulation. Not all of the received window units is recycled, as the metal fraction from the double-glazed thermal windows is removed and not recycled.

The wood fraction from doors and windows will, if it is painted or impregnated, be sent to incineration with energy recovery or special thermal destruction. Pure wood is sorted for recycling where it is broken into wood chips and prepared for chipboard or OSB boards. The process does not distinguish between interior and exterior doors and windows. Another minor recycling option is that wood chips can be utilized in soil purification processes as structural materials that provide the oxygen-rich conditions necessary for the purification process. The wood can be used several times before eventually incinerated.

Denmark is currently facing a challenge as there is more clean wood on the market than recycling capacity. The only alternative for this excess clean wood is incineration.

However, the industry also reports issues with lack of incineration capacity for the clean wood. The reason for this is apparently because Danish incinerators can make more profit by importing mixed waste from abroad. The import of mixed waste is however, expected to decline because of Brexit and because the UK is in the process of establishing their own incineration facilities.

As a consequent of lack of national recycling and incineration capacity, the demolition industry occasionally exports wood waste for incineration to Germany when the market is favourable. In addition, the wood waste can also be sold to Danish wood pellet producers selling wood pellets for energy purposes in Denmark, Germany and Poland. This outlet is expected to increase due to the summer's drought, which has resulted in less straw production for energy purposes.

In Denmark, there is specific requirements for sorting wood waste containing PCB and chemical pressure preservation. If the wood fraction contains too much PCB, lead or zinc, it is sent to incineration either at an incineration facility or a specialized plant, such as Fortum's facility. The hazardous waste limit value decides whether the waste is subjected to conventional incineration with energy recovery or specialized incineration facilities like Fortum's. Economically, it is 5-6 times more expensive per tonne to use Fortum's facility than a conventional incineration facility with energy recovery. A few incinerators in Denmark are not eligible to receive PCB contaminated wood due to inability to clean the dioxins formed during PCB combustion. PCB contaminated materials can also be exported to the Netherlands, where there also is a specialized incineration facility similar to Fortum's, but cheaper.

For construction waste in general the industry estimates that only about 2% is subjected to incineration with energy recovery, 3% to landfill, 94% to recycling and 1% reused. For wood waste from C&D activities, it is estimated that 5% is reused, 20% recycled, 75% incinerated with energy recovery and 0% landfilled.

## Most significant national actors

### Industry

- The Association of Danish Window Manufacturers (Danish: Vinduesindustrien)
- Association of Danish Wood and Furniture Industries (Danish: Træ- og Møbelindustrien)
- The Association of Danish Door Manufacturers (Danish: Foreningen af Dørproducenter)
- VELUX

**DAKOFA:** Founded in 2012. Network for key actors involved in construction and demolition waste. DAKOFA facilitates conferences, courses, networks, and working groups on construction and demolition waste management, trends, legalization and more.

The network aims to bring up future key focus and priority areas related to management of construction and demolition waste.

**Genbyg:** The biggest online shop for used materials. Especially doors and windows. See more on their website: [https://www.genbyg.dk/brugte\\_vinduer/](https://www.genbyg.dk/brugte_vinduer/)

**Lendager UP:** is a Danish architect firm who provides recycling building materials including doors and windows. <https://lendager.com/upcycle/upcycle-traepanel/>

**Bango A/S:** Shop for new and used doors and windows. <https://www.bango.dk/>

**Kingo Karlsen A/S:** Demolition company. <https://www.kingo.biz/>

**Tscherning A/S:** Demolition company. <http://tscherning.dk/>

## 4.4 France

### Main legal framework, regulations and interpretations

The legal framework for waste management in France is based on the following regulations:

1. Articles L. 541-1 to L. 541-50, Environment Code
2. Articles R. 541-7 to R. 541-97, Environment Code

Article L. 541-1 states the fundamental principles of waste legislation as:

1. Preventing and reducing the production and harmfulness of waste by acting at the stages of the design, manufacture and distribution of substances or products and promoting reuse;
2. Implementing the waste management hierarchy following this order:
  - Prevention,
  - preparing for re-use,
  - recycling,
  - other recovery (e.g. energy recovery from incineration and pellet production)
  - disposal, landfill;
3. Ensuring that waste management do not endanger human health and harm the environment;
4. Organizing transport of waste to limit it in distance and volume.

Any professional waste producer or waste holder:

- Is responsible for its management in accordance with the law, until its final disposal or recovery;
- Must ensure that the operator collecting, transporting and/or treating its waste is duly authorized for such activities;
- Must respect the waste management hierarchy, except in the following two cases:
  - for certain types of waste, when it is included in the national or a regional waste management and prevention plan,
  - if it can be justified based on the environmental and health impacts, along with technical and economic conditions;
- Can only dispose to landfill "ultimate waste", which means that the waste is no longer likely to be re-used or recovered in the current technical and economic conditions, by extracting the valuable part or by reducing its polluting or dangerous nature [FR, Art. L. 541-2 to L. 541-2-1, Environment Code].

French legislation does not provide a specific legal framework for the management of EoL wooden windows and doors. For example, no Extended Producer Responsibility (EPR) has been implemented. Consequently, manufacturers of doors and windows are not responsible for management of their products when they become waste.

However, the following regulations are relevant for EoL wooden windows and doors:

#### 1) *Classification*

The European Waste Catalogue codes is transposed into French law through article R. 541-7 of Environment Code. Most relevant waste codes for EoL wooden windows and doors fall under chapter 17 for construction and demolition waste (including renovation activities).

#### 2) *Ban of waste burning in the open air*

Waste burning in the open air is banned by the departmental regulations for health. On-site burning is only permitted for materials contaminated with termites or other wood-eating insects. Such operation must be declared notified to the mayor [FR, Art. L. 133-5 and R. 133-5, Building and Housing Code].

#### 3) *Waste sorting and separate collection*

Producers and holders of paper, metal, plastic, glass and wood waste must sort and collect

separately these 5 types of waste to promote their re-use and recycling [FR, Art. D. 543-278 to D. 543-284, Environment Code]. This requirement applies from 1 July 2016 to producers and holders whose waste are collected by:

- a private contractor, or
- the public waste collection service but in quantity above 1,100 litres per week (the five types of waste taken together).

For example, a carpentry company whose waste is collected by the public service and which produces 3 m<sup>3</sup> of wood waste per week must comply with the requirement. The same applies to a construction and renovation company using private contractors to manage waste produced on its worksites.

Paper, metal, plastic, glass and wood waste can be stored and collected either separately from each other, or wholly or partly mixed with each other. Then, the producer or holder can:

- carry out the recovery of waste herself;
- sell or give waste to the operator of a recovery or recycling facility;
- sell or give waste to an intermediate operator (collector, carrier, dealer and/or broker) with the aim of recycling or recovering it.

#### 4) *Waste survey prior to demolition*

Prior to demolition of one or the other of the following buildings, the project owner must conduct a survey of the waste resulting from the work:

- Buildings with a gross floor area greater than 1,000 m<sup>2</sup>;
- Buildings used for agricultural, industrial or commercial activity in the presence of hazardous chemical substances [FR, Art. R. 111-43 to 49, Building and Housing Code / Ministerial order dated 19 December 2011].

The survey must provide:

- nature, quantity and location of building materials, products and equipment;
- estimation of the nature and the quantity of materials, products or equipment which can be re-used on the site;
- identification of the waste management channels;
- estimation of the nature and the quantity of waste resulting from the demolition intended to be recovered or disposed.

At the end of the demolition work, the project owner is required to prepare a checking form mentioning the nature and the quantity of, firstly, the materials re-used on the site, secondly, the waste recovered or disposed.

This checking form ([https://www.formulaires.modernisation.gouv.fr/gf/cerfa\\_14498.do](https://www.formulaires.modernisation.gouv.fr/gf/cerfa_14498.do)) must be sent to the National Environment and Energy Management Agency (ADEME) which presents an annual report on the implementation of the regulation to the Minister for the Ecological and Inclusive Transition. Online declaration is also possible: <http://www.diagnostic-demolition.ademe.fr/demolition/>

Materials such as wood and glass and products as windows and doors must be considered for that diagnosis.

According to ADEME, this obligation is not respected by project owners for different reasons: project owners are not aware of it, they don't anticipate enough, surveyors are not competent enough and the regulatory instrument is not accurate.

There is clearly a need to make this obligation more relevant and to convince the project owners of the usefulness and their economic interest of such waste surveys. Today, it's more perceived as a constraint, as another survey among others (asbestos etc.).

5) *Distributors' take back system for waste of building materials, products and equipment*

From 1<sup>st</sup> January 2017, any distributor of building materials, products and equipment intended for professionals, who operates a store with a surface area of at least 400 square meters and with an annual revenue of at least 1 million euros, must provide a take back service for waste resulting from the same types of building materials, products and equipment that it sells to professionals [FR, Art. R. 543-288 to 290, Environment Code].

The take back service must be carried out on site or within a maximum area of ten kilometres around the store. In that case, the address of the take back point must be posted in the store and displayed on the website of the distributor.

Federation of the recycling players in the building industry (SR BTP) is involved in the implementation of the distributors' take back system. Distributors of building materials, products and equipment intended for professionals make use of the waste platforms of its members as take back points.

6) *End-of waste criteria*

Waste treatment facilities intending to turn a waste into a material or object legally considered as a product must make a request to the minister for the Ecological and Inclusive Transition, using the Cerfa 14831 form.

([https://www.formulaires.modernisation.gouv.fr/gf/cerfa\\_14831.do](https://www.formulaires.modernisation.gouv.fr/gf/cerfa_14831.do)).

The request can concern a category of waste or a specific waste. The Minister decides on the request and sets the criteria for leaving the waste status (possibly for a fixed term) by ministerial order. In every instance, the operator must implement a quality management system to ensure compliance with the end-of-waste criteria required [FR, Art. D. 541-12-4 to D. 541-12-14, Environment Code / Ministerial order dated 19 June 2015].

This national procedure does not apply when end-of-waste criteria have already been fixed by a European regulation (e.g. *regulation n° 1179/2012 of 10 December 2012 establishing criteria determining when glass cullet ceases to be waste*).

## National waste management

### 1) Waste management plans

Minister for the Ecological and Inclusive Transition establish a national waste prevention plan (NWPP). This plan is reviewed every six years and, if necessary, updated [FR, Art. L. 541-11, Environment Code].

NWPP:

1. Prepares national objectives and guidelines of waste prevention policies;
2. Inventories of preventive measures implemented;
3. Assesses the impact of the implemented measures on the design, production and distribution of waste-generating products, as well as on the consumption and use of these products;
4. States preventive measures that must be pursued and new measures to be implemented;
5. Draws up indicators associated with waste prevention measures.

NWPP must deal with the special issue of wood material and the need to coordinate the management of wood waste and wood products. It must highlight the conditions under which wood waste, in particular from the Extended Producer Responsibility (EPR) chains (e.g. packaging, furniture) can be reused as raw materials [FR, Art. L. 541-11-2, Environment Code].

This last requirement was introduced in the Environment Code by the Act of 17 August 2015 on energy transition for green growth, after the adoption of the current NWPP 2014-2020. Indeed, the NWPP 2014-2020 does not incorporate specific measures for wood waste.

On the other hand, NWPP 2014-2020 identifies construction and demolition waste as one of its priority areas. Four major measures have been decided:

1. Implementation of a specific awareness-raising campaign for project owners;
2. Creation of a charter of voluntary commitment for the building sector to encourage waste prevention;
3. Identification of the levers of action to develop the re-use of materials in the building sector;
4. Assessment of the regulation mentioned above related to demolition diagnoses, to amend it if necessary.

For now, none of these measures leads to concrete legal actions or incentive programs.

In addition to NWPP, French regions must establish a regional waste prevention and management plan (RWPMP) [FR, Art. L. 541-13 and R. 541-13 to R. 541-27, Environment Code].

Developed by the president of the regional council, RWPMP must:

- Establish a picture of the prevention and management of waste in the Region (inventory of waste, description of existing measures of prevention, description of the organization for waste collection, survey of existing facilities);
- Present a six-year and twelve-year prospective study of trends in the quantity of waste produced in the territory, integrating foreseeable demographic and economic trends;
- Set regional objectives in terms of prevention, recycling and recovery of waste;
- Include a regional plan of actions to promote circular economy.

RWPMP must provide specific objectives and measures for construction and demolition waste, especially to organise the collection and take-back network [FR, Art. D. 541-16-1, Environment Code].

So far, RWPMP is still under development in the 13 metropolitan regions and 4 overseas regions of France.

As long as the RWPMP is not adopted, former local plans for hazardous waste, non-hazardous waste and construction and demolition waste remain applicable. Regarding construction and demolition waste, former plans were elaborated at the department level by the prefect between 2000 and 2010, then by the president of the department council between 2010 and 2015.

Based on a brief review of a sample of these former plans, it seems that none of them incorporate specific measures for EoL wooden windows and doors.

However, French national and local waste plans are not prescriptive. Only the operation permits delivered to waste facilities must be consistent with those plans. Other provisions intended for promoting re-use, recycling or recovery of waste are more policy trends or declarations of intent.

SR BTP contributes to the elaboration/development of the regional waste prevention and management plans (RWPMP). SR BTP is a member of the working groups dedicated to construction and demolition waste, and a member of the decision-making committee with advisory status. SR BTP uses this lever of action to promote its members which are locally set up and to contribute to develop waste management platforms on a local level.

## *2) Wood waste classification and treatments*

Wood waste management is based on three categories of wood waste:

- Class A wood: Unpainted and untreated wood, such as pallets, planks, packaging;
- Class B wood: Treated with low-concentration chemical additives to help preserve it. It might be painted and glued;
- Class C wood: Treated and hazardous, including creosoted wood for railway sleepers and wood treated with CCA (Copper, chrome, arsenic) such as electric poles.

Once checked, sorted, milled and processed into chips, class A wood can be recycled as biomass fuel for industrial combustion plants or district heating systems.

Class B wood can be:

- recycled as raw material for the manufacture of wood-based panel,
- incinerated with energy recovery,
- used as alternative fuel in cement industry.

Class C wood can be incinerated with energy recovery or used as alternative fuel in cement industry.

In practice, EoL wooden windows or doors are classified B or C, most likely B.

It is worth noting that classification A, B and C of wood waste is not a regulatory classification. It is more common practice within the sector. ADEME and SR BTP agree that this classification should be more detailed. The Class B-wood category is too large and covers different types of wood waste that need to be managed separately. A new classification is under preparation under the supervision of the National Council for Industry (CNI). The aim is to characterize more precisely Class B-wood to select the right route for each type of waste. The German classification is taken as an example and a benchmark.

## *3) Separate collection of finishing work waste (DEMOCLES Project)*

According to ADEME, rehabilitation and demolition of buildings in France generates more than 10 million tons of finishing work waste (FWW), including doors and windows, with a recovery rate below 35%, while most of FWW could be re-used, recycled or recovered under feasible technical and economic conditions.

Launched at the end of 2014, DEMOCLES is a 2 years collaborative project involving more than



40 French stakeholders of building sector: Ministry of Economy, Ministry for the Ecological and Inclusive Transition, ADEME, building owners, project managers, demolition companies, waste management companies, building materials and equipment manufacturers.

The aim of DEMOCLES was to study with a pragmatic approach what to do to increase FWW recycling and recovery without increasing projects global cost, nor administrative burdens. Six renovation/demolition projects (residential, offices, hotel...) have been accurately followed and about 20 projects feedback analysis have been performed.

The main issues for the lack of recovery identified by DEMOCLES project are:

- Will/knowledge from building owners and projects managers;
- Coordination between all actors;
- Knowledge about what can be operationally recycled or not;
- Appropriate packaging to allow FWW proper recovery;
- Transparency in waste traceability.

DEMOCLES conclusions to increase FWW recovery rate are the following:

- Switch from the exclusive responsibility of demolition companies to a responsibility shared by all actors, starting with building owners;
- Building owner/client must express their will to achieve re-use/recycle/recovery targets at the very beginning of the project;
- Project manager must:
  - Conduct a pre-demolition audit to evaluate, before the selection of demolition contractor, the quantity and quality of each waste stream generated by the building refashioned or demolished (Mandatory in France for substantial demolition works as mentioned above),
  - Provide to demolition contractors competing for the contract, the pre-demolition audit for relevant demolition works quotation,
  - Set a waste management plan;
- Demolition contractor must:
  - Be equipped with all necessary tools/skills to remove and dispose FWW in a safe manner;
  - Use appropriate containers/packaging to allow recovery, as FWW collected in bulk with a dumper truck will never be sorted and recycled.

In November 2017, several major building owners (*Bouygues Immobilier, Foncia IPM, Paris Habitat, SNCF, Société du Grand Paris...*) officially committed to implement the recommendations of the methodological guide produced within the DEMOCLES platform to integrate the prevention and management of construction waste in their renovation/demolition work contracts.

ADEME considers that this commitment by several major building owners is a good sign, as project owners' involvement is a key lever of action. It is important to raise awareness among them. Nevertheless, ADEME believes that project owners are not ready to act at any cost. The difference in cost between sorting, recycling, recovery and landfilling should be more significant.

SR BTP also considers that project owners play a big part in the efforts of improving collection and segregation of construction and demolition waste to limit landfilling. For SR BTP, nothing can happen without them. It is their responsibility to incorporate waste management in their technical specifications. It is through their environmental clauses that the candidates who respond to their request for proposal will look for waste recovery and recycling routes.

SR BTP finds it difficult to convince the project owners, whose argument is often the same: it is more expensive to sort and collect and recover/recycle the different types of waste, than landfilling them. Even if it is not necessarily true, it is not easy for SR BTP to prove it can be the opposite.

## Legal provisions - reuse and preparation for reuse

French legislation distinguishes between the following two concepts:

- Re-use ("Réemploi"): any operation by which substances, materials or products that are not waste are used again for the same purpose for which they were conceived (same concept as WFD, Art. 3)
- Reutilisation ("Réutilisation"): any operation by which substances, materials or products that have become waste are used again [FR, Art. L. 541-1-1, Environment Code].

According to ADEME:

- Re-use is the operation by which a product is given or sold by its holder to another party who intend to give him a second life. In that case, the product does not become waste at any time. In this sense, re-use contributes to waste prevention;
- Reutilisation falls under waste management: the holder discards its used product without giving or selling it to an organisation committed to re-use. Used product takes the waste status and undergoes "preparation for re-use" to regain its product status, in accordance with the end-of-waste criteria.

EoL windows and doors could be re-used or prepared for re-use, depending on the specific case.

Considering the third measure of NWPP 2014-2020 mentioned above, ADEME has conducted a specific study entitled *"IdMinistry of Industry to initiate a voluntary take back entification of the constraints and levers for the re-use of construction products and materials"* (April 2016).

141 practical cases of re-use/reutilisation have been reviewed. In the end, 16 interesting study cases were selected and subject of OPTIGEDE Sheets (OPTIGEDE is a platform for exchange and dissemination of tools and feedback on waste prevention and management). For example, one of the selected study case concerns the reutilisation of windows as display supports on building's facade: <http://optigede.ademe.fr/fiche/reemploi-de-fenestres-pour-revetement-de-facade>

The main findings based on these 16 study cases were the following:

- Re-use/Reutilisation practices in the building sector are not very developed. They are mainly experimental projects aimed at demonstrating the feasibility of re-use or projects with minor technical constraints;
- Re-use/Reutilisation practices are facilitated by project managers or clients who are aware of the environmental issues;
- The status of re-used materials/products, as well as the financial aspects were not issues for the cases studied;
- Resource centres dedicated to construction materials and products are struggling to sale place their products with professionals. For the managers of these structures, this mistrust is related to the ten-year warranty issue, professionals fearing that they will not be covered if they use reclaimed products.

According to ADEME and SR BTP, reuse of wood waste is a niche market in France. ADEME admits that reuse is not simple, as it requires:

- anticipation to identify the opportunities of reuse before the beginning of the demolition or refurbishment works and to find a potential buyer of the material;
- a strong preliminary analysis to characterize the performance of the material, considering the legislation and standards that are applicable to the product;
- ADEME noted the recent launch of several platforms that could accelerate the development of waste reuse in the next few years. In addition to Solibat and Recyclo'Bat;
- Cycle up (<http://www.cycle-up.fr>) is a platform aggregating a community of suppliers and buyers for the reuse of construction of building materials;
- Batidon (<http://batidon.com/>) offers construction industry an economic solution to

evacuate their surplus and waste in the form of donations to associations.

In addition, ADEME underlines the fact that challenges are different for windows and doors. Interior doors could be more easily reused, as they did not suffer significant deterioration. Yet, there are still technical constraints, as reused doors do not comply with quality standards. Windows are usually more deteriorated and cannot comply with the new thermal regulations' requirements. Consequently, windows can only be reused as another product. For example, the ReQualif's program, supported by ADEME, tries to develop reuse of wood from windows for manufacturing other products such as window boxes, sawhorses or wooden floor.

### Legal provisions – recycling

#### 1) *End-of-waste criteria*

The end-of-waste criteria of article 6 WFD are implemented into French law through article L. 541-4-3 of Environment Code. Waste ceases to be waste when it has undergone a recovery operation, including recycling or preparation for re-use, in a waste treatment facility and meets criteria fulfilling all the following conditions:

1. The substance or object is commonly used for specific purposes;
2. A market or demand exists for such a substance or object;
3. The substance or object fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products;
4. The use of the substance or object will not lead to overall adverse environmental or human health impacts.

These criteria are set by European regulations or by ministerial orders at national level. So far, very few end-of-waste ministerial orders have been issued in France. Neither of them, nor public requests still under review, are related to EoL wooden windows and doors. Yet, it is worth noting the ministerial order dated 29 July 2014 which sets the end-of-waste criteria for wood packaging shreds used as biomass fuel.

**Note:** Based on jurisprudence, and according to a notice published in the Official Journal of 13 January 2016, French authorities officially distinguishes between:

1. "*Explicit end-of-waste procedure*" (described above) which is mandatory for materials resulting from waste treatment facility to leave their waste status
2. "*Tacit end-of-waste recognition*" which applies to production facility using waste as a substitute for raw materials. Substance or article manufactured with the use of waste implicitly leaves the waste status on conditions that it remains similar to the substance or article that would have been produced without the use of waste and complies with product regulations (such as REACH or POP regulations).

Wood-based panel manufacturers using waste wood as raw materials benefit from this "*tacit end-of-waste*".

## 2) Recycling facilities

As classified facilities for the protection of environment (ICPE), wood waste treatment facilities must be operated in compliance with the requirements of their operating permit.

Such facilities are subject to notification or authorisation under the following items of the ICPE nomenclature:

Item	Activities
2714	Transit, grouping and/or sorting of non-hazardous wood waste
2718	Transit, grouping and/or sorting of hazardous wood waste
2790	Treatment of hazardous wood waste other than burning or landfill (e.g. sieving, grinding...)
2791	Treatment of non-hazardous wood waste other than burning or landfill (e.g. sieving, grinding...)

Commonly, operating permits regulate:

- Waste acceptance criteria and procedures,
- Treatment processes and techniques,
- Quality of materials resulting from treatment and possible future usages of them.

Wood-based panel facilities are subject:

- to notification or registration under item# 2410 of the ICPE nomenclature,
- to authorisation under item #3610 when the production capacity exceeds 600 m<sup>3</sup> per day.

Facilities classified under item #3610 are subject to the provisions of the IED Directive and the implementation of the best available techniques (BAT). Decision n° 2015/2119 of 20 November 2015 of European Commission establish the BAT conclusions for the production of wood-based panels. According to the BAT n° 2, operator must apply a programme for the quality control of recovered wood used as raw material, in particular to control pollutants such as As, Pb, Cd, Cr, Cu, Hg, Zn, chlorine, fluorine and PAH.

## 3) Product regulations

Wood-based panels for use in construction must comply with European regulation n° 305/2011 of 9 March 2011 laying down harmonised conditions for the marketing of construction product. Wood-based panels manufacturer can use harmonised standard EN 13986:2004+A1:2015 – (*Wood-based panels for use in construction - Characteristics, evaluation of conformity and marking*) to demonstrate their products are compliant.

Unlike construction products, marketing of furniture is not subject to European harmonised regulation. However, like any product, furniture must not harm the health or safety of individuals under normal conditions of use or in other conditions reasonably foreseeable by the professional [FR, Art. L. 421-3, Consumption code].

## Legal provisions - recovery (incineration with energy recovery)

### 1) Combustion as biomass fuel

Class A wood is considered being biomass fuel for combustion plant classified under item #2910 of nomenclature ICPE. Class B-wood can only be considered being biomass if it does not contain organic halogen compounds or heavy metals, which is not easy to ensure in case of construction and demolition waste.

#### a- Waste wood fuel

Combustion plants using waste wood (other than sawmill coproducts) as fuel are subject to registration under item #2910-B of the ICPE nomenclature. Ministerial order dated 24 September 2013 sets the general requirements for these installations. In particular, wood waste used as biomass fuel must comply with the following limit values:

Compounds	Content limit (mg/kg dry matter)
Hg	0,2
As	4
Cd	5
Cr	30
Cu	30
Pb	50
Zn	200
Cl	900
PCP	3
PCB	2

Fly ashes resulting from the combustion of wood must observe the following limit values (in mg /kg of dry matter):

- Cd: 130
- Pb: 900
- Zn: 15 000
- Dioxins and furans: 400 ng.I-TEQ/Kg.

Atmospheric emissions from biomass combustion must comply with specific limit values regarding sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), dust, carbon monoxid (CO), polycyclic aromatic hydrocarbons (PAHs), non-methane volatile organic compounds (NMVOCs), dioxins and furans, as well as metals.

ADEME and SR BTP underline that ministerial order dated 24 September 2013 is restrictive concerning wood waste that can be used as biomass fuel for combustion plant subject to registration under item #2910-B of the ICPE nomenclature. A very strict segregation of wood waste is necessary to comply with the content limit values. Waste platforms must be able to sort and collect separately unpainted and untreated wood waste for such combustion plant.

ADEME reports that the French Minister for the Ecological and Inclusive Transition is not willing to reduce the requirements considering the air quality issue, as these installations are not equipped with filtration system to burn polluted wood. On the contrary, SR BTP considers that the authorities are attentive to its recommendations to reduce the requirements for combustion plants under item #2910-B, so that this recovery route could more effective. SR BTP believes that the Minister is listening to its arguments, even if it will not be easy to convince it. SR BTP is associating the authorities to its technical studies (combustion test with different batches of wood waste) for that purpose.

*b- Biomass fuel resulting from end-of-waste material*

Combustion plants using biomass fuel resulting from wood waste which ceased to be waste (e.g. wood packaging shreds in accordance with ministerial order dated 29 July 2014 mentioned above) are subject to notification or authorisation under item #2910-A of the ICPE nomenclature, depending on whether their rated thermal input is above 2 MW or 20 MW.

Ministerial orders dated 25 July 1997 and 26 August 2013 set the general requirements for respectively notified and authorised installations. Atmospheric emissions must comply with specific limit values regarding sulphur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), dust, carbon monoxide (CO), polycyclic aromatic hydrocarbons (PAHs), non-methane volatile organic compounds (NMVOCs), dioxins and furans, as well as metals. For authorized installations, operating permit must specify the limit values of compounds allowed in the biomass fuel and the monitoring program.

*2) Incineration with energy recovery*

If waste wood is not classified as biomass, it can still be incinerated or co-incinerated for the generation of energy. This is considered being a recovery operation in France. Two ministerial orders dated 20 September 2002 regulate hazardous and non-hazardous waste incineration and co-incineration installations, such as cement plants.

On 17 January 2018, a green deal ("*Engagement pour la croissance verte*") has been signed by the French Ministry for Environment, the French Ministry for Industry and several project stakeholders (*French Union of Cement Industry, National Union of Demolition Companies, Union of Building Industry Recyclers, Federation of Recycling Companies*) to promote the recovery of construction and demolition waste wood in cement industry.

Consequently, French cement producers plan to increase the use of waste fuels from 44% of the fuel mix to 50% by 2025. To support this initiative, they aim, in collaboration with construction and recycling trade organisations, to increase by 90% the amount of wood waste used in the energy supply of cement plants within 2020 compared to 2015.

According to an ADEME study of 2015, wood waste from construction and demolition work come to 2 200 ktons per year, 500 ktons of which are not recovered but simply landfilled. Green deal plan to increase energy substitution in cement industry by using 80 ktons of the latter every year.

Commitments and actions of stakeholders and French state to reach that purpose are specified in the green deal, which applies to class B and class C waste wood.

According to ADEME and SR BTP, the objectives of this green deal are not ambitious. This is mainly because cement manufacturers can use different types of fuel and are already saturated. In addition, cement industry in France is not growing and usually look for low cost waste. This green deal is more a test, that could be followed by other more ambitious opportunities, if it works.

*Note: Another green deal related to waste flat glass from the demolition and replacement window industry has been signed in November 2017. According to this green deal, the annual amount of waste flat glass is estimated at 200 000 tons, 70 000 tons of which are windows. The aim of the green deal is to collect and source 80 000 tons of waste flat glass by 2025, 50% of which should be recycled in the glass industry. This green deal could also influence other aspects such as eco-design of windows and separation of their components.*

According to ADEME and SR BTP, the green deal related to waste flat glass will have more impact and could generate major changes for the recycling of wood waste from EoL windows. It will help to bypass one of the obstacles to recycling, which is the cost of dismantling windows.

<b>Legal provisions - landfilling</b>
<p>The landfill disposal of waste wood is forbidden in France on basis of article L. 541-2-1 of Environment Code. However, 1.2 million of tons of waste wood are disposed to landfill according to ADEME, 500 ktons of which are generated by construction and demolition works.</p>
<b>Legal provisions – product regulation</b>
<p>At national level, no specific legislation related to products likely to be produced with the use of EoL wooden windows and doors can be noted.</p>
<b>Relevant national guidelines</b>
<ul style="list-style-type: none"> <li>• National waste prevention plan 2014-2020: <a href="https://www.ecologique-solidaire.gouv.fr/sites/default/files/Programme_national_prevention_dechets_2014-2020.pdf">https://www.ecologique-solidaire.gouv.fr/sites/default/files/Programme_national_prevention_dechets_2014-2020.pdf</a></li> <li>• Methodological guide for project owner and project manager to integrate waste provisions in the refurbishment and demolition work contracts (November 2017): <a href="https://www.recylum.com/democles/guide-moa-moe.pdf">https://www.recylum.com/democles/guide-moa-moe.pdf</a></li> <li>• OPTIGEDE platform for exchange and dissemination of tools and feedback on waste prevention and management: <a href="http://www.optigede.ademe.fr/">http://www.optigede.ademe.fr/</a></li> <li>• Technical sheet ADEME - Building waste: <a href="http://www.ademe.fr/sites/default/files/assets/documents/fiche_-technique-dechets-batiment-2017-09.pdf">http://www.ademe.fr/sites/default/files/assets/documents/fiche_-technique-dechets-batiment-2017-09.pdf</a></li> </ul>

## General policy developments

French Prime Minister, Édouard Philippe, presented a new “Roadmap for the circular economy” the 23 April 2018 (<https://www.consultation-economie-circulaire.gouv.fr/la-feuille-de-route-economie-circulaire>). Among the fifty measures inscribed included in this Roadmap, it is worth noting the following objectives:

- Improving separate collection of construction and demolition waste to limit landfill. The implementation of Extended Producer Responsibility (EPR) chains will be one the solutions to be studied;
- Reviewing the current regulatory system concerning “Waste diagnoses before demolition” by mid-2019, to increase the re-use and the recovery of building sector’s waste. The scope could be extended to major refurbishment activities;
- Setting technical guides by 2020 to recognize the performance of re-used materials for construction;
- Establishing by 2018 the list of waste that could no longer be landfilled or incinerated;
- Simplifying the end-of-waste criteria and procedures, especially for the wood sector.

Otherwise, a waste wood plan is under preparation by the stakeholders of the sector under the aegis of the National Council for Industry (CNI). As part of this plan, the wood waste classification is about to be reviewed.

SR BTP is opposed to the implementation of an Extended Producer Responsibility (EPR) in the building sector. SR BTP considers there are too many different types of materials and waste. Waste management platforms of its members also collect waste from the public sector (municipalities). Once it is mixed, they are unable to distinguish waste from the construction sector and waste from the municipalities. In addition, such EPR could also favour the big companies which have the capacity to cover the whole territory, to the detriment of small and medium size businesses. SR BTP would accept it only if it preserves all the initiatives and activities of its members. Finally, SR BTP believes implementing a constraining EPR could slow the willingness of the affected actors.

According to ADEME, the implementation of an EPR is one solution among others. Nothing has been decided yet. It is more a way for the authorities to exert pressure on the building industry and to convince the stakeholders to improve waste segregation and recovery. As a matter of fact, an EPR would be costly to manage.

As a first step, the authorities prefer to encourage voluntary initiatives, like the green deals, and to let the recovery and recycling businesses to organise themselves. DEMOCLES program and other initiatives demonstrate that things are slowly changing. But one question remains: who will pay, as the wood waste recovery and recycling routes are not durably profitable yet? Should it be the raw material supplier? Should it be the distributor?



## National data availability, waste statistics and data quality

Waste statistics are mentioned in the section above.

Data sources are:

- Technical sheet ADEME - Building waste (September 2017): [http://www.ademe.fr/sites/default/files/assets/documents/fiche\\_-technique-dechets-batiment-2017-09.pdf](http://www.ademe.fr/sites/default/files/assets/documents/fiche_-technique-dechets-batiment-2017-09.pdf)
- ADEME Study - Assessment of the wood waste quantities: <http://www.ademe.fr/evaluation-gisement-dechet-bois-positionnement-filiere-boisbois-energie>
- DEMOCLES report (July 2016): <https://www.recylum.com/democles/>
- ReQualif report - Conditions of development of reuse for EoL wooden windows (January 2018)

ADEME considers that knowledge of the construction and demolition waste area can be improved. More specific data concerning the different waste streams, especially for wood waste, could be obtained with the collaboration of the stakeholders. Thus, ReQualif report estimates the number of EoL wooden windows dismantled every year between 5 and 6 million.

## Treatment in reality

According to SR BTP, most of demolishers collect all wood waste in a single skip. For windows, glass is generally broken or mixed with concrete, the wood part is disposed of in the wood waste skip. The latter is then transferred to a waste platform where wood waste is sorted in accordance with the available recovery and recycling routes.

From SR BTP point of view, even if wood-based panel manufacturers and biomass combustion plants are relatively well distributed across the country, wood waste recovery and recycling routes in France are saturated.

Firstly, wooden-panels' manufacturers raise their technical specifications due to the standards applicable to their products. As a result, their need for wood waste is limited and irregular. In addition, their level of demand concerning the quality of the wood involves a rigorous sorting, which means higher costs. No pieces of glass can be found in the wood used by the wood-based panel manufacturers.

Secondly, for the cement industry, waste wood is in competition with other types of waste used as alternative fuels.

Lastly, France lacks industrial combustion plants which could recover energy from treated wood waste burning, given that only unpainted and untreated wood can be considered as biomass fuel for combustion plant. For ADEME, this can be explained by two main reasons:

- there is no financial incentive to substitute gas, fuel oil or coal by wood waste fuel. Fossil fuels remain competitive compared to renewable energies;
- an industrial combustion plant needs to be sure of its fuel supply for 20 years, considering the amount of the associated investment. Yet, construction and demolition recycling players are not ready to provide a regular supply of wood waste at a fixed/similar price for this time frame.

Consequently, a proportion of wood waste is exported for recycling or recovery mainly in Italy and Belgium or landfilled.

According to the ADEME study based on 2012 data (See page 6):

- 3,2% of wooden waste is used as fuel in biomass combustion plant
- 21% is incinerated or co-incinerated with energy recovery
- 56,5% is recycled
- 19,3% is landfilled.

When focusing on demolition and construction waste:

- 34% of wooden waste is used for energy (no distinction between biomass fuel and incineration)
- 43% is recycled
- 23% is landfilled

For SR BTP, waste management platforms are sometimes obliged to landfill wood waste which remains a cheaper option than using other options abroad. SR BTP underlines that its members make this choice reluctantly, as they know wood waste could be recycled or recovered.

Actually as classified facilities for the protection of environment (ICPE), waste management platforms are subject to waste quantities thresholds (or limit values). In other words, they cannot keep large quantities of waste for a long period of time and need to find a suitable disposal route sooner or later.

Both ADEME and SR BTP consider that cost for waste disposal in France is low. Some landfill sites offer very low prices that can discredit the recovery and recycling routes. An increase of taxes on waste disposal or fossil fuels could be a financial booster for recovery routes.

For ADEME, France is in midstream concerning the management of demolition and refurbishment wood waste. There are some positive signs: recovery and recycling routes are technically operational, waste collection is relatively well organised, building owners' commitment is making progress. But, on the other hand, there are still some economical barriers that prevent the recovery and recycling routes to develop as fast as expected.

France has 2 challenges to take up:

- the first one is to improve waste collection and segregation, to separate the different types of materials
- the second one is to set up recovery and recycling routes that are economically viable and stable.

## Most significant national actors

### National authorities:

- National environment and energy management agency (ADEME): <http://www.ademe.fr/en>
- Minister for the Ecological and Inclusive Transition, General Direction of Risk Prevention, Bureau of Waste Planning and Management: <https://www.ecologique-solidaire.gouv.fr/>

### Professional federations:

- Federation of the recycling players in the building industry (SR BTP): <http://recycleurs-du-btp.fr/> and National Federation of demolition contractors (SNED): <http://www.sned.fr/>. Who has the 1<sup>st</sup> of June merged to Federation of demolition, remediation and recycling companies (SEDDRe).
- Federation of building industry (FFB): <http://www.ffbatiment.fr/>
- Wood-based panels manufacturers' Union (UIPP): <http://www.uipp.fr/>
- Windows and doors manufacturers' Union (UFME): <http://www.ufme.fr/>

### Collaborative projects:

- DEMOCLES: <https://www.recylum.com/democles/>
- ReQualif': <http://emmaus-france.org/economie-circulaire-emmaus-presente-ses-premiers-prototypes-issus-de-la-filiere-dechets-du-btp/>

### Web platforms:

- Cycle-up: <https://www.cycle-up.fr/>
- Batidon: <http://batidon.com/>
- Recyclo'Bat: <https://www.recyclobat.fr/>

## 4.5 Germany

### Main legal framework, regulations and interpretations

#### Main legal framework

The following relevant regulations currently apply to the management of EoL wooden windows and doors in Germany:

- Federal Circular Economy Law (Kreislaufwirtschaftsgesetz – KrWG 2012, as amended) [DE KrWG 2012]

KrWG is the central law on waste management and circular economy in Germany, containing fundamental concepts and key definitions and implementing EU Waste Framework Directive.

- Federal Ordinance on Commercial Waste (Gewerbeabfallverordnung – GewAbfV 2017) [DE GewAbfV 2017]

The recently fundamentally revised GewAbfV defines obligations for producers, holders of waste and operators of treatment facilities in the context of wastes produced by commerce, as well as wastes generated in the context of C&D activities.

- Federal Ordinance on waste wood (Altholzverordnung – AltholzV 2002, as amended) [DE AltholzV 2002]

AltholzV applies to separately collected waste wood. The Ordinance introduces different categories of waste wood and defines admissible treatment plus additional criteria for recycling.

#### KrWG

KrWG is the central law on waste management and circular economy, containing fundamental concepts and key definitions and implementing EU Waste Framework Directive. The Law sets out key terms and general responsibilities for producers and holders of waste and hazardous waste in line with what EU law requires.

The key term “discarding” (thus the distinction between waste and non-waste) is further detailed in section 3 of KrWG. We assume that EoL wooden windows and doors would usually be fulfil the definition of waste.

Section 5 of KrWG allows for different actors to set EoW criteria; in absence of specific criteria, it is the task for the owner/holder of material to determine whether it is waste or whether the general criteria of section 5 KrWG (those taken from Article 6 WFD) can be applied. To our knowledge, no specific EoW criteria exist for waste wood, so the question of at what point waste wood destined for recycling loses waste status needs to be assessed alongside the general criteria of section 5 KrWG, while taking into account the requirements of AltholzV (see below).

Waste wood is to be considered as hazardous or non-hazardous according to Federal AVV (the legal document implementing the EU LoW). AltholzV lists relevant LoW entries in its Annex III. In case a mixture of waste wood contains hazardous components, the entire mixture is to be considered as hazardous (section 6 para 4 AltholzV). AltholzV is further described below.

One German particularity is the so-called “handover obligation” whereby municipal solid wastes from households and all wastes destined for disposal are to be handed to public waste management bodies (öffentlich-rechtliche Entsorgungsträger), in line with section 17 of KrWG.

#### GewAbfV

The recently fundamentally revised GewAbfV defines obligations for producers, holders of waste and operators of treatment facilities in the context of wastes produced by commerce, as well as

wastes generated in the context of refurbishment and C&D activities.

Fractions of waste wood occurring during refurbishment and demolition activities must be collected separately according to section 8 para 1 GewAbfV unless, in exceptional cases, it is technically not feasible or economically unreasonable to do so. Few experiences exist with application of that clause, yet it is the expectation of the legislature that separate collection should be the rule, and mixed collection the exception, under the revised GewAbfV.

#### Waste Wood Ordinance

AltholzV regulates the recovery and disposal of waste wood in Germany. The Ordinance dates to 2002, and although amended several times, some parts considered by many to be outdated. The Federal Ministry for the Environment has announced for the upcoming session to evaluate the AltholzV, in particular the regulations on waste hierarchy described below (which were introduced before the 5-step-hierarchy of EU WFD was adopted in 2008).

It applies to separately collected waste woods as defined by the Ordinance (irrespective whether it was generated by bigger demolition sites in huge quantities, on small scale sites, or even waste that would have been collected through separate collection of waste wood as part of bulky waste collection organised in the responsibility of municipalities). AltholzV sets out obligations for producers, owners, operators of waste wood treatment plants, and also public waste disposal companies, in so far as they recycle or dispose of waste wood.

#### Waste hierarchy for waste wood

Producers and holders of waste are obliged to have the waste recovered (disposal should not be the better option under an environmental perspective which in principle need to be assessed alongside sophisticated criteria), in line with sections 6 and 7 KrWG. Regarding the choice between recycling and energy recovery (i.e. incineration), section 8 KrWG allows explicitly for stream-specific Ordinances to determine such ranking. In the German AltholzV, recycling and energy recovery are "ranked" equally in terms of the waste hierarchy, allowing for the choice of the treatment route legally very much a discretion of the waste producer/holder (section 4 AltholzV).

Waste wood is, according to AltholzV, to be classified in the different categories AI to AIV (plus waste wood containing PCB), depending on the content of contaminants and with direct consequences for further treatment. In its Annex III, AltholzV contains examples of usual assignment of the common types of waste wood (see the Table below).

Cat.	Definition	Examples of common types of wood waste [
AI	Waste wood in its natural state or only mechanically processed which, during use, was at most insignificantly contaminated with substances harmful to wood	<ul style="list-style-type: none"> <li>- Cuttings, shavings from solid wood in its natural state</li> <li>- Palettes made from solid wood (e.g. Europalettes)</li> <li>- Boxes for fruit and vegetables</li> <li>- Cable reels made from solid wood (made after 1989)</li> <li>- Waste wood in its natural state from building sites</li> <li>- Furniture, solid wood in its natural state</li> </ul>
AII	Bonded, painted, coated, lacquered or otherwise treated waste wood with no halogenated organic compounds in the coating and no wood preservatives	<ul style="list-style-type: none"> <li>- Boards, planks from interior work (with no harmful contaminants)</li> <li>- Palettes made from derived timber products</li> <li>- Profile boards for the fitting out of rooms (with no harmful contaminants)</li> <li>- Boards, false ceilings, planks from interior work, door leaves and frames (with no harmful contaminants)</li> <li>- Chipboards used in construction</li> <li>- Furniture, with no halogenated organic compounds in the coating</li> </ul>
AIII	Waste wood with halogenated organic compounds in the coating, with no wood preservatives	<ul style="list-style-type: none"> <li>- Other palettes with composite material</li> <li>- Furniture, with halogenated organic compounds in the coating</li> <li>- Waste wood from bulky refuse (mixed)</li> </ul>
AIV	Waste wood treated with wood preservatives, such as railway sleepers, telephone masts, hop poles, vine poles as well as other waste wood which, due to its contamination, cannot be assigned to waste categories AI, AII or AIII, with exception of waste wood containing PCBs	<ul style="list-style-type: none"> <li>- Wood used in construction for load-bearing elements</li> <li>- Windows, window posts, outer doors</li> <li>- Impregnated wood used in external structures</li> <li>- Various wood used in horticulture and landscaping, impregnated garden furniture</li> <li>- Railway sleepers, telephone masts</li> <li>- Various wood used in agriculture</li> <li>- Cable reels made from solid wood (made before 1989)</li> <li>- Ammunition boxes</li> <li>- Waste wood from damaged structures (e.g. burnt wood)</li> </ul>
Waste wood containing PCBs	Wood waste which constitutes waste wood containing PCBs within the meaning of the PCB/PCT Waste Ordinance (PCB/PCT-Abfallverordnung)	<ul style="list-style-type: none"> <li>- Insulating boards and sound insulating boards treated with agents containing PCBs</li> </ul>

EoL doors and windows usually fall under Category AII or AIV, depending on the extent they have been treated with biocides (assumed for windows) and paints (for older windows, Pb- and Zn containing products may have been used) [BAV 2012].

Section 5 of AltholzV defines criteria applied by waste wood treatment operators.

## National waste management

In Germany, there is no national waste management plan; instead, Federal States must prepare regional waste management plans.

In general, EoL wooden doors and windows arise from demolition or refurbishment works. They can be found in waste streams called "waste wood", "construction and demolition wastes" or "municipal wastes". More specifically, the following LoW entries are in particular used for EoL wooden windows and doors:

### Chapter 17 Construction and demolition wastes

- 17 02 01 wood
- 17 02 04\* glass, plastic and wood containing or contaminated with hazardous substances
- 20 03 07 bulky waste (of minor importance)

The most relevant is LoW entry "17 02 04\*"

[DE VFF interview]

It is important to distinguish between windows and exterior doors (usually Category A IV Waste Wood Ordinance) and interior doors (usually Category A II Waste Wood Ordinance). It is estimated that today more than 80% of EoL wooden doors and windows are included in LoW entry 17 02 04\*. However, it is expected that waste amounts falling under LoW entry 17 02 01 will steadily increase in future, because since the 1990s less contaminated windows have been produced and installed (e.g. surface treatment only instead of full impregnation). Under the assumption that the average lifespan of a wooden window is 30 years, more and more of such less contaminated windows that will become waste in future will fall under Category A II Waste Wood Ordinance / LoW entry 17 02 01.

In general, there is a well-established collection system for EoL wooden windows in Germany. During demolition or refurbishment works, (wooden) windows are removed and collected (in containers) on site. In a next step, windows are either directly handed over to recycling / disposal partner or transported to the company premises, further separated by material, and then handed over to recycling / disposal partner. Recycling / disposal partners that are used for wooden windows are companies such as Alba, Remondis, Veolia, or local partners. This collection practice is supported by take-back systems such as Rewindo or A/U/F.

Waste wood from households (small amounts) can be disposed of at civic amenity sites.

## Legal provisions - reuse and preparation for reuse

In Germany, used wooden windows and doors usually would be considered waste and fall under the scope of AltHolzV with the respective approach of different classes and admissible treatment. Under assumption that EoL wooden doors and windows are not re-used and not prepared for re-use and, on the flipside of the hierarchy, are not disposed of at landfills without prior treatment, the decision of a waste producer/holder is between recycling or incineration. Regarding this decision, legally the producer/holder of the waste is granted broad discretion, and criteria are set for material to be used as input for later recycling; this is without prejudice to product-related requirements that material made from recycled material would need to fulfil (see below).

**Legal provisions – recycling**

Section 3 para 1 in conjunction with Annex I AltholzV regulates requirements for recycling. For material recovery (i.e. treatment of waste wood to wood chips for the production of wood products), waste wood of category AI and AII is generally admissible, and waste wood of Category AIII is admissible under condition that paints, and coatings are largely removed (either during pre-treatment or during the recycling process itself). The following limit values (concentration mg/kg dry matter) need to be met for wood chips destined to be used for wood products according to Annex II AltholzV:

As	2
Pb	30
Cd	2
Cr	30
Cu	20
Hg	0.4
Cl	600
Fl	100
PCP	3
PCBs	5

Waste wood treatment operators need to have a system established of internal and external monitoring to ensure that the legal criteria are complied with (section 6 AltholzV).

**Legal provisions - recovery (incineration with energy recovery)**

Section 3 para 2 AltholzV refers for requirements for incineration to the requirements of Federal Emission Control Act (the German law implementing EU's Industrial Emissions Directive) and its statutory ordinances.

No biomass subsidies are granted for waste wood in Germany according to the respective legal act EEG 2017 as currently in force.

**Legal provisions - landfilling**

N/A

**Legal provisions – product regulation**

Not identified.

**Relevant national guidelines**

- Guidelines and studies (Germany and Bavaria)
- BAV Guide to Waste Wood Recycling / BAV – Bundesverband der Altholzaufbereiter und -verwerter e.V., Leitfaden der Altholzverwertung 2012. Available in German & English.
  - Website "Informationsportal zur Abfallbewertung" (IPA):  
--> overview of EU / national / regional regulations and guidelines on waste wood  
[https://www.abfallbewertung.org/reppen.php?&report=ipa&char\\_id=Altholz&lang\\_id=de&avv=&synon=&kapitel=5&gtactive=no&olevels=BY\\_BE\\_DE#S5DE](https://www.abfallbewertung.org/reppen.php?&report=ipa&char_id=Altholz&lang_id=de&avv=&synon=&kapitel=5&gtactive=no&olevels=BY_BE_DE#S5DE)
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[errmuell.pdf](#).

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- Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit (BMU), Leitfaden zur Anwendung der Abfallhierarchie nach § 6 Kreislaufwirtschaftsgesetz (KrWG) - Hierarchiestufen Recycling und sonstige Verwertung,  
[http://www.bmu.de/fileadmin/Daten\\_BMU/Download\\_PDF/Abfallwirtschaft/krwg\\_leitfaden\\_abfallhierarchie\\_bf.pdf](http://www.bmu.de/fileadmin/Daten_BMU/Download_PDF/Abfallwirtschaft/krwg_leitfaden_abfallhierarchie_bf.pdf)

### General policy developments

The German Federal Ministry has announced a possible review of the AltholzV in the coming years.

[DE VFF interview]

- Overall, EoL doors and windows are well managed.
- Wooden windows are environmentally friendly and CO<sub>2</sub>-neutral.
- Increase of recycling of EoL doors and windows not meaningful for several reasons:
  - wood is a sustainable resource --> sustainable forestry in Germany practiced for more than 300 years,
  - waste wood is an important renewable energy source in Germany,
  - recycling processes can also affect the environment in a negative way,
  - wooden windows are used in structural applications – recycled wood / woodchips cannot be used to produce new wooden windows since demanding material requirements are not met.
- Associations such as VFF focus on long product lifetimes and maintaining high product quality; therefore, guidelines and quality labels are developed; see for example <https://www.window.de/fensterverbaende/navigation-kopfbereich/publikationen-shop>
- Currently, there is an on-going discussion about whether requirements for combustion plants should become more stringent: this could affect manufactures in a negative way, e.g. wooden wastes from production processes often are directly used for energy production in the factory – with more stringent requirements, this might be no longer possible and threaten the competitiveness and business of SMEs
- Possibilities for further improvement of management of EoL wooden doors and windows in future
  - Incorporate requirements for proper waste management already in call for tenders for installation of new windows; provide funds and incentives for proper disposal; specification of frame material by contracting body in technical specifications

- Identification of contamination of old wooden windows with asbestos / PCB: initiatives to develop rapid tests that can directly be performed on site would be beneficial to have a sound decision basis how to manage such wastes immediately

[DE waste wood expert interview]

- It must be ensured that contaminants do not enter the chip board production process.
- Recycling is not an option for contaminated EoL wooden doors and windows, except for the glass part.
- In general, re-use/preparation for re-use should be promoted (where possible for EoL wooden doors and windows), also making use of market / platforms for used building material.

[DE BAV interview]

- "UBA Planvorhaben zur Ermittlung des Novellierungsbedarfs der AltholzV" initiated, review of AltholzV expected to start in next 2 years
- BAV position on revision of AltholzV not affecting management EoL wooden doors and windows in particular; BAV position described in EUWID 16.2018 Article "Novellierung der Altholzverordnung steht für den BAV im Vordergrund"
- current study "Altholz Quo Vadis" on waste wood treatment plants in Germany: <http://www.izes.de/de/projekte/altholz-quo-vadis>
- at EU level: reclassification of titanium dioxide under discussion; outcome could affect allocation of e.g. EoL wooden windows / doors to waste wood categories (category A IV instead of category A II)

### National data availability, waste statistics and data quality

Specific waste statistics focusing on EoL wooden doors and windows only could not be identified.

All waste statistics that could be identified usually refer to **construction and demolition wastes** or **waste wood** as a **group** only. The following information could be identified:

[DE UBA 2007]

Generation of waste wood in Germany 2003:

*Tabelle 4-4: Bundesweites Aufkommen an Altholz in den verschiedenen Anfallbereichen*

	Altholzanfall insgesamt		davon separat vorliegend	
	absolut [kt]	Anteil [%]	absolut [t]	Anteil [%]
Siedlungsabfälle	974	12,3	385	7,1
Verpackungsabfälle	891	11,2	229	4,2
Bauabfälle	3.623	45,7	2.348	43,5
Abfälle der Holzindustrie	2.441	30,8	2.441	45,2
Summe	7.929	100,0	5.403	100,0

It is assumed that EoL wooden doors and windows are included in the category "Bauabfälle" (total of 3.6 million tonnes). However, additional / specific information on EoL wooden doors and windows is **not available**.

[DE Döring, Cords, Mantau 2018]

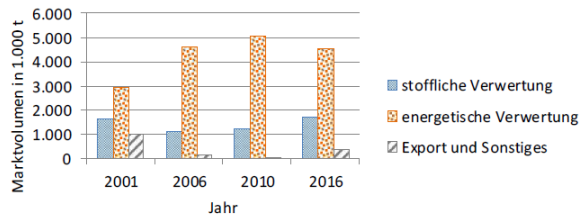
- Data on EoL wooden windows and doors not available
- Waste wood generation in 2016: 6.6 million tonnes (trade volume: 7.7 million tonnes);
- Treatment:

Tab. 15: Stoffliche und energetische Verwertung für 2001, 2006, 2010 und 2016

Nutzungsart	Marktvolumen (Handelsvolumen abzgl. Intrahandel)							
	2001		2006		2010		2016	
	1.000 t	%	1.000 t	%	1.000 t	%	1.000 t	%
stoffliche Verwertung	1.629	29,3	1.098	18,8	1.190	18,9	1.696	25,7
energetische Verwertung	2.923	52,6	4.611	78,7	5.048	80,1	4.525	68,5
Export und Sonstiges	1.008	18,1	147	2,5	65	1,0	380	5,8
<b>Summe</b>	<b>5.559</b>	<b>100,0</b>	<b>5.856</b>	<b>100,0</b>	<b>6.303</b>	<b>100,0</b>	<b>6.601</b>	<b>100,0</b>

Quellen: Siehe Tab. 13.

Abb. 3: Stoffliche und energetische Verwertung für 2001, 2006, 2010 und 2016



[DE UBA 2017]

### Generation of waste wood in Germany 2015:

- total waste wood generation of approximately 11 million tonnes, thereof 64% collected (~ 7 million tonnes)
- EoL wooden doors and windows could be included in the categories "Bau- und Abbruchholz" (collection of approx. 2 million tonnes --> 10% material recycling / 90% energy recovery) and / or "Holz aus Außenanwendungen" (collection of approx. 0.5 million tonnes -> 2% material recycling, 98% energy recovery)

--> additional / specific information on EoL wooden doors and windows is not available.

	Abfall-relevante Menge Altholz	davon zur Verwertung erfasst (2)		davon zur Verwertung exportiert		davon stofflich	davon energetisch
		in kt	in %	in kt	in %		
Verpackungsholz (1)	3.110	63,3	1.970	2,5	50	50	0
Bau- und Abbruchholz	3.040	65,8	2.000	0,0	0	0	0
Holz aus Außenanwendungen	800	62,5	500	0,0	0	0	0
Altmöbel / Sperrgut / Restholz / Sonstiges	4.050	64,2	2.600	0,0	0	0	0
<b>Gesamt - Sollmenge</b>	<b>11.000</b>	<b>64,3</b>	<b>7.070</b>	<b>0,7</b>	<b>50</b>	<b>50</b>	<b>0</b>

	im Inland verbleibt	davon werkstofflich verwertet		energetisch verwertet		beseitigt insgesamt	
		in kt	in %	in kt	in %	in %	in kt
Verpackungsholz (1)	1.920	39,1	750	60,9	1.170	36,7	1.140
Bau- und Abbruchholz	2.000	10,0	200	90,0	1.800	34,2	1.040
Holz aus Außenanwendungen	500	2,0	10	98,0	490	37,5	300
Altmöbel / Sperrgut / Restholz / Sonstiges	2.600	13,5	350	86,5	2.250	35,8	1.450
<b>Gesamt - Sollmenge</b>	<b>7.020</b>	<b>18,7</b>	<b>1.310</b>	<b>81,3</b>	<b>5.710</b>	<b>35,7</b>	<b>3.930</b>

(1) einschließlich Kabeltrommeln

(2) nicht berücksichtigt ist hier Altholz, das von Haushalten und Gewerbe zu Brennholz verarbeitet wird.

[DE BayLfU 2012]

Reference is made to waste statistics as presented in [DE UBA 2007]. In addition, it is stated that the bvse (Bundesverband Sekundärrohstoffe und Entsorgung e. V.) and the VHI (Verband der Deutschen Holzwerkstoffindustrie e. V.) estimate that annual waste wood generation is approx.

8 million tonnes (reference is made to [DE BVSE 2010]).

[DE Destatis 2017]

Official waste disposal statistic – selection of LoW entries 17 02 01 and 17 02 04\*:

- statistic shows total input in waste treatment plants in Germany
- total input in waste treatment plants gives an indication of total waste generation
- it is important to note that these waste statistics do not refer to EoL wooden doors and windows only; the share of these wastes within the different LoW codes remains unclear; overall, Destatis statistics are only of limited value

Input in waste treatment plant	AS 17 02 01 1.000 tons	From within the country	From abroad
<b>Waste treatment plants in total</b>	<b>3,158.1</b>	<b>3,115.4</b>	<b>24.9</b>
Thermal waste treatment plant	2.2	2.2	-
Combustion plant with energy re-covery	400.6	378.0	18.2
Soil treatment facility	0.6	0.6	-
Biological treatment plant	40.9	40.9	-
Mechanical-biological treatment	0.3	0.3	-
Shredding facility and scrap shears	1,803.5	1,789.0	3.9
Sorting plant	577.5	575.4	-
Other treatment plants	293.3	289.8	2.9
Demolition waste treatment facility	36.7	-	-

\*The table does not include waste generated within the facilities. Therefore, values from within the country and abroad do not necessarily sum up to the total values.

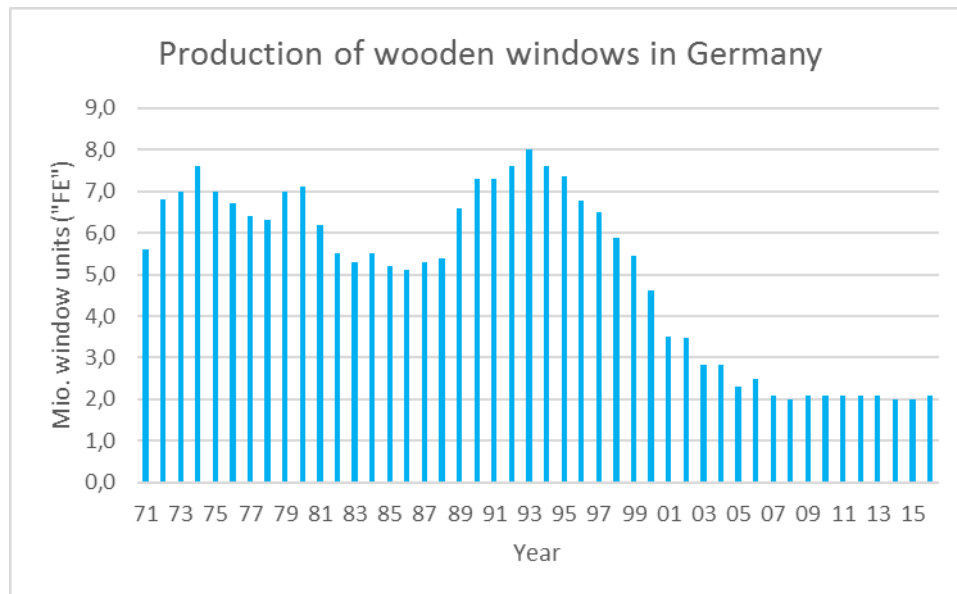
Input in waste treatment plant	AS 17 02 04* 1.000 tons	From within the country	From abroad
<b>Waste treatment plants in total</b>	<b>753.9</b>	<b>661.8</b>	<b>87.2</b>
Thermal waste treatment plant	42.6	20.3	20.7
Combustion plant with energy re-covery	190.6	153.5	37.1
Soil treatment facility	1.1	1.1	-
Physicochemical treatment	0.6	0.6	-
Shredding facility and scrap shears	390.1	362.0	26.9
Sorting plant	94.2	92.2	-
Other treatment plants	32.6	30.1	2.5
Demolition waste treatment facility	1.7	-	-

[DE VFF interview]

Additional insights / information on waste statistics as presented above, i.e. the actual share of EoL wooden doors and windows within general waste wood / C&D waste generation statistics, cannot be provided. Overall, annual generation of EoL wooden doors and windows remains unclear.

An interesting statistic in the context of waste generation that is available at VFF is the "statistic on production of wooden windows since 1971" ("Holzmengen in Fenstern seit 1971 in Deutschland"). The figure below shows amounts of wood included in window production since 1971 in window units ("Fenstereinheiten" FE); one window unit equals 1.69 m<sup>2</sup>. It can be seen that since the beginning of the 2000s, production remains stable at approx. 2 million window units. Under

the assumption that the average lifespan of a wooden window is 30 years, wooden windows that have been installed in the beginning of the 1990s become waste today. In the medium and long-term, waste generation from EoL wooden windows is expected to decrease.



In general, it is important to note that the lifespan of a building usually far exceeds the window lifespan, meaning windows are often replaced several times within a building. Today about 60 – 70% of wooden windows that are installed in buildings replace old windows, whereas 30 - 40% of wooden windows are installed in new buildings.

It is estimated that approx. 10% of the total window surface in a building are exterior doors. Similar information on interior doors is not available.

### Treatment in reality

[DE VFF interview]

It is estimated that more than 90% of EoL wooden doors and windows in Germany is sent to incineration with energy recovery:

- Waste wood category A II (material recycling and energy recovery ranked equally): 90% energy recovery, 10% material recycling
- Waste wood category A IV (energy recovery only choice): 100% energy recovery

[DE waste wood expert interview] and [DE BAV interview] confirm that EoL wooden windows and doors are usually incinerated with energy recovery.

### Most significant national actors

- Verband Fenster + Fassade (VFF): <https://www.window.de>
- BAV – Bundesverband der Altholzaufbereiter und -verwerter e.V.: <https://altholzverband.de>
- Bvse – Fachverband Ersatzbrennstoffe, Altholz und Biogene Abfälle: <https://www.bvse.de/fachverband-ersatzbrennstoffe-altholz-biogene-abfaelle.html>
- VHI - VERBAND DER DEUTSCHEN HOLZWERKSTOFFINDUSTRIE E. V.: <https://vhi.de>
- Gütegemeinschaft Sekundärbrennstoffe und Recyclingholz e. V.: <http://bgs-ev.de>
- BDE Bundesverband der Deutschen Entsorgungs-, Wasser- und Rohstoffwirtschaft e.V.: <https://bde.de>
- Tischler Schreiner Deutschland: <https://www.tischler-schreiner.de>
- Bundesverband ProHolzfenster: <http://www.proholzfenster.de>

#### In general:

- building owner / awarding authority
- refurbishment and demolition companies
- municipal disposal companies
- companies dealing with waste wood
- market / platforms for used building material

## 4.6 Italy

### Main legal framework, regulations and interpretations

#### Main legal framework

The main legal framework for waste management in Italy is provided by the D.Lgs. 3 April 2006, n. 152, "Norme in materia ambientale" and amendments (Testo Unico Ambientale, hereafter TUA), in **Part IV** "Norme in materia di gestione dei rifiuti e di bonifica dei siti inquinati" (provisions on waste and contaminated sites management). The TUA sets the framework in which more specific national and regional regulation is/can be developed.

No dedicated legislation on wooden waste currently exists, at national nor at regional level.

#### Waste hierarchy and legal requirements for treatment

Art. 179 of the TUA contains the requirements for the priorities to be followed in the waste management (waste hierarchy). At paragraph (3) the article states that, *"with reference to individual waste streams, exceptionally, it is allowed to depart from the priority order referred to in paragraph 1 if justified, in compliance with the precautionary and sustainability principle, based on a specific analysis of the overall impact the production and management of this waste both from an environmental and health point of view, in terms of life cycle, and from a social and economic point of view, including technical feasibility and protection of resources"*. In addition, art. 179 (4) reports that *"With one or more decrees (...), the options that guarantee, in accordance with the provisions established from paragraphs 1 to 3, the best result in terms of protection of human health and environment can be identified with reference to individual specific waste streams"*.

Currently, no specific decree or other legal provision is in place which defines the best option to be adopted for the management of wooden waste with reference to the waste hierarchy. This implies that in principle any treatment option could be potentially adopted for wooden waste, if properly justified by specific analysis as reported at art. 179 (3) of TUA and in accordance to the other national/regional legislation in force.

The national law for public contract (grantings; Codice appalti (D.lgs 50/2016) include obligatory policies for GPP (green public procurement). This law for public works also describes new standards for CAM, Criteri Minimi Ambientali: minimal environmental criterion for enterprises and building materials to use in public buildings and works in general. These minimal criterions are topics in the law 221/2015 and described in D.lgs. 50/2016 art. 34.

## National waste management

Other relevant national regulations applicable to the management of EoL wooden doors and windows in Italy comprise the following, clustered by topic:

### Landfilling:

- D.M. 27 September 2010 (amended by D.M. 24 June 2015): identifies the criteria for the eligibility of waste in landfill; D.Lgs. 36/2003: implements the Directive 1999/31/EC on landfills.

### Incineration and energy recovery:

- D.Lgs. 3 April 2006, n. 152 art. 208: most of waste wood energy recovery is performed under these requirements;
- D.M. 14 February 2013, n.22: regulates the EoW criteria for specific types of refuse-derived fuels (Rdf);
  - D.Lgs. 11 May 2005, n. 133: implements the Directive on the incineration of waste and provide requirements for wood waste containing halogenated organic compounds or heavy metals.

### Recycling:

- D.M. 5 February 1998 (amended by D.M. 5 April 2006 n.186): identifies the non-hazardous waste subject to simplified recovery procedures.

At regional level, specific legislation exists which regulates the management of waste in general or of specific waste streams. For instance:

### C&D waste, Veneto:

- D.G.R. n. 1773, 28 August 2012: regulates the operating procedures for the management of C&D waste.

### Waste and Air, Trentino Alto Adige – Autonomous Province of Bolzano:

- L.P. 16 March 2000, n. 8: on air quality;
  - Integrated environmental permit for the thermal waste recycling plant Bolzano of 20.12.2013 Prot. Nr. 698527
- L.P. 26 May 2006, n.4: provincial law on waste management and soil protection.

Waste management planning in Italy is under the responsibility of the regions, as provided for in art. 196 of TUA; no national waste management plan (WMP) is therefore in place.

For the purpose of the present work, 2 out of 20 Italian regions (Veneto and Emilia-Romagna) have been taken into consideration for the search of regional regulation on wooden waste. The WMPs of both regions do not contain any specific requirements for wooden waste, even if it is mentioned as a fraction either of the municipal and the special waste.

Wooden waste from EoL wooden doors and windows would mostly be classified as special C&D waste with the LoW entries 17 02 or 17 09. In particular, the LoW entry 17 02 02 is identified as the correct one for this type of waste if it does not contain any hazardous substance, while in case it contains hazardous substances the correct LoW entry to be used is 17 02 04. No specific classification or requirements for the collection, treatment, recovery or landfilling of the wooden fraction of this waste is to be found in the regional special WMPs. In general, the C&D waste is mostly recovered, and a small percentage is landfilled.



## Legal provisions - reuse and preparation for reuse

Specific requirements for the reuse and preparation for reuse for wooden waste have not been found in the national nor in the regional legislation of the two selected regions (Veneto and Emilia Romagna).

Art. 181 (b) of the TUA reports the general objectives for preparation for reuse, recycling and recovery of C&D waste; specific measures for the management of C&D waste are included in the national legislation related to the Green Public Procurement and established at regional level in the WMPs and in the regional legislation.

In Veneto, for instance, with DGRV n. 1773 of 28 August 2012 the Regional Council approved a Guideline containing "Operating procedures for the management of waste from construction and demolition activities. D.Lgs. 03.04.2006 and s.m.i., n. 152; LR 3/2000 ". At regional level, particular emphasis is given to the promotion of the so-called "selective demolition", which aim at identifying building materials and components that can be reused. The selected elements, such as doors and windows, after the verification to evaluate their possible reuse, are excluded from the waste legislation and considered as any other building material. The dismantling of this reusable element should be done in order to preserve its residual performance or artistic aesthetic value avoiding movements and accumulations in bulk.

## Legal provisions – recycling

In Italy the wooden waste recovered is mostly transformed into chips and used to produce chipboard panels. 97.1% of the recycled wood becomes a panel while other recycling methods, such as MDS panels, pallet blocks, pulp for paper and cartons etc. are niche options.

### EoW criteria for wooden waste

The EoW topic as provided for by Article 6 of the Waste Framework Directive is discussed at art. 184-ter of the TUA, which states that EoW criteria, when no such criteria have been set out at Community level, shall be identified case by case through one or more decrees of the Environmental Ministry. Currently, EoW criteria have been identified regarding the production of refuse-derived fuels (RDF) in the D.M. 14 February 2013, n.22 (see section on recovery).

### Recycling of wooden waste

The D.M. 5 February 1998 (amended by D.M. 5 April 2006 n.186), identifies the waste streams which can be subjected to simplified recovery procedures with reference to material and energy recovery. Wooden waste is included regarding different EWC codes as stemming from C&D activities, selection of municipal solid waste or assimilated, construction industry and separate waste collection, industrial, commercial, and agricultural activities. The recovery operations related to this type of waste are storage of wood waste with eventual washing, sorting, adjustment volumetric or chipping for subsequent recovery in different industrial sectors (e.g. paper, wood).

It is also possible to issue permits on a case by case scenario for the single recycling process with specific authorizations. This process is currently under review [IT IS interview].

## Legal provisions - recovery (incineration with energy recovery)

The incineration and co-incineration of waste is regulated by Title III-bis of TUA.

Burning wood in Italy is possible for three different levels [IT IS interview]:

- Virgin wood: biomass as fuel. Only virgin wood, subjected only to mechanical treatment and without any glue is eligible for this treatment;
- Waste wood: any (mechanically or chemically) treated wood, therefore any panel, wood composite, or any wood with glue. The requirements are provided by the D.Lgs n. 152/06 (TUA), which identifies two different procedures: a simplified one (according to DM 05.02.1998) and an ordinary one (D.Lgs n. 152/06 art.208)
- Contaminated wood: incineration under the requirements of D.Lgs n. 133/05 (waste incineration directive)

According to D.M. 05.02.1998 Annex 2 clause 6 (for simplified authorizations) the minimum conditions to obtain an authorization to burn wood waste (for example, glued laminated timber residues) are the following:

**6. Type:** Treated waste from wood processing and similar [03 01 05] [20 01 38]

**6.1 Origin:** Wood industry (first and second processing, production of particle, fiber and plywood panels, furniture, semi-finished products for furniture, building products, etc.)

**6.2 Waste characteristics:** Waste and agglomerates also in powder based only on wood and vegetable containing the 1% maximum of phenolic resins and without impregnating based on tar oil or CCA salts, having also the following characteristics:

- 20% (as dry mass/dry mass of panel) as maximum content of urea-formaldehyde or melanin-formaldehyde or urea-melanin-formaldehyde;
- 8% (as dry mass/dry mass of panel) as maximum content of diphenylmethane diisocyanate resin;
- 0.9% by mass as maximum chlorine content;
- 10% (as dry mass/dry mass of resin) as maximum content of additives (ammonium sulphate, urea hexamethylenetetramine).

**6.3 Activities and methods of recovery:** The energy recovery of the waste referred to in clause 6 can be carried out through combustion under the following conditions: plants dedicated to the energy recovery of waste or industrial plants with a nominal thermal power of not less than 1 MW.

Although there is no specific enforcement of the waste hierarchy about waste wood, burning of non-virgin wood (meaning, wood with glue, panels, any non-virgin wood) cannot apply to incentives for renewable energy since 2005. (L. n. 221/2015) [IT IS interview].

### Biomass for incineration

The art. 237-ter (1) (s) includes in the definition of biomass wood waste, with the exception of those which may contain halogenated organic compounds or heavy metals, obtained as a result of treatment or coating, including in particular wood waste of this kind arising from C&D waste.

### Combustible biomass and refuse-derived fuel (Rdf)

The Annex X to Part V of TUA identifies as combustible biomass plant material from crops, produced exclusively by mechanical treatment, washing with water or drying of non-dedicated agricultural crops, wood from forest maintenance or mechanical processing of virgin wood. Wooden waste coming from EoL wooden doors and windows, is therefore not classifiable as combustible biomass according to the requirements of this decree.

<p>The material made of wood that has undergone treatment processes, is excluded from the fuel regime defined in Annex X to Part V of the TUA. The incineration or co-incineration of such waste needs therefore to be authorised in application of the D.Lgs. 133/2005.</p> <p>Wooden waste can be used for the production of RDF, defined by art. 183 (1) (cc) of TUA. RDF is considered as special waste, except when the criteria of DM 14 February 2013, n.22, which identifies the EoW criteria for the RDF, are applicable.</p>
<p><b>Legal provisions - landfilling</b></p>
<p>No specific national or regional regulation exists which forbids the landfilling of wooden waste or C&amp;D waste. The landfilling of waste is in general discouraged by the application of a tax on landfilling. The applicable legislation is represented by D.M. 27 September 2010 (amended by D.M. 24 June 2015) which identifies the criteria for the eligibility of waste in landfill. Materials containing PCBs and POPs, in compliance with specific requirements, can be landfilled only in landfills for hazardous waste.</p>
<p><b>Legal provisions – product regulation</b></p>
<p>No specific product legislation on national level for products made from recycled wooden windows and doors are in place.</p>
<p><b>Relevant national guidelines</b></p>
<p>See section “National waste management”.</p>
<p><b>General policy developments</b></p>
<p>With the Law n. 221 of 28 December 2015, the so-called "Collegato Ambientale" (Environmental Connection), and the enactment of some regulatory provisions, the Italian government has put in place some actions aimed at promoting the circular economy.</p> <p>In 2017, Italy presented its National Strategy for Sustainable Development, the strategic reference framework of sectoral and territorial policies in Italy which will last until 2030.</p> <p>The strategy, which aligns with the UN Sustainable Development Goals, includes the following relevant objectives on waste:</p> <ul style="list-style-type: none"> <li>• By 2020, achieving eco-compatible management of chemicals and all waste during their entire life cycle, in accordance with the agreed international frameworks, and significantly reducing their release to air, water and soil to minimize their negative impact on human health and the environment;</li> <li>• By 2030, substantially reduce waste production through prevention, reduction, reuse and recycling.</li> </ul> <p>The strategy will be followed by a dedicated Action Plan (initially foreseen to be published before end of 2017) which will provide quantified strategic objectives and select the definitive core of monitoring indicators.</p> <p>Specific targets on wooden waste are to be found at regional level, given the responsibility of the Region for the waste management planning. As an example, the region Emilia Romagna has defined a target for the recycling rate for wooden waste, calculated using the methodology 2 indicated in Decision 2011/753/EU, which will have to increase from 73% in 2011 to 89% in 2020. In 2013 the recycling rate is estimated to have reached 79%.</p>

## National data availability, waste statistics and data quality

Data regarding waste wood generation is available for municipal waste; wood from EoL wooden doors and windows is not considered included since the doors and windows are identified as special waste.

No specific data are available for the generation of waste from wooden doors and windows. This type of waste must be searched among the waste identified with LoW entry 17 02 01. Nevertheless, such data might not provide realistic information about the amount of such waste: in the Trentino Alto Adige region, for instance, wood material is highly used for the construction of houses, especially mountain houses, and therefore the quantity of EoL wooden doors and windows could represent just a minor share of the overall amount of waste classified as 17 02 01.

## Treatment in reality

Currently, the wooden waste from C&D activities is mostly separated accordingly to the principles of the selective demolition and stored on site in specific containers. Many regions and autonomous provinces have published a guideline for the selective demolition (e.g. the Bolzano province, with the DGP 1030/2016). Because of the good quality of waste differentiation on the C&D sites, the most used EWC code for the EoL wooden doors and windows is 17 02. In particular, wooden windows can be either classified as 17 02 01 (wood) or 17 02 02 (glass). The separation of materials is done on site. Only in few cases the code 17 09 is used. No LoW entries referring to hazardous waste are used: EoL windows and doors stemming from C&D activities are always identified as non-hazardous materials.

After the separation, the wooden waste is prepared for use in the wood industry (mostly as chipboard panels), which basically consists in sorting and chipping as reported in the D.M. 5 February 1998. In Italy the current wood recycling rate is 63% [IT IS interview], although Eurostat indicates that the recycling rate is closer to 80% for all wood waste [IT Eurostat 2018].

Only a very minor part of the wooden waste is sent to energy recovery. In the absence of specific requirements for wooden waste with regard to the waste hierarchy, the market is driven by an economic advantage: sending wooden waste for recycling is much cheaper than sending it to energy recovery.

In general, it is difficult to estimate the extent of reuse, as reused items are not registered as waste (see above). However, if an item that ends up in reuse first enters the waste system, the company who substitutes the door/window would in any case identify the EoL door/window as C&D waste and use the LoW entry 17 02.

No wooden waste, identified as such, is landfilled. A variable share of wooden waste can be found in general C&D waste sent to landfill in cases where selective demolition is not applied.

In the present state of knowledge, no facilities specifically dedicated to the treatment of EoL wooden doors and windows are present at national level. This type of waste is treated in the same facilities that receive wooden waste in general.

Wooden waste, including EoL wooden doors and windows, are not currently exported for treatment abroad: the treatment capacity of the current national facilities is adequate.

## Most significant national actors

### Authorities

- Regional / provincial Waste Management Departments. For the Autonomous Province of Bolzano: [http://www.provincia.bz.it/it/contatti.asp?orga\\_orgaid=878](http://www.provincia.bz.it/it/contatti.asp?orga_orgaid=878)

### Wood sector/industry

- Federlegnoarredo – national wood association  
<http://www.federlegnoarredo.it/>
- IDM Südtirol  
<https://www.idm-suedtirol.com/it/home.html>
- CNA / Consorzio LegnoLegno  
<http://www.legnolegno.it/inizio/index.php>
- Confartigianato – members operating in the wood sector  
<https://www.confartigianato.it/>

The most significant actors on national level in Italy at industry level within this field are the demolition companies and the wood industry. The demolition companies are significant actors not only regarding the demolition activities but also the recovery operations: these are in fact either done directly on site or in a separate facility owned or participated by the contractor.

## 4.7 The Netherlands

### Main legal framework, regulations and interpretations

The main legal framework for waste management in the Netherlands is included in the *Wet Milieubeheer* (Environmental management law) [EML]. Chapter 10 of the EML contains provisions regulating waste management on national, provincial and municipal level and provides a legal basis for more specific regulations. In addition, Dutch spatial planning law plays an important role regarding permitting of waste treatment operations. In this regard, *Besluit omgevingsrecht* (the decree on spatial planning law) [BOR] and *Activiteitenbesluit milieubeheer* (the decree on activities of environmental management, Abm) may be especially relevant.

### National waste management

*Landelijk afvalbeheersplan* [NL LAP] (the national waste management plan, NWMP) interacts with the EML as the main policy document which influences the interpretation and application of Dutch waste management law. The most recent and **third NWMP** [NL LAP3] entered into force on the 28 December 2017.

The NWMP has a general part in which the general waste management policy is described. Three aspects regarding the treatment options of EoL wooden doors and windows are especially relevant:

- Minimum standards for waste treatment
- Obligation to keep certain waste separated
- Focus on substances of very high concern

The general policy part of LAP is complemented with so-called sector plans, which lay down the applicable policy with regard to certain waste streams or streams from specific sectors. *Sector plan 36* applies to wood waste.

EoL wooden doors and windows is covered by the sector plan as either “wood kept separate during demolition activities (not being wooden packaging)” or a “mono-stream generated after the sorting of mixed streams”.

The following table provides an overview of the minimum treatment standards for waste wood under sector plan 36:

Waste wood category	Minimum treatment standard (and conditions)
A-wood and B-wood	Other recovery
Non-wolmanized C-wood	Main use as fuel. All other forms of discovery are prohibited, unless there is a case of recycling of creosoted wood, in as far as this is possible according to REACH.
Wolmanized C-wood	Landfilling on suitable landfills. Recovery is explicitly prohibited to prevent the diffusion of heavy metals in the environment, unless: <ul style="list-style-type: none"> <li>• it concerns “main use as fuel” or “incineration as form of disposal” in installations where generated residues (ashes) are landfilled in order to avoid diffusion of the metals.</li> <li>• there is a case of recycling of CCA-wood, in as far as this is possible according to REACH.</li> </ul>

The execution and enforcement of the provisions of chapter 10 of the EML, the environmental provisions of spatial planning law and the NWMP is to a large extent a competence of municipalities and provinces. Their activities with regard to issuing of permits and control of waste

management activities, is largely carried out by so-called *omgevingsdiensten* (regional services), which are public bodies.<sup>10</sup> In addition, the *inspectie leefomgeving en transport* (national human environment and transport inspectorate) is competent with regard to the control of certain big industrial installations and the transboundary shipments of waste.

#### **Legal provisions - reuse and preparation for reuse**

In line with the EU legal framework, EoL wooden windows and doors which are re-used (i.e. renewed period of use without any prior treatment necessary) are not considered to be waste as defined by Article 3 WFD and implemented in Article 1.1 EML. As such, the wooden doors and windows will not be subject to waste legislation, but rather to applicable product legislation. Regulation (EU) No 305/2011 laying down harmonised conditions for the marketing of construction products (CPR) may be relevant in this regard.

However, it should be mentioned that the line between reuse and "discard", i.e. classification as waste, often is a thin one. It is not uncommon for Dutch competent authorities to classify a stream as waste, despite initial conclusion by the holder, that the material is not discarded.

If a stream of EoL wooden doors and windows is classified as waste, but will be reused in their original form, after checking, cleaning or minor repairs for example, this will be considered preparation for reuse as defined in Article 3 WFD. Preparation for reuse is a waste treatment operation and must result in the relevant waste stream meeting the end-of-waste criteria of Article 6 WFD.

#### **Legal provisions – recycling**

The EoW criteria of Article 6 WFD are implemented into Dutch law through Article 1.1 sub 6 of the EML. This article refers back to Article 6 WFD for the applicable criteria to determine whether the end-of-waste status has been attained. Currently, the main guidance documents for the application of the end-of-waste criteria in the Netherlands are:

- LAP3;
- a guidance document on the status of untreated wood; and
- so-called declarations of law on the EoW status of specific waste streams.

With regard to the potential presence of substances of concern in recycled material, especially criteria (c) and (d) of Article 6 WFD may be relevant. With regard to criterion (c), it is relevant to firstly take into account REACH and the POP Regulation and the section of LAP3 with regard to the regulation of SVHCs and POPs. With regard to criterion (d), it is relevant to take into account the section of LAP3 concerning risk assessment, bearing in mind the general aims of national, EU and international environmental law.

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<sup>10</sup> Examples of big regional services are DCMR in the Rotterdam region and ODNZKG in the Amsterdam region. English page DCMR: <https://www.dcmr.nl/en>;

### **Legal provisions - recovery (incineration with energy recovery)**

LAP3 classifies the processing of materials to be used as fuels as “other recovery”, which means that e.g. the processing of wood into pellets for incineration will not be considered as recycling. This is in line with the definition of recycling under Article 3 WFD. As such, wood pellets will also remain waste and therefore regulated under the legal framework for waste management and most relevant in the case of pellets, waste incineration. If the wood is classified as biomass, a lighter regime will apply than the one for waste incineration.

Under EML, the option of incineration of biomass fuel exists. This option is attractive in the Netherlands, due to subsidy which is available for the incineration and co-incineration of biomass in incineration installation for energy generation (SDE+).

In this regard, it is important to note that not all wood categories are considered biomass. Annex I part A of the decree on spatial planning law (Besluit omgevingsrecht) determines that A-wood is considered being biomass, while B-wood can only be considered biomass if the paint, varnish or glue with which it has been treated does not contain any organic halogen compounds or heavy metals. Conversely, C-Wood and B-wood treated with paint, varnish or glue containing organic halogen compounds or heavy metals are not considered biomass.

Further information on the incineration of biomass and the subsidy policy SDE+, we refer to the website of the Netherlands Enterprise Agency (Rijksdienst voor ondernemend Nederland, RVO): <https://www.rvo.nl/subsidies-regelingen/stimulering-duurzame-energieproductie>.

Finally, it is important to note that according to the Dutch decree on activities of environmental management (Activiteitenbesluit milieubeheer), the incineration of biomass is not regulated by the regime for waste incineration laid down in section 5.2 of the decree.

If waste wood is not classified as biomass, it can still be incinerated and co-incinerated in waste incineration installations for the generation of energy. This is considered to be a recovery operation in the Netherlands. Section 5.1.2 of the Dutch decree on activities of environmental management (Activiteitenbesluit milieubeheer) on waste incinerated and co-incineration installations will be the regulatory framework for such operations.

### **Legal provisions - landfilling**

Apart from the case of wolmanized wood, the landfilling of wood for disposal is forbidden in the Netherlands on the basis of Article 1(1) category 37 of the decree on landfills and landfilling prohibitions (Besluit stortplaatsen en stortverboden afvalstoffen/ BSSA) [NL BSSA].

### **Legal provisions – product regulation**

Depending on the recycled material generated, specific product legislation can be applicable. An example of such product legislation which could be relevant for recycling of EoL wooden windows and doors is Regulation (EU) No 305/2011 laying down harmonised conditions for the marketing of construction products (CPR).

Also relevant to mention in this regard, is that the Dutch declarations of law on EoW status (see section 1.3) indicate that standards of harmonization bodies and industry standards can be taken into account when assessing whether EoW criteria (c) and (d) are met.



Relevant national guidelines
<ul style="list-style-type: none"> <li>• Landelijk afvalbeheersplan [NL LAP3] (the national waste management plan): <a href="https://lap3.nl/">https://lap3.nl/</a></li> <li>• Guidance document on the status of untreated wood (waste or not?): <a href="https://www.afvalcirculair.nl">https://www.afvalcirculair.nl</a></li> <li>• Expected publication of guidance on the application of the waste definition.</li> </ul>
General policy developments
<p>An important policy background for the treatment options of EoL wooden windows and doors is the Dutch strategy for a circular economy in the Netherlands by 2050<sup>11</sup>. The strategy contains the current steps and sets a course for the subsequent steps to be taken on the way to 2050, in order to develop a circular economy in the Netherlands. One major concrete objective of the strategy is a 50% reduction in the use of primary raw materials (minerals, fossil and metals) by 2030.</p> <p>Within the context of this report, the envisaged intervention “fostering legislation and regulations” provides some interesting general points, concerning, for example, harmonized and circular application waste management legislation (likely to include EoW and byproduct criteria). At the moment, the interventions are being elaborated as part of sub-strategies for designated priority sectors, among which biomass and the construction sector. It remains to be seen which concrete developments in terms of “fostering legislation and regulations” will be relevant for EoL wooden windows and doors.</p> <p>In addition, regarding the priority sector biomass, the strategy envisages a financial intervention by optimization SDE+ subsidy regulations.</p> <p>Another envisaged and relevant intervention is altering the rules on combustion of waste wood. The aim is to allow less clean waste wood (“B-wood”) as a fuel in some SDE+ categories.</p>
National data availability, waste statistics and data quality
<p>Specific data on national flows of wooden doors and windows is not available. The most recent report on the Dutch waste wood market confirms that no detailed data is available regarding the source of various waste wood streams [NL Tauw, 2017]. Consulted stakeholders indicated that they are not aware of any existing data. One consulted stakeholder indicated that the data is <i>“not structural and therefore not (yet) suitable for long term planning”</i>. However, the consulted stakeholder mentioned <i>“a new system which has been introduced in 2017 called Madaster. Builders and owners of new (sometimes) older buildings have to enter their material list of the building concerned, so that when demolition phase is there one knows exactly what materials will come available”</i>.</p> <p>The most recent information concerns the flow of A-, B- and C-wood in the Netherlands for the years 2014 and 2015, presented in the Tauw report. The report concludes for the year 2015 that A- and B- wood generated in the Netherlands has a volume of 1 378 Kton. The volume of generated C-wood is 104 Kton. These quantities exclude the imported A-, B- and C- wood which are also listed in the report.</p> <p>The website <a href="http://www.houtenbos.nl">www.houtenbos.nl</a> (wood and forest) which is a cooperation between the Probos institute, the Dutch Ministry of Economic affairs and climate policy and the wood industry, lists an A- and B-wood generation in 2016 of 1 579 Kton. The website lists a generation of C-wood of 99 Kton for 2016 [Houtenbos.nl].</p> <p>Regarding the treatment of the waste wood, the Tauw report concluded that from the A- and B-wood flowing through the market (generated and imported):</p>

11 Link to strategy: <https://www.government.nl/documents/policy-notes/2016/09/14/a-circular-economy-in-the-netherlands-by-2050>

- 249 Kton is recycled;
- 848 Kton is used as fuel;
- 49 Kton has an unknown fate.

All C-wood (105 Kton) is exported to Germany for incineration as fuel.

Based on the available data and stakeholder information, the Tauw report also provides an estimate of the flows of A-, B- and C-wood in the Netherlands for the year 2017. This estimate provides a more detailed overview of the generation of waste wood per class (A-, B- and C-wood). The category B-wood is even divided into Massive and non-massive B-wood. Massive B-wood being non-glued with relatively little paint compared to the wood volume (e.g. beams and massive table tops).

The Tauw report [NL Tauw 2017] estimates for the year 2017:

- 250 Kton A-wood generated;
- 370 Kton massive B-wood generated;
- 890 Kton other B-wood generated (excludes 130 Kton imported); and
- 100 Kton C-wood generated (excludes 1 Kton imported).

Regarding the treatment of the waste wood, the Tauw report concluded that from the A- and B-wood flowing through the market (generated and imported):

- 260 Kton is recycled in the Netherlands;
- 860 Kton is used as fuel; and
- 300 Kton is recycled outside the Netherlands.

In addition, 321 Kton of A-, B- and C-wood is used as fuel outside the Netherlands.

This roughly results in 68% incineration with energy recovery and 32% recycling for A, B and C wood.

Data on waste wood streams in the Netherlands can be found at the following sources:

- The report on the Dutch waste wood market written by the consultancy Tauw B.V. for the Dutch Ministry of Infrastructure and water management. Data is provided for 2014 and 2015 based on available sources. Estimate is provided for data of 2017. [www.rijksoverheid.nl](http://www.rijksoverheid.nl)
- The website houtenbos.nl (wood and forest) which cooperates with the Probos institute and the Dutch Ministry of Economic affairs and climate policy, as well as the wood industry. Data is provided on waste wood generation, import and export in 2016. <http://www.bosenhoutcijfers.nl/de-houtmarkt/houtproducten/gebruikt-hout/>
- Website Probos institute for forestry, forest products and services. Provides data on waste wood generation, import and export for the years 2004-2014 (no differentiation between A-, B- and C-wood) [NL Probos.nl].

This section was supplemented with input from Mevo wood industry and the Wood Centre (Centrum hout) [NL Industry interview, 2018].

## Treatment in reality

A report by the Probos institute on the Dutch market for residual and used wood in 2012 [NL Probos 2014] provides the most relevant description of the treatment process of EoL wooden window frames. The following is a summary of this description.

The sector distinguishes between two types of wooden frames which are generated at demolition and refurbishment sites:

- "Demolition wood" which is collected together with other A-, B- and C-wood. This wood is referred to as waste wood.
- "Demolition wood" which is reused as second-hand construction product. This wood is referred to as "full demolition wood".

Full demolition wood is a niche market product and is only separated if the contractor is active on the market for second-hand construction products and if a sufficient volume of the wooden windows can be collected.

In general, demolition wood (full demolition wood or waste wood) is not treated at the demolition site. Wooden windows are treated on the location of the trader. The Probos report [NL Probos 2014] mentions that nails and other metal parts are removed. Paint is usually not removed. Damaged parts are removed or polished. Sometimes, wood is sawed into smaller parts.

Wooden windows which are not destined for reuse as second-hand construction product are sorted according to A-, B- and C-wood with other waste wood streams. The report mentions the biggest part of the demolition wood consist of B-wood.

The waste wood streams are transported to a sorting facility. At the sorting facility, the wood is usually shredded. After shredding, the ferrous and non-ferrous metals are removed. The shredded wood is subsequently sold to final buyers such as chipboard producers, energy companies and wood production companies.

For the elaborate description of the processes above, we refer to the Probos report: <http://www.probos.nl/rapporten-2014/1081-de-markt-van-resthout-en-gebruikt-hout-in-2012>

A consulted stakeholder in the field of processing of collected wooden windows has described a similar process for wooden windows destined for reuse.

Another consulted stakeholder indicated that due to circular entrepreneurship the following steps are taken more frequently:

- Direct reuse
- Repair and reuse
- Stripping of wooden windows and doors and processing into new products.

This consulted stakeholder furthermore indicated that *"Nowadays more and more companies focus on "harvesting" building products such as wooden windows and doors from demolition buildings. Also, some producers started to "take back" products for reuse."*

The consulted stakeholder indicated that most waste streams containing EoL wooden windows and doors are categorised under the EU list of waste codes of the chapters:

- 03 (wastes from wood processing and production of panels and furniture, pulp, paper and cardboards;
- 17 (construction and demolitions wastes); and
- 20 (municipal wastes).

This section was supplemented with input from Mevo wood industry and the Wood Centre (Centrum hout) [NL Industry interview, 2018].

## Most significant national actors

### Authorities

- Ministry of Infrastructure and water management: <https://www.rijksoverheid.nl/ministeries/ministerie-van-infrastructuur-en-waterstaat>
- Ministry of Economic affairs and climate policy: <https://www.rijksoverheid.nl/ministeries/ministerie-van-economische-zaken-en-klimaat>
- Rijkswaterstaat (executive body): <https://www.rijkswaterstaat.nl/zakelijk/innovatie-en-duurzame-leefomgeving/duurzame-leefomgeving/circulaire-economie/index.aspx>
- National human environment and transport inspectorate: <https://www.ilent.nl/>

### Wood sector

- Dutch association for the wood working industry (Nederlandse Branchevereniging voor de Timmerindustrie, NBvT): <https://nbvt.nl/>
- Probos institute (independent non-profit institute for forestry, forest products and services): <http://www.probos.nl/>
- Wood center (center for the support of sustainable building and design with wood): <http://www.centrum-hout.nl/>

### Waste management sector

- Netherlands from waste to resource (NEDerland Van Afval Naar Grondstof, Nedvang): <https://www.nedvang.nl/>
- Association for organic residues sector (Branche Vereniging Organische Reststoffen): <http://bvor.nl/>
- Association for sorting and recycling companies (Branchevereniging Recycling Breken en Sorteren, BRBS): <http://www.brbs.nl/>
- Association for waste management companies (Vereniging Afvalbedrijven, VA): <https://www.verenigingafvalbedrijven.nl/>

## 4.8 Sweden

<b>Main legal framework, regulations and interpretations</b>
<p>In Sweden both discarded wooden doors and wooden windows are classified as C&amp;D waste. If only a few doors or windows are discarded, they can be considered household waste. An exact limit has not been defined.</p> <p>The main legislation relevant for wood waste in Sweden are:</p> <ul style="list-style-type: none"><li>• Plan- och bygglag (2010:900) (Planning and Building Act)</li><li>• Miljöbalk (1998:808) (the Swedish environmental code)</li><li>• Avfallsförordning (2011:927) (the national ordinance on waste)</li><li>• The National Waste Management plan<sup>12</sup></li></ul> <p>There is no requirement in the Legislation for sorting of wood (besides impregnated/pressure treated wood), but individual municipalities can set separate regulations on sorting and treatment.</p>
<b>National waste management</b>
<p>In Sweden's previous national waste management plan 2012-2017, developed by the Swedish Environmental Protection Agency, C&amp;D waste was one of the five focus areas [SE Naturvårdsverket 2012, p.49]. The Swedish Environmental Protection Agency is currently working on a new waste management plan for 2018-2023. The aim of the new plan is to strive towards circular economy, where C&amp;D waste is a priority area [SE Naturvårdsverket n.d., p.15].</p>
<b>Legal provisions - reuse and preparation for reuse</b>
<p>The national waste management plan for 2018-2023 is focusing on circular economy with increased reuse of C&amp;D waste. Doors and windows are to a very small extent collected for reuse at recycling centres today. Doors and windows must be in good condition to be used again and only minor processing is allowed.</p> <p>Building materials, for example doors and windows, that can be reused directly without processing or preparation are legally not defined as waste and therefore not covered by the Waste Legislation.</p> <p>To reuse an old window or door it is required that they are used in a way that is in line with the current energy requirements from the Building Regulation Act. BFS 2011:6. [SE BBR 2011, p.143-144].</p>
<b>Legal provisions - recycling</b>
<p>Currently almost all wood waste for recycling is recycled into particleboard [SE Svenskt trä 2003]. Other recycling alternatives are niche options.</p> <p>Surface-treated wood will typically be found in doors, windows, kitchen cabinets and wooden floors.</p> <p>Surface treated wood is often not suitable for recycling because of the risk of contamination. Few, if any, municipalities or waste companies collect surface treated wood for recycling.</p> <p>In windows used in buildings between 1956 and 1973, it should be noted that the window joints may contain PCBs that may have contaminated the window frame. Therefore, windows from that period must be mapped for PCB before removed from the building [SE SFS 2007].</p>

<sup>12</sup> The Swedish Environmental Agency is currently working on the national waste management plan for 2018-2023. It is expected to be published summer 2018.

<p>If the doors or windows contain, or are suspected to contain, PCB they are classified as hazardous waste [SE SFS 2011, Appendix 4]. Because of that, the wood cannot be recycled and must be disposed of and destroyed as hazardous waste.</p>
<p><b>Legal provisions - recovery (incineration with energy recovery)</b></p>
<p>The most common EoL solution for wooden doors and windows categorized as “wood and surface treated wood” is combustion with energy recovery at waste incinerator plants in Sweden. It is the ordinance SFS 2013:253 that regulates waste incineration in Sweden. [SE SFS 2013].</p> <p>In some cases, it is possible to use wood waste as a biomass fuel. This is however not likely for used doors and windows.</p> <p>Impregnated and PCB containing wood is incinerated at waste incineration facilities with permits for hazardous waste incineration [SE Stena Recycling n.d.].</p>
<p><b>Legal provisions - landfilling</b></p>
<p>Landfill activities in Sweden are regulated under the Landfill ordinance SFS 2001:512 and the Swedish Environmental Agency’s regulation NFS 2004:10. It is not allowed to landfill combustible waste [SE SFS 2001; SE NFS 2004].</p>
<p><b>Legal provisions – product regulation</b></p>
<p>No specific product legislation on national level for products made out of recycled wooden windows and doors are in place.</p> <p>The building product classification system Byggvarubedömningen going beyond requirements in REACH is not mandatory by law, but in practise is required to sell building products on the Swedish market, regardless of recycled content or not.</p>
<p><b>Relevant national guidelines</b></p>
<p>See section “National waste management”.</p>
<p><b>General policy developments</b></p>
<p>Sweden’s new national waste management plan is expected to be ready in the summer of 2018. The coming waste management plan will be in the lines of the European circular economy package and is expected to include initiatives on the C&amp;D sector, that would be of relevance to EoL wooden doors and windows [SE Naturvårdsverket 2018].</p>
<p><b>National data availability, waste statistics and data quality</b></p>
<p>There is not much statistics regarding EoL wooden doors and windows available and the data often lacks in quality. The lack in quality is mainly because there is no obligation for waste entrepreneurs to discard the wooden doors and windows as a separate fraction. Also, the fact that most waste treatment facilities receiving this kind of waste are not obligated to collect and report statistics. A project made in 2015 on behalf of the Swedish government concluded that the lack in statistic regarding C&amp;D is the foremost hinder to achieve the target of 70% by weight preparatory for reuse, reuse and recycling by 2020 [SE Palm, D et.al 2015, p.7].</p> <p>The main suppliers of data in Sweden are SCB and IVL.</p>

### **Treatment in reality**

EoL wooden doors are mainly discarded in the wood fraction at the recycling centre or directly in a wood waste container and is sent off to incineration with energy recovery.

However, EoL wooden doors with windows and wooden windows are discarded in the non-combustible fraction at the recycling centre or container at an entrepreneur. It is then transported to a sorting facility where the glass is crushed by a waste processor. The glass is then used as ether construction material or is landfilled. The wooden doors and windows are finally incinerated with energy recovery.

Impregnated and PCB containing wood is incinerated at waste incineration facilities with permits for hazardous waste incineration [SE Stena Recycling n.d.].

There is a very small amount of reuse and repair of wooden doors and windows done by the municipalities at for examples the Eco park Alelyckan in Gothenburg and Eskiltunas ReTuna facility. There are also a couple of private actors working with reuse of doors and windows, e.g. Kompanjonen, Hus Till Hus and Brattöns Återbruk.

Recycling of wooden doors and windows are rarely present. If recycled, the doors and windows are mainly recycled into particleboard [SE Svenskt trä 2003].

### **Most significant national actors**

Some of the most significant actors operating in Sweden today are;

- Stena Recycling
- Ragn-Sells
- Suez
- Veolia
- The municipalities in Sweden
- Municipal owned waste companies

## 4.9 United Kingdom

### Main legal framework, regulations and interpretations

Whilst the EU WFD acts as a constant policy driver across the UK, the legal framework for waste policy is devolved to the national governments across England, Wales, Scotland and Northern Ireland. As part of this autonomy, each country has their own interpretation of the EU WFD and have therefore established their own strategy for the management EoL wooden window and door frames.

#### **Primary Legislation**

The overarching legislation relevant to wood waste in the UK are:

- *The Environmental Protection Act 1990 (as amended)* [UK EPA 1990]; and
- *The Pollution Prevention and Control Act 1999* [UK PPCA 1999]

The Environmental Protection Act (EPA) 1990 relates to controlled wastes (defined in **§ 75**) [UK EPA 1990 p.83] as waste arising from household, industrial and commercial sources; such definition would be considered to encompass non-contaminated EoL wooden windows and doors) and makes provision for the management of pollution from industrial processes.

*Section 34* [UK EPA 1990 p.36] imposes a duty of care on persons concerned with handling waste; i.e. anyone who "...imports, produces, carries, keeps, treats or disposes of controlled waste or, as a broker, has control of such waste". It is the responsibility of anyone who handles waste to store it safely and securely, to prevent it from causing harm to anyone or the environment, to prepare a transfer note if you intend to pass the waste on to someone else, and to ensure the person/establishment you are transferring the waste to is licensed to receive it. The responsibilities are outlined in more detail within waste Duty of Care Code's of Practice [UK DoC 2016] which have been prepared by governmental departments for each UK nation; whilst it is not a statutory requirement to follow these codes, the documents are admissible as evidence in court when determining whether persons subject to the duty took reasonable measures to comply with it. Failure to comply with the duty of care obligations can result in criminal prosecution and face financial penalties.

The Pollution Prevent and Control Act 1999 sets out the responsibilities of the UK's Environment Agencies and Local Authorities as the regulators of pollution control for various industrial process (such as incineration). The Act also enabled the implementation of regulations (as outlined below) which transposes the EU Integrated Pollution Prevention and Control Directive (succeeded by the Industrial Emissions Directive (IED), requiring operators of regulated plants to use Best Available Techniques.

#### **Secondary Legislation**

Relevant secondary legislation made under the provisions of the aforementioned Acts (and Orders) is as follows:

- *The Waste (England and Wales) Regulations 2011 (as amended)* [UK WR 2011]; and
- *The Waste (Scotland) Regulations 2012* [UK WSR 2012]

The Waste Regulations provide definitions for waste, imposes the waste hierarchy priority order and sets a requirement for the establishment of waste prevention programmes and management strategies.

*Part 5 12.—(2)* [UK WR 2011] allows for any persons handling waste to depart from the waste hierarchy priority order "...so as to achieve the best overall environmental outcome where this is justified by life-cycle thinking on the overall impacts of the generation and management of the waste". The following considerations (set out in *Part 5 12.—(3)*) must be taking into account when considering the 'overall impact':

- (a) the general environmental protection principles of precaution and sustainability;



- (b) technical feasibility and economic viability;
- (c) protection of resources;
- (d) the overall environmental, human health, economic and social impacts.

- *The Environmental Permitting (England and Wales) Regulations 2010 (as amended)* [UK EP 2010]; and
- *The Pollution Prevention and Control (Scotland) Regulations 2012 (as amended)* [UK PPCsR 2012]

The above environmental permitting regulations implement the requirements of the Industrial Emissions Directive (IED) and are concerned with licensable waste management activities (e.g. treatment, recovery and incineration). The pertinence of environmental permitting in the context of EoL wooden windows and doors applies to the storage and transportation of waste wood, and with respect to treatment and incineration for energy recovery. Anyone operating an activity that is listed in Part 2 of Schedule 1 of the permitting regulations (in both England & Wales and Scotland) requires a Permit; the recovery of energy from waste wood for example will be regulated under Part 2 Section 5.

In England & Wales, environmental permitting regulations split industrial operations into three categories - Part A(1), Part A(2) and Part B; Part A activities are those activities listed on Annex 1 to the IED and are regulated by the Environment Agency (EA). Part A(2) and Part B are regulated by Local Authorities.

In Scotland, environmental permits are defined as either a Part A activity or a Part B activity and are regulated in a similar manner as described for England & Wales.

Anyone wanting to operate an A1 activity (i.e. those listed on Annex 1 to the IED) needs to apply to the EA (or Scottish Environment Protection Agency; SEPA) and anyone wishing to operate a Part A2 or Part B activity must submit an application, with the appropriate fee, to the local authority. The permit issued by the regulatory authority will include conditions which set down how to minimise pollution. Guidance has been prepared by both the EA and SEPA on how the permitting regime operates in the respective nations.

Activities exempt from waste permitting activities are listed and defined under Schedule 2 and 3 [UK EP 2010].

### **End of Waste Status**

In England & Wales, Quality Protocols [UK QP 2015] have been established at the national level to provide guidance on how to recover certain waste materials and remove it from the regulatory waste management controls. The aim of Quality Protocols is to produce high quality products from waste to promote enhanced recovery and recycling – in line with the waste hierarchy; however, compliance with Quality Protocols is voluntary.

The EA stated during an interview that between 2009 and 2011, the EA had worked with industry stakeholders to assess whether waste wood, to be used for a number of different purposes (such as animal bedding and landscape use), could meet the end of waste (EoW) test as set out in Article 6 of the WFD. The research concluded that waste wood could not satisfy the requirements of an EoW test as it was found that the waste stream was not consistent in terms of the contaminants it contains, and the recovery treatments used.

Whilst no Quality Protocol has been prepared specifically for waste wood, a Quality Protocol exists for the production of quality compost from source-segregated biodegradable wastes [UK QP 2012] (which extends to certain wood wastes). To comply with this protocol, waste wood must:

- be produced using only those source-segregated input materials listed in Appendix B. This includes waste wood from windows and doors providing that it is untreated (i.e. the wood must have no chemical additives or preservatives).
- meet the requirements of an approved standard for use in the market it is destined for;
- be destined for appropriate use in land restoration, horticulture, agriculture or forestry;

- require no further processing including maturation or re-screening for use in one of the above defined designated market; and
- meet any additional customer specifications, as agreed between the supplier and the customer which involve further processing.

If the above criteria are met, the resulting output will normally be regarded as having been fully recovered and to have ceased to be waste.

In the absence of Quality Protocols for a waste-derived product, an end of waste assessment [UK EoW 2018] can be undertaken to facilitate the recovery or recycling of waste for use as a resource. An EoW test seeks to assess whether:

- the waste has been converted into a distinct and marketable product;
- the processed substance can be used in the exact same way as a non-waste; and
- the processed substance can be stored and be used with no worse environmental effects when compared to the raw material it is intended to replace.

'Isitwaste' is a free self-assessment tool to help determine if your material meets EoW or by-product status; this tool is based on England and Welsh case law only.

In June 2018 the EA in England will open its 'Definition of Waste Service' which will allow operators to ask for the EA's opinion on the waste status of their material. This will be a charged service with an interim charge of £750, followed by a £125 per hour plus VAT fee for the EA to conduct their full assessment on the information provided.

### **Regulatory Position Statement and Guidance**

The Quick Guide (43\_17) prepared by the EA in March 2017 [UK EAqg 2017] defines wood waste as any non-virgin timber and associated residues such as offcuts, shavings, chippings and sawdust, either treated or not treated. Where virgin wood is mixed with waste wood such as pallets, door or frames, the mixed load is considered being waste.

Treated waste wood is wood that has been treated by being injected, impregnated, sprayed, infused (soaked) or surface coated (varnishes, paints, glues and veneers) with any organic or inorganic substances.

All items of treated waste wood should be regarded as potentially hazardous waste. To determine whether waste wood is hazardous, the producer must identify the European Waste Catalogue code that applies to the waste. This will involve an assessment which will have to consider what hazardous substances are present, and their concentration and chemical classification.

In the UK waste is assessed in accordance with technical guidance prepared by the EA. The guidance explains how to accurately describe ALL waste, including specific wood waste streams [UK WM3 2015].

The regulatory position statement (RPS) on classifying waste wood from mixed waste wood sources [UK RPS 2017] states that unassessed treated or mixed waste wood can be classified as non-hazardous waste, but it must be destined for incineration at an Industrial Emission Directive (IED) Chapter IV compliant permitted incinerator or co-incinerator, or to panel board manufacturers. If the mixed wood waste is destined for other end-uses, then it must be accompanied with a precautionary hazardous waste classification and associated consignment note.

Anyone producing wood waste which do not comply with the RPS must apply a hazardous waste classification for treated or mixed wood. Waste wood that is recognised as hazardous must still be segregated and consigned as hazardous to licensed facilities.

The RPS is only temporary and will be withdrawn in November 2018, at which point all unassessed waste wood must be classed as hazardous if its properties cannot be appropriately assessed at the front end. The waste wood sector, led by the Wood Recyclers Association (WRA)

and supported by the EA, is working on a wood-type approval classification scheme similar to the German approach; this is based on wood treatments and sampling and testing.

### **National waste management**

National Waste Management Plans have been prepared in accordance with Article 28 of the WFD for each UK nation, and include:

- Waste Management Plan for England;
- Towards Zero Waste: The Overarching Waste Strategy 2010 (Wales);
- Scotland's Zero Waste Plan; and
- Waste Management Strategy 2006-2020 (Northern Ireland)

The waste management plan for England [UK WMP 2013] includes the EU's target for at least 70% (by weight) of construction and demolition waste to be subjected to material recovery by 2020. At the time of publishing (2013), it was reported that England was already surpassing the target with a recovery rate of approximately 93%.

The waste prevention programme (WPP) in England [UK WPP 2013] details the Government's strategy on minimising waste production. There are no quantitative targets set in the WPP, but initiatives have been laid out for different materials/sectors. The built environment (including construction and demolition) has been recognised as one of eight priority areas for action on waste prevention. The Green Construction Board working group has been established as a consultative forum for government and industry actors (including UK design, construction, property and infrastructure industries) to promote resource efficiency and reduce waste.

The WPP has also developed a new metric indicator for waste arising from construction and demolition; waste arisings (Mt) per unit gross value added (GVA) in constant price (volume) terms. The metric provides a consistent measurement at a national level to help with monitoring progress on waste prevention [UK WPP 2013, pg.14].

### **Site Waste Management Plans**

At project level, a Site Waste Management Plan (SWMP) applied under the SWMP Regulations (now revoked) was intended to define roles and responsibilities for construction & demolition projects with respect to waste management and minimisation, following the principles of the waste hierarchy. The SWMP identified waste streams and re-use, recycling and reduction targets. It was an active document that was updated regularly and was used to track waste movements and provided a method for compiling that information into an auditable document. Although an SWMP is no longer a regulatory requirement, the benefits of developing and implementing SWMPs in identifying waste streams and enabling their efficient management is still recognised in the UK [UK SWMP 2016], thus the same principles can be adopted for management of waste during the construction and demolition phases of a site.

### **Waste Wood Management**

At demolition and refurbishment sites, producers of wood waste have a legal obligation to [UK DoC 2016]:

- Assess whether the waste wood is hazardous;
- Identify the segregation needed. Unless the producer has a permit to allow the mixing of waste, the law prohibits the mixing of any hazardous wood waste with any non-hazardous waste (including other wood), or other types of hazardous waste;
- Complete the appropriate paperwork in line with duty of care producers (i.e. consignment note for hazardous waste and a waste transfer note for non-hazardous waste); and
- Ensure the hazardous wood waste is transported by a licensed waste carrier and that the destination site is authorised to accept the waste.

If hazardous wood waste is stored in a container with non-hazardous wood waste, then all items in the container are controlled and processed as hazardous waste wood.

## **Waste Wood Classification**

In the UK a 'hierarchy' exists which categorises wood waste into four discrete grades based on its quality; the grading system is similar to the German Waste Wood Ordinance (Altholzverordnung). These grades provide a standard specification for the technical and commercial capabilities of the recovered wood for end-use market which is detailed further in the table below (extracted from BSI Publicly Available Specification (PAS) 111) [UK PAS111 2012] which has been developed by the Wood Recycler's Association.

<b>Grade</b>	<b>Typical markets</b>	<b>Typical sources of raw material for recycling</b>	<b>Typical materials</b>	<b>Typical non – wood content prior to processing</b>
<b>Grade A "Clean" recycled wood</b>	A feedstock for the manufacture of professional and consumer products such as animal bedding and horticultural mulches. May also be used as fuel for renewable energy generation in non-IED installations, and for the manufacture of pellets and briquettes.	Distribution, Retailing, Packaging, Secondary manufacture, e.g. joinery, Pallet reclamation.	Solid softwood and hardwood, packaging waste, scrap pallets, packing cases, and cable drums. Process off-cuts from the manufacture of untreated products.	Nails and metal fixings, minor amounts of paint and surface coatings.
<b>Grade B Industrial feedstock</b>	A feedstock for industrial wood processing operations, such as the manufacture of panel products, including chipboards and medium-density fibreboards.	At Grade A, plus construction and demolition operations transfer stations.	May contain up to 60% Grade A material as above, plus building and demolition materials and domestic furniture made from solid wood.	Nails and metal fixings, some paints, plastics, glass, grit, coatings, binders and glues. Limits on treat or coated materials as defined by IED.
<b>Grade C Fuel</b>	Biomass fuel for use in the generation of electricity and/or heat in IED compliant installations.	All above, plus municipal collections, recycling centres transfer stations and civic amenity recycling sites.	All the above plus fencing products, flat pack furniture made from board products and do-it-yourself (DIY) materials. High content of panel products such as chipboard, MDF, plywood, OSB and fibreboard.	Nails and metal fixings, paints, coatings and glues, plastics and rubber, glass and grit. Coated and treated timber (non-CCA or creosote).
<b>Grade D Hazardous waste</b>	Requires disposal at facilities licensed to accept hazardous waste.	All of the above plus fencing, track work and transmission pole contractors.	Fencing, transmission poles, railway sleepers, cooling towers.	Copper / chrome / arsenic (CCA) preservation treatments and creosote.

Waste wood must be effectively segregated into these grades before subsequent processing for use so that correct controls can be applied.

Grade D (hazardous waste wood) must be segregated before further subdivision of the non-hazardous wastes into Grades A to C occur.

## Legal provisions – reuse and preparation for reuse

Non-hazardous wooden windows and doors of good condition (e.g. easily removed during demolition or refurbishment), especially those with architectural or ornamental features, should be handled with re-use in mind for other construction projects [UK NFDC 2018].

### **Building Standards**

Reusing wooden windows and doors in both domestic and commercial properties falls within the scope of Building Regulations. 'Approved Documents' [UK AD 2016] published by the Ministry of Housing, Communities and Local Government provide guidance on ways to meet building regulations.

In the context of reusing wooden windows [UK BWftw 2018] and doors [UK BWfid 2018], building regulations will need to be adhered to in relation to fire safety, conservation of fuel, and air supply and ventilation.

For reuse in certain applications, doors will be required to have a fire rating; discussion with and approval from the Local Authority Building Control department would be required. The key components to achieve fire rating include door size, materials, intumescent strip around the door and closer. In these cases, fire certification for the original door should be kept with the door in its new location where possible.

The glass and framework of reclaimed windows and doors must conform to a specific energy value or 'U' value, which relates to the amount of heat allowed to pass through the glass and framework; the U value should not be exceeded. They must also provide ventilation capability, which will depend upon the size and room of the property.

## Legal provisions – recycling

### **BSI PAS 111: Processing Wood Waste**

A Public Available Specification [UK PAS111 2012] has been developed by industry stakeholders in the UK which sets the requirements for processing waste wood into materials intended for recycling. The PAS is intended to assure those that source or use PAS 111 compliant material that they are procuring recovered wood of verifiable quality.

The following markets account for most of recovered wood in the UK and are covered by PAS 111:

- Panel board manufacture
- Biomass energy generation
- Animal bedding
- Mulches
- Equine surfaces
- Pathways and coverings
- Industrial and commercial applications

When collected and sorted, Grade A [untreated, non-virgin] wood waste can go to higher value markets, i.e. in agriculture for animal bedding, as a mulch, panel manufacturers, and any incineration plants. Rejected Grade A waste wood becomes either Grade B or Grade C waste wood [treated, non-virgin].

Waste wooden windows and doors are typically considered to be Grade B or Grade C wood waste, depending on the presence and degree of coating and preservatives. Grade B and visibly clean Grade C waste wood may go to wood-based panel manufacturers, otherwise Grade C (presence of hazardous substances) and can be used as fuel in permitted co-incinerators. Visibly clean Grade C wood may also go to wood-based panel manufacturers.

Hazardous wood waste can only be used in panel board manufacturing, subject to gatehouse controls at the receiving site, or burnt in permitted incinerators which are compliant with Chapter IV of the IED.

Since the enforcement of the Control on Dangerous Substances and Preparations Regulations (2006) [UK CoDSPR 2006], the potential for treated wooden windows and doors to contain hazardous substances has significantly been reduced; Schedule 1 of the regulations outlines substance restrictions. Waste producers at demolition and refurbishment sites should consider the ages of buildings when handling the waste arisings; waste wooden windows and doors from buildings erected prior to 2006 have the potential to contain hazardous substances.

### **Recycling Initiatives**

The National Community Wood Recycling Project (NCWRP) [UK NCWRP 2018] was established in 2003 to support and encourage the recycling of wood waste that would otherwise be downcycled (e.g. woodchipped for panel board manufacturing or energy recovery) or even landfilled.

The NCWRP has established local community wood recycling enterprises across England and Scotland to provide a collection service for all wood waste streams. The NCWRP follow an arbitrary grading system (Grades 1 to 3) for the recycling of wood waste which allows for the identification of suitable means of reuse. Essentially, large pieces of timber (>1.5 m in length) that is non-hazardous can be destined for use in do-it-yourself (DIY), building projects and arts and crafts, whilst smaller pieces can be destined for reuse in making other wood products (e.g. furniture). Any remaining clean, solid wood can be bagged for firewood and kindling. All other waste wood that cannot be reused must be passed on to a chipping facility for subsequent use in panel board manufacturing or energy recovery.

### **Gate Fees**

The gate fee price at wood recycling facilities depends on the quality of the wood (i.e. whether it is high grade or low grade) and region. High grade wood gate fees in the UK (as of April 2018) are on average £10 per tonne; a decrease of £2.50 per tonne from the previous period in 2017. Low grade wood gate fees are £35 per tonne; £12.50 per tonne less than prices seen in April 2018 [UK GF 2018].

Clean wood waste is reported to be attracting positive prices (i.e. negative gate fees) in Scotland at present; i.e. paying to receive the material, which further incentivises waste wood producers to employ waste hierarchy [UK MSR 2011].

## **Legal provisions - recovery (incineration with energy recovery)**

In England and Wales, the waste regulations define recovery as – “means any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy”.

Recovering energy from wood waste through burning (e.g. biomass plants and co-fired plants) is covered in Chapter IV of the IED and is regulated in the UK under the Environmental Permitting and Pollution Prevention and Control Regulations. Recovered wood intended for energy recovery may be of any grade, assuming that the incineration plant has a permit to process the material.

Wood wastes excluded from Chapter IV by article 42(2) of the IED include:

- Untreated sawdust, wood shavings or wood offcuts
- Wood, particle board and facings – as long as they do not contain halogenated organic compounds or heavy metals from wood-preservative treatment or coatings.

However, if the plant burns excluded waste along with any other regular waste then the plant will have to follow Chapter IV requirements.

Wood wastes from demolition and refurbishment activities are likely to have been treated and so will be covered by Chapter IV IED. Wood waste recovered from transfer stations is equally likely to contain demolition or construction wood waste.

Compliance with Chapter IV IED requirements may be required for Grade B wood waste; the

waste producer/plant operator must be able to demonstrate that such waste does not contain treated wood waste. Grade C wood waste would be required to be sent to a permitted (i.e. IED-approved) incinerator for energy recovery [UK EAqg 2017].

In England, the burning of wood waste is regulated by the EA or the local authority. Small-scale burning of untreated wood waste can be done under the terms of registered exemption from permitting.

### **Waste Wood Recovery Incentives**

UK's legislation supporting the energy from wood waste covers both the supply and demand side of the chain. Policies are implemented to boost domestic supply through the Bioenergy Strategy [UK BS 2012] while grants are provided to domestic industries and households to install pellet boilers/stoves for energy provision. Other government incentives to encourage energy recovery includes the Renewable Heat Incentive [UK RHI 2018] which aims at increasing the proportion of electricity generated from renewable resources, particularly biomass wood pellets.

According to sources reviewed, demand from the biomass sector has grown rapidly, encouraged by government incentives to increase the level of electricity generated from renewable resources. This has placed downward pressure on gate fees for wood recovery.

### **Legal provisions - landfilling**

If non-hazardous treated wood waste cannot be recovered, it can be disposed of at a non-hazardous landfill. Landfill activities in the UK are regulated under the Landfill (England and Wales) Regulations 2002 (as amended) and the Landfill (Scotland) Regulations 2003 (as amended).

Any wastes destined for landfill must undergo pre-treatment. In the case of non-hazardous wood waste, this may include:

- Physical processing including source separation;
- Biological treatment including compositing / anaerobic digestion; and
- Thermal treatment including energy from waste plant.

Landfill operators require a Waste Pre-Treatment Confirmation form to accompany the waste wood, describing the pre-treatment prior to its receipt at the landfill site [UK TWL 2011].

There are currently no wood waste landfill restrictions in the UK, however Scotland has a target of sending no more than 5% of all waste to landfill by 2025 [UK ZWS 2010], and has a strong focus on prevention, recycling and recovery of all wastes to support that.

Anyone disposing of waste at a landfill site is due to pay landfill tax. As of 1<sup>st</sup> April 2018, the standard rate (which will apply to wood waste) is set at £88.95 per tonne in England & Wales and in Scotland [UK TAX 2018].

## Legal provisions – product regulation

Refer to preceding sections.

Any wood material which outline ceases to be waste must comply with relevant national guidelines for product regulations.

### **Construction Products Regulations**

The Construction Products Regulations 2013 is the enabling law in the UK which covers enforcement and penalties for not meeting the different stage requirements of wood waste management. The EU legislation provides a system of harmonised technical specifications for construction products (e.g. timber products including wood-based panels) to ensure the performance of the structure itself. The regulations define a 'Construction Product' as:

*“any product or kit which is produced and placed on the market for incorporation in a permanent manner in construction works or parts thereof and the performance of which has an effect on the performance of the construction works with respect to the basic requirements for construction works”.*

The regulations require that all manufacturers apply CE marking to any of their products covered by harmonized European Standard (hES) or a European Technical Assessment (ETA). The CE mark must be displayed on or with the timber product in accordance with Article 9 of the regulation [UK WPIF 2015]. Examples of CE marking that is available for wood-based products include, but are not limited to:

- Strength Graded Timber (Untreated or Treated – EN 14081-1
- Wood Floorings – EN 14342
- All Wood-Based Panels used in Construction – EN 13986

The regulation clarifies that certain products may be exempt from its requirements where they are:

- Custom made products in response to a specific order, when installed by the manufacturer.
- Manufactured on the construction site.
- Intended for use in traditional, heritage type conservation projects.

It should also be noted that wood-based panels suitable for non-construction uses (e.g. furniture, doors, skirting and decking) do not need to be CE marked.

### **REACH Regulations**

Registration, Evaluation, Authorisation, Restriction of Chemicals (REACH) is transposed in to UK law by the REACH Enforcement Regulations 2008. Manufacturers of wood-based products are required to register the details of the properties of chemical substances on a central database managed by the European Chemicals Agency, if both of the following conditions are met [UK REACH 2018]:

- The substance is present in the components of a final product above a concentration of 0.1% weight by weight; and
- The substance is present in the components of a final product in quantities totalling over one tonne per year.

The European Chemicals Agency does not need to be notified if the manufacturer can demonstrate that the substance has already been registered by a manufacturer in the EU for that use, or if the manufacturer can exclude the exposure of humans and the environment to the substance during use.

The Regulation also requires the most dangerous chemicals to be progressively replaced as suitable alternatives develop.



## General policy developments

The UK Government is currently implementing the EU Directive on the circular economy and is also developing a resource and waste strategy which is to be published later this year.

The EA have confirmed that they are not currently proposing to develop any new guidance specifically for waste wood.

The Wood Recyclers Association (WRA) and their technical working group; comprising the Wood Protection Association, National Federation of Demolition Contractors, United Resource Operators Consortium and the Wood Panel Industries Federation, are committed to developing a code of practice for the assessment and classification of waste wood, which the EA support. The guidance documents being developed will follow the withdrawal of the EA's RPS (November 2018).

The WRA, along with the working group, are currently finalising testing plans with the EA and will go through a period of sampling and testing of various treated waste wood materials, the prospect of which will be to ease the front-end assessment process for waste producers and processors.

## National data availability, waste statistics and data quality

There is no specific data on EoL wooden windows and doors available for the UK.

The EA publish a waste interrogator [UK EAwi 2017] which is based on waste returns from permitted incineration facilities (in England only) as part of a permit condition; therefore, this dataset does not include data from facilities that are not required to submit data. The most recent data was published in October 2017 for waste returns released in 2016. The dataset includes the waste EWC code of received wood waste, the tonnage of waste wood incinerated and details of the operator. According to the data, approximately 221,000 tonnes of wood waste was incinerated at permitted facilities in England in 2017.

The Wood Recyclers Association (WRA) represent waste wood operators in the recovery, recycling and service sector; representing over 80% of the UK's wood recyclers and reprocessors. The most recent (unpublished) information collated by the WRA from its members in 2017 is summarised below:

- Approximately 5 million tonnes of waste wood are generated in the UK.
- Approximately 3.7 million tonnes of waste wood are processed (both recycled and recovered) -
  - 1.7 million tonnes of which is being further processed into biomass for energy purposes;
  - 1.7 million tonnes is being recycled; and
  - 300,000 tonnes are being exported (for recycling or energy purposes).

Overall this results in 34% recycling of the wooden waste, 34% incineration with energy recovery, 26% landfilled, and 6% exported for recycling and energy recovery.

When comparing the above data with that collected in 2016, there has been an increase in the amount of waste wood recycled in the UK (1.4 million tonnes in 2016) and a decrease in the amount of waste wood exported (600,00 tonnes in 2016). The reduction in exports appears to correspond with a shift from an oversupply of waste wood to a growing shortage which the UK is beginning to face, this is in part caused by a combination of the unsettled winter the UK faced in 2017/2018 and a higher demand; a large number of wood waste energy recovery plants had entered commissioning at the beginning of 2018 and are due to be operational later this year [UK Anthesis 2017].

The data supplied by WRA is considered being of good quality as they represent a significant proportion of the waste wood industry within the UK. However, the data does not clarify the

proportion of waste wood processors which had actually contributed to the survey.

As the waste wood industry has such a complex supply chain involving numerous stakeholders, data gaps will inherently exist regarding the volumes of wood waste arising from different sources e.g. Local Authority, civic amenity sites, commercial, industrial and construction and demolition sectors. Only controlled or regulated waste wood streams can be traced through the UK Duty of Care regime (e.g. documented on Waste Transfer Notes/Consignment Notes).

### **Treatment in reality**

Following discussions with the EA and the WRA, it is apparent that new guidance for the management of wood waste is due to be released within the coming year. Such guidance will seek to address the ambiguities which wood producers and processors have with respect to classifying waste wood, and how it should be appropriately handled and processed. It is anticipated that separate codes of practice will be prepared for different sectors.

The WRA have advised that 'on the ground' classification of wood waste follows the grading system outlined in PAS 111, which can simply be defined as:

- (Grade A) Clean, untreated
- (Grades B and C) Treated, non-hazardous
- (Grade D) Treated, hazardous

The WRA have further advised that wood waste materials are handled following the appropriate Duty of Care procedures (as outlined in previous sections), with disposal routes following the priority order of the waste hierarchy.

Based on information supplied within current guidance, wooden windows and doors would be classified as mixed wood waste and would be destined for Chapter IV compliant incinerators and panel board manufacturing [UK PAS111 2012] [UK RPS 2017].

The barriers to better and/or more recycling of EoL wooden windows and doors in the UK are outlined below:

- The impacts of some treatments applied to wood are not widely understood by waste producers and processors. This therefore not only raises uncertainty regarding how wood waste materials can and can't be recycled, but also regarding control measures to make sure reprocessed wood does not pose a risk to human health or the environment.
- The oversupply of wood waste within the UK in recent years, particular regarding lower quality wood, has given rise to a lack of rigour in wood waste segregation at wood processing sites. This has meant that wood wastes are being sent to inappropriate facilities. With the growing development of energy recovery plants in the UK which are forecast to become operational later in 2018, there will be a higher demand for lower quality wood wastes. This will encourage greater discipline when segregating waste wood from mixed waste streams.

## Most significant national actors

Some of the most significant actors in the UK are:

### *Industry*

- Wood recyclers association
- British Woodworking Federation
- Wood Panel Industries Federation
- Wood Protection Association
- UK Timber Federation
- Wood Window Alliance
- Construction Products Association
- BRE
- National Federation of Demolition Contractors

### *Regulatory*

- Environment Agency
- Department for Environment, Food and Rural Affairs (DEFRA)
- Department for Business, Energy and Industrial Strategy (BEIS)
- Scottish Environment Protection Agency
- Natural Resource Wales
- Northern Ireland Environment Agency

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## 6. APPENDIX A - FINANCIAL PARTNERS



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Nederlandse Branchevereniging voor de Timmerindustrie (NBvT)  
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On behalf of EuroWindow,

Helle Carlsen Nielsen

Vice President

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## 7. APPENDIX B - DEFAULT USE STAGE AND EOL SCENARIOS FOR TIMBER WINDOWS AND DOORSETS

### B.1 General

The European Standard prEN 17213:2018 provides product category rules (PCR) for Type III environmental declarations for windows and pedestrian doorsets as defined in EN 14351-1 and prEN 14351-2. It includes a proposal for default treatment of waste windows and doorsets.

The scenarios provided in this appendix (see Figures 1, 2, 3 and 4) for timber windows and doorsets are proposed as alternatives to the default scenario for timber windows and doors proposed in the prEN 17213:2018 (E).

The scenarios are qualified estimates for timber windows and doorsets, based on the 2018 Ramboll screening study on wooden doors and windows EoL treatment conducted on behalf of EuroWindow (Ramboll, 2018). The scenarios are based on interviews with national authorities and industries from nine European countries, which combined represents different geographical regions in Europe. The scenarios reflect the best current knowledge on the EoL treatment for timber windows and doorsets in Europe.

The geographical regions are as follows:

- Northern Europe (exemplified with Denmark and Sweden)
- Middle Europe (exemplified Austria, France, Germany, The Netherlands, and UK)
- Eastern Europe and the Baltics (exemplified with Czech Republic)
- Southern Europe (exemplified with Italy)

The Ramboll screening study focused on the wooden part of timber windows and doorsets and the proposed amendments to the prEN 17213:2018 (E) therefore only apply for the timber fraction. The amended data to the prEN 17213:2018 (E) default scenario is highlighted with **bold** in the figure.

The default EoL scenarios for timber windows and doors considers three likely EoL options: Recycling, incineration with energy recovery, and landfilling. Doors and windows that can be classified as hazardous (e.g. due to PCB content) must be treated in specialized facilities for hazardous waste and are not included in the scenarios.

Denmark, The Netherlands, Sweden and United Kingdom report small amounts of reuse of timber doors and windows, and reuse in general is likely to increase in the coming years due to focus on circular economy and the environmental benefits of reuse. However, as this is still a minor treatment route this has not been suggested as a relevant EoL scenario for timber windows and doorsets.

## B.2 End-of-life

### Transport to landfilling, non-glass fraction (C4)

The prEN 17213:2018 (E) default scenario estimated that 50% of the non-glass fraction (metal, plastic, timber) is transported to landfilling following dismantling of the products. The Ramboll screening study does not support this estimation. The stakeholder interviews indicate that landfilling of this waste type is only relevant for France, the Czech Republic, the Netherlands and the UK where only a minor amount is routed to landfill. The remaining countries report that timber windows and doors are sent for recycling and incineration.

The following waste landfill rates for the *non-glass* fractions following dismantling of the products are therefore suggested:

**Table 1 Suggested landfill rates for non-glass fraction of EoL windows**

Region	C4: non-glass landfill rate [x]
Northern Europe	0 %
Southern Europe	0 %
	FR 10 %
Middle Europe*	UK, NL 5 %
	AT, DE 0 %
Eastern Europe and the Baltics	10%

\*If the specific country is unknown or if general data for Middle Europe is required, an average of 5% may be used. However, as the screening study revealed national differences country specific data is to be used when these are available.

NB: The Southern Europe and Eastern Europe and the Baltics regions are based on only one country each.

### Glass, metal and plastic waste from timber windows and doors (D)

As the screening study focuses on the wooden waste, there are no suggested changes to the prEN 17213:2018 (E) assumptions for glass, metal and plastic. The assumptions for these fractions therefore remain. 30% of the glass is transported for recycling, and 100% of this is considered recycled. 70% of the glass is landfilled.

100% of the metal received at the waste treatment facility is recycled and 100 % of the plastic waste from the waste treatment is incinerated with energy recovery.

### Wood waste from timber windows and doors (D)

There is overall a lack on specific data for timber from EoL windows and doors, but most countries report data for waste wood in general.

The prEN 17213:2018 (E) default scenario estimated that 100% of the timber fraction is incinerated with energy recovery. The Ramboll screening study does not support this estimation as the stakeholder interviews indicate that recycling of the timber fraction is a relevant treatment option in most European countries.

Based on the Ramboll screening study, Ramboll has estimated the EoL waste routing for the timber fraction from wooden doors and windows. This has been done by combining qualitative interviews with available national data on EoL treatment of waste wood in general and from C&D activities. Generally, it is assumed that the recycling percentage of wood waste from EoL wooden doors and windows is lower than that for general wood waste and waste wood from C&D activities.

Based on this, the estimations in Table 1 for EoL wooden doors and windows is suggested.

As the screening study also showed large variations in the EoL wooden doors and windows waste routing between countries, it has not been possible to suggest general regional data for the timber fraction. As a result, country specific data should be used when these are available.

**Table 2: Suggested country specific estimations of the treatment for the timber fraction from EoL windows and doors.**

	Recycled [a]	Incinerated [b]	Landfilled
Austria	0	100	0
Czech Republic	40	55	5
Denmark	25	75	0
France	40	35	25
Germany	5	95	0
Italy	80	20	0
The Netherlands	30	70	0
Sweden	5	95	0
UK	35	35	30

*Please note that these are based primarily on available data for wood waste in general combined with qualitative interviews on the waste routing, as no specific data on waste wood from doors and windows exist.*

### **Incineration with energy recovery**

As in the current draft for prEN 17213:2018 (E) energy recovery from incineration must be done with the process efficiency rate above 60% (R1 according to 2008/89/EC Annex II) in order to be defined as incineration. If it is lower the process is classified as disposal.

The screening study did not specifically investigate the process efficiency rates of the incineration facilities that receive the wood waste from timber windows and doors. But, based on Ramboll's professional knowledge of the European incinerators, it can be assumed that all incineration facilities for industrial wood waste and biomass combustion plants can be categorised as R1 facilities and thus incineration with energy recovery.

### **B.3 Regional scenarios for timber from EoL doors and windows.**

The following figures 1-4 describe regional scenarios for EoL of timber doors and windows in Europe, based on the findings in this report, qualifying the product specific EoL scenario for timber windows as outlined in prEN 17213:2018.

## Northern Europe

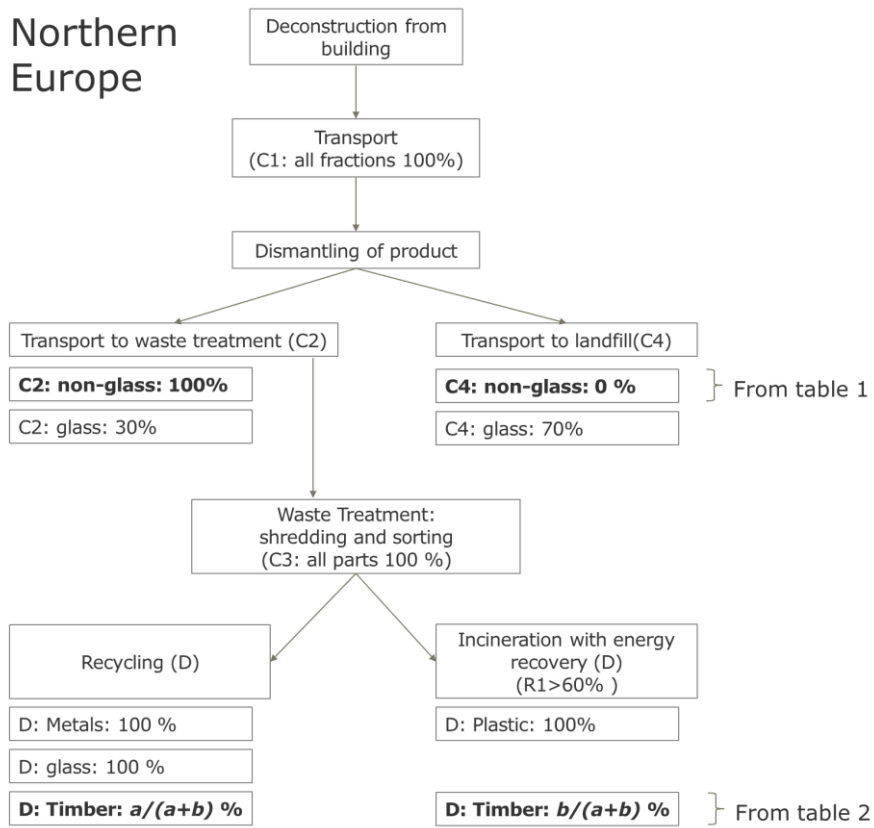


Figure 1 - treatment of EoL wooden windows and doors: Northern Europe

## Southern Europe

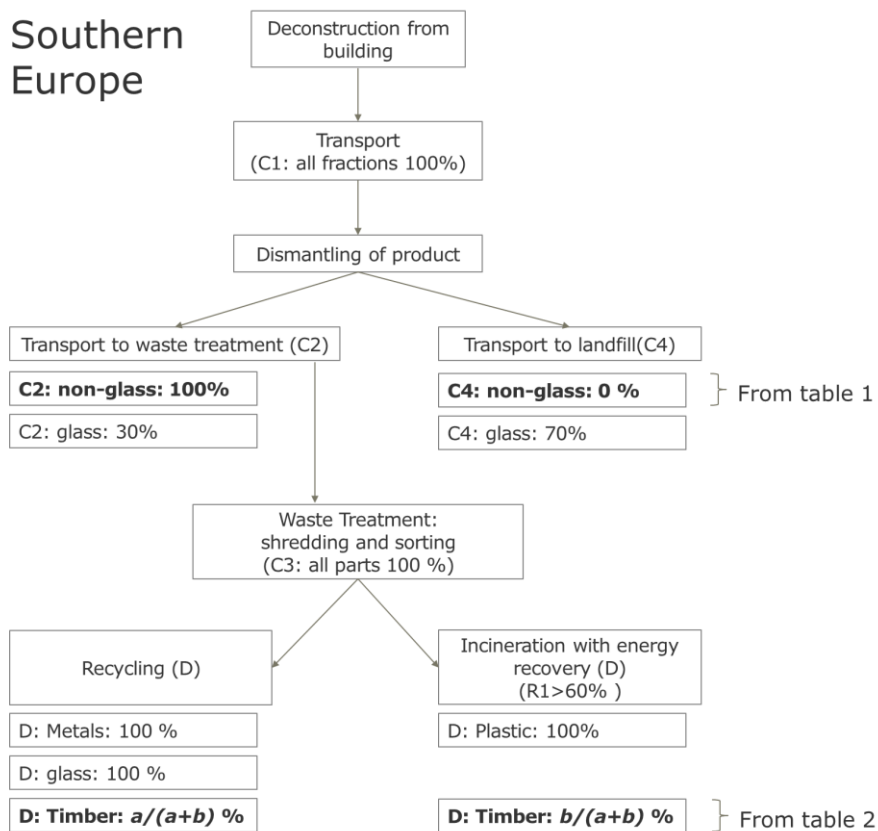


Figure 2 - Treatment of EoL wooden windows and doors: Southern Europe

## Middle Europe

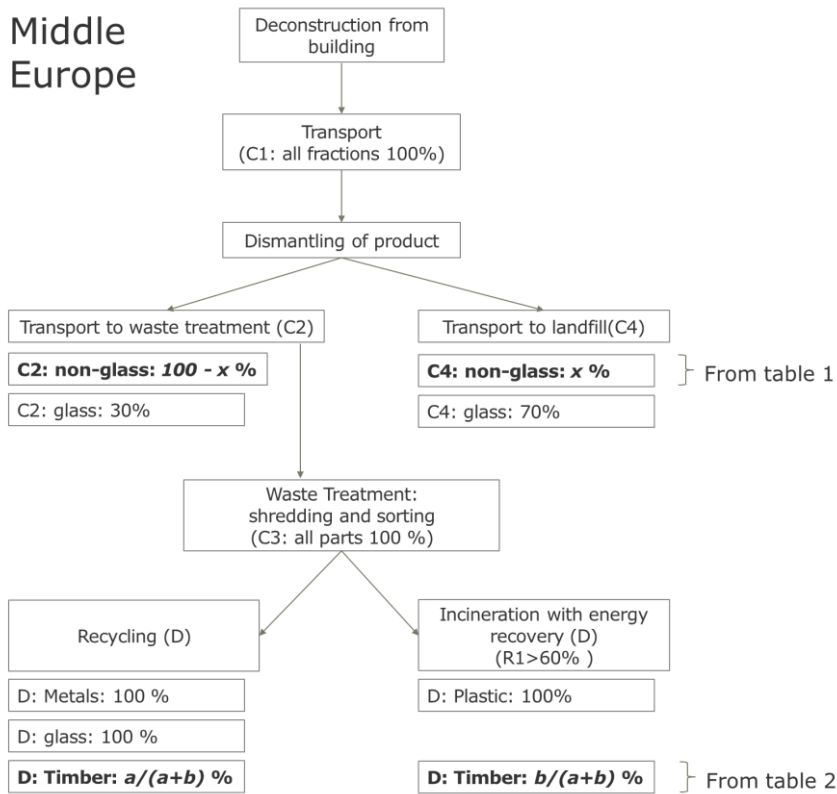


Figure 3 - Treatment of EoL wooden windows and doors: Middle Europe

## Eastern Europe and the Baltics

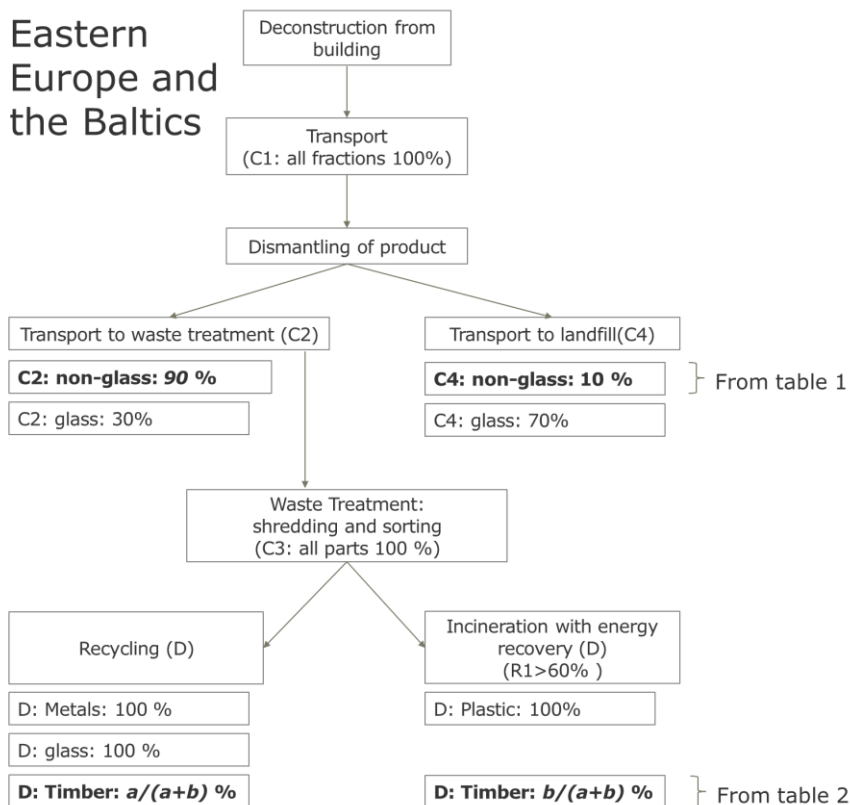


Figure 4 - Treatment of EoL wooden windows and doors: Eastern Europe and the Baltics