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Abstract

Waste wood or 'reclaimed wood' is produced in numerous areas of private and public life, in trade and in commerce. Its re-use increasingly poses problems in Germany since the construction sector produces large amounts of waste wood, particularly within the framework of the new building and reconstruction measures in the new federal states. This development has been reinforced in Germany as a result of national legislation, such as the German Waste Circle Act (KrW-/AbfG), and the European definitions of hazardous waste as well as accompanying regulations of the combustion of wastes.

In order to meet these challenges Germany has issued the 'Ordinance on the requirements for the recycling and disposal of waste wood', which is put into force, March 2003 in order to guarantee an orderly, environmentally correct and thus harmless disposal of timber treated with preservatives. Aim of the ordinance is to avoid, to reduce, to re-use or to recycle waste wood.

This paper gives an overview about the European definitions and classification principles for hazardous wastes as well as the regulation of the combustion of treated wood waste on the European and German level. Further, it describes the assessment of treated wood waste properties and the classification system of wood wastes applied in the German Ordinance of waste wood. Finally, it presents an overview about the main actives in treated wood wastes, their classification according to the established European and German codification and the problems arising thereof for the German impregnation industry.

1 Legal Aspects

Referring to the Council Frame-Directive 75/442/EEC¹ on waste of 15 July 1975, the Commission Decision 2000/532/EC² on a waste catalogue and a list of hazardous wastes of 22 January 2001, and the Council Frame-Directive 2001/77/EC³ on Renewable Energies of 27 September 2001, Germany implemented several subsidiary legal measures in order to ensure the orderly and harmless disposal of wastes.

The most important regulations referring to recovered wood are: The German Closed Substance Cycle and Waste Management Act (Kreislaufwirtschaftsgesetz - KrW-/AbfG), the Ordinance on Incineration Plants and other Combustible Substances (Seventeenth Ordinance on the Implementation of the Federal Emission Control Act), the Ordinance on the Requirements Pertaining to the Recovery and Disposal of Waste Wood (Ordinance on the Management of Waste Wood - (Altholzverordnung - AltholzV), the Act on Granting Priority to Renewable Energy Sources (Erneuerbare-Energien-Gesetz - Renewable Energy Sources Act - EEG), the Ordinance on Generation of Electricity from Biomass (Biomass Ordinance – Biomasseverordnung

¹ Amended by the following measures:

Council Directive 91/156/EEC of 18 March 1991; Council Directive 91/692/EEC of 23 December 1991; Commission Decision 96/350/EC of 24 May 1996; Council Directive 96/59/EC of 16 September 1996

² Replacing Decision 94/3/EC establishing a list of wastes pursuant to Article 1(a) of Council Directive 75/442/EEC on waste and Council Decision 94/904/EC establishing a list of hazardous waste pursuant to Article 1(4) of Council Directive 91/689/EEC on hazardous waste

³ Directive on the promotion of electricity produced from renewable energy sources in the internal electricity market

für klimaschonende Energieerzeugung - BiomasseV) of 21 June 2001, and the Ordinance on a Harmonised Waste List (Verordnung über das Europäische Abfallverzeichnis - Abfallverzeichnis-Verordnung - AVV) of 01. January 2002. On the basis of these legal regulations, in Germany recovered wood is mainly ruled by the waste regime and it is subdivided into five property-based categories.

1.1 German Closed Substance Cycle and Waste Management Act⁴

The German 'Act for Promoting Closed Substance Cycle Waste Management and Ensuring Environmentally Compatible Waste Disposal' (Waste Avoidance, Recovery and Disposal Act (KrW-/AbfG) of 27 September 1994, (latest changes: 21. August 2002) determines the objectives and fundamental rules of German waste management. It aims at the protection of natural resources and eco friendly waste disposal.

The general principles for the waste management are

- To AVOID
- To REDUCE
- To REUSE or to RECYCLE
- To ELIMINATE

1.2 German Ordinance on Incineration Plants

In Germany the Ordinance on Incineration Plants and other Combustible Substances – 17th BImSchV (Seventeenth Ordinance on the Implementation of the federal Emission Control Act) - of 23. November 1990 establishes a limitation of air emissions and further appropriate conditions for combustion in waste incineration and co-incineration plants. It was changed on 14. August 2003. The ordinance fixes the conditions for the incineration of solid and liquid waste and other substances which are not regular fuel according to the 4th BImSchV (Fourth Ordinance on the Implementation of the Federal Emission Control Act – Ordinance on Installations subject to Licensing (4. BImSchV) of 14. March 1997, changed 14. August 2003). Having regard to the potential hazardous waste, the 17th BImSchV requires more stringent conditions concerning the limitation of air emissions, the operation and monitoring of waste incinerators and co-combustion plants.

In the case of industrial plants practising co-incineration by mixing regular fuels with waste wood, the co-incineration shall not be allowed to cause higher emissions of polluting substances than those permitted for conventional waste incinerators. That means that the limit values for the combustion of regular fuel will be determined in accordance with the 13th BImSchV (Thirteenth Ordinance Implementing the Federal Immission Control Act - Ordinance on Large Firing Installations) or TA Luft (First General Administrative Regulation Pertaining the Federal Immission Control Act - Technical Instructions on Air Quality Control) of 1986, changed 30. July 2002. For the partial use of waste the stringent emission limit values apply to that fraction of the combustion gasses derived from incineration of waste according to the 17th BImSchV.

On European level the Directive 2000/76/EC on the Incineration of Waste of 4 December 2000 establishes legal requirements for the incineration and co-incineration of waste. The Directive was approved by the Conciliation Committee at the begin of October 2000 and entered into force with its publication on 4 December 2000. Germany had to transpose the Directive into national laws within two years. As a consequence the German 17th BImSchV had to be amended (s. above).

⁴ As amended by the Act on the Expedition of Licensing Procedures (Genehmigungsverfahrensbeschleunigungsgesetz) of 12 September 1996 (Federal Law Gazette I p. 1354), the Act for the Conservation of the Soil (Gesetz zum Schutz des Bodens) of 17 March 1998 (Federal Law Gazette I p. 502), the Act on the Reform of Road Haulage Law (Gesetz zur Reform des Güterkraftverkehrsrechts) of 22 June 1998 (Federal Law Gazette I p. 1485) and the Act on the Implementation of the Protocol of 7 November 1996 to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter of 1972 (Federal Law Gazette I p. 2455)

This Act implements Council Directive 91/156/EEC of 18 March 1991 for amendment of Directive 75/442/EEC on waste (EC Official Journal no. L 78 p. 32) and of Council Directive 94/31/EC of 27 June 1994 for amendment of directive 91/689/EEC on hazardous waste (EC Official Journal no. L 168 p. 28).

1.3 German Ordinance on the Management of Waste Wood

1.3.1 General

The Closed Substance Cycle and Waste Management Act (KrW-/AbfG) considerably extended the scope of the waste law as compared to earlier legislation. Under the heading “closed substance cycle” the Act also includes all waste recovery measures relevant to the waste sector. The provisions in the Closed Substance Cycle and Waste Management Act that in many cases had to be kept general, need to be specified for individual waste flows by means of more detailed provisions in order to ensure legal and investment certainty in the enforcement of the law.

Furthermore, the Ordinance shall guarantee a binding and nationwide standard for waste wood management and thus leading to greater equality of competition, in particular for the small to medium waste management companies primarily active in this field. From both an ecological and an economic point of view, the Waste Wood Ordinance represents an important step towards the sustainable further development of the closed substance economy.

On 1 March 2003 the Ordinance on the Management of Waste Wood entered into force. This Ordinance is considered a pilot project for such material-specific ordinances. It laid down specific requirements pertaining to the recycling and energy recovery as well as for the disposal of waste wood on the basis of the Closed Substance Cycle and Waste Management Act. These requirements provide a sustainable support for the environmentally sound recovery of waste wood and ensure that pollutants are eliminated from the economic cycle.

In this context, waste wood was particularly suitable as a model substance because

- It is a significant volume flow for waste recovery,
- It is suitable for both substance recycling and energy recovery,
- The environmental compatibility of some of the recovery paths for waste wood currently in practice is questionable, and
- There is an urgent need for standard nationwide regulation in view of the different regulations of the German Länder.

The Ordinance defines specific requirements for substance recycling and energy recovery and for the disposal of waste wood on the basis of the Closed Substance Cycle and Waste Management Act. At the same time, these requirements are harmonised with the requirements to be adhered to for the management of waste wood pursuant to chemicals and hazardous substances law as well as the provisions governing the keeping of waste recovery and disposal records. The following regulations are particularly relevant:

- Both residual wood from industry and wood products that have become waste are classified as waste wood in this Ordinance. Generally speaking, waste wood includes residues from the working and machining of wood and derived timber products as well as used products such as wood packaging, pallets, furniture and waste wood from demolition.

The prerequisite here is firstly, in the case of composite materials, that the wood content is greater than 50 percent by mass, and secondly, that the waste wood qualifies as waste. This means, for instance, that residual wood classified as a tie-in product or a by-product (e.g. wood chips from saw mills or forest thinning) is not included in the scope of application.

- The Ordinance identifies and covers all the common methods of waste wood management such as preparing waste wood for the production of derived timber products, the production of active carbon or industrial charcoal and synthesis gas and the energy recovery of waste wood as a substitute fuel. Other possible recovery paths are not regulated by the Ordinance but are also not excluded so that this does not stand in the way of incorporating new recovery paths and innovative recovery procedures for waste wood. Whether these are permissible according to waste law is then assessed not on the basis of the Waste Wood Ordinance but instead directly on the basis of the requirements in the Closed Substance Cycle and Waste Management Act.

If waste wood cannot be recovered, it must be disposed of using thermal processes. Land filling is not permitted

The requirements in the Waste Wood Ordinance define high-quality substance recycling and energy recovery procedures. There is no regulation in the Ordinance on priority for substance recycling or energy recovery pursuant to the Closed Substance Cycle and Waste Management Act, since in the case of wood as a renewable raw material there are no clear advantages or disadvantages for the one or the other type of recovery. The waste holder thus has the choice between substance recycling and energy recovery, although the prerequisites for permissibility stipulated in the Closed Substance Cycle and Waste Management Act are to be given due consideration in the case of energy recovery.

1.3.2 Specific regulations for waste wood in Germany

Definition of Terms

For the purposes of this Ordinance the following terms are used in Germany in connection with wood preservation and the disposal of wood wastes. The same terms might be used in a different way in other countries and might have an other meaning

Waste wood:

Residual wood from industry and used wood, insofar as these constitute *waste*⁵ within the meaning of the Closed Substance Cycle and Waste Management Act;

Residual wood from industry:

Wood residues accumulating in woodworking and machining plants, including derived timber residues accumulating in the derived timber product industry as well as composite products consisting mainly of wood (over 50% by mass);

Used wood:

Used products made from solid wood, derived timber products or from composite materials consisting mainly of wood (over 50% by mass);

Waste wood containing PCBs:

Waste wood which constitutes waste wood containing PCBs within the meaning of the PCB/PCT Waste Ordinance [*PCB/PCT-Abfallverordnung*] and is to be disposed of in accordance with the provisions of this Ordinance, in particular insulating board and sound insulating board treated with agents containing polychlorinated biphenyls;

Wood preservatives:

Substances used in woodworking and machining having a biocidal effect against xylophagous insects and fungi as well as fungi which discolour the wood, as well as substances for reducing the flammability of wood;

Substance recycling of waste wood:

- a) Processing of waste wood to wood chips for the manufacture of derived timber products,
- b) Production of synthetic gas for further chemical use and
- c) Manufacture of active carbon/industrial charcoal;

Energy recovery from waste wood:

Recovery of waste wood within the meaning of the Closed Substance Cycle and Waste Management Act⁶;

⁵ "Waste" means all movable property, which the holder discards, or intends or is required to discard. "Waste for recovery" is waste that is recovered; waste that is not recovered is "waste for disposal".

⁶ *Energy recovery* shall mean the use of waste as a substitute fuel; the priority for energy recovery does not affect thermal treatment of waste for disposal, especially household waste. The main purpose of a measure in question shall be taken as the criterion for differentiation. For a given waste sample that has not been mixed with other substances, the type and extent of the waste's impurities, and the additional waste and emissions occurring as a result of its treatment, shall be the criterion for determining whether the relevant waste management measure's main purpose is energy recovery or treatment.

Waste wood treatment installation:

Installation used for substance recycling or energy recovery from waste wood and installations for sorting or other treatment of waste wood including any attendant storage;

Interfering substances:

Inorganic or organic substances which damage wood, particularly soil, stones, concrete, metal parts, paper, cardboard, textiles, plastics or foil which are stuck to, added to or attached to the waste wood, insofar as they prevent recovery.

1.3.3 Waste Wood Categories

Waste wood must be assigned to one of four of the following waste wood categories depending on the level of pollution.

- **Waste wood category A I:**
Waste wood in its natural state or only mechanically worked which, during use, was at most insignificantly contaminated with substances harmful to wood,
- **Waste wood category A II:**
Bonded, painted, coated, lacquered or otherwise treated waste wood with no halogenated organic compounds in the coating and no wood preservatives,
- **Waste wood category A III:**
Waste wood with halogenated organic compounds in the coating, with no wood preservatives,
- **Waste wood category A IV:**
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 wood categories A I, A II or A III, with the exception of waste wood containing PCBs.

1.3.4 Implications for the German industry

The assignment of waste wood to category A IV can pose difficulties to the wood industry. Waste timber can be contaminated to different extents with paint, lacquer, coatings and wood preservatives. Some active ingredients can represent a particular risk potential. Among these are pentachlorophenol, mercury, arsenic and/or chromium compounds, as well as creosotes (Table 1).

Table 1: Kind of impurities* and estimated quantity of wood waste from different origin (Voss, Willeitner 1995, changed)

Assortment	(possible) impurity	Retention	Estimated quantity (*1000 to/a)
Sleepers	Creosote, CKB ¹	45 kg/m ³ – 175 kg/m ³ n.d.i.	ca. 60 – 85
Poles	CKB, CKF, CKA	6-12 kg/m ³	ca. 15 – 25

	creosote, HgCl ₂	ca. 90 kg/m ³ 0,6-1,0 kg/m ³	
Landscaping	CKB, CKF Cu-HDO-salts creosote tar oil derivates/ formulations LOSP	6-8 kg/m ³ 3-4 kg/m ³ ca. 80 kg/m ³ 250-400 g/m² n.d.i.	ca. 220
Hop-poles	CKB, CKF, CKA creosote HgCl ₂	ca. 6-8 kg/m ³ ca. 90 kg/m ³ ca. 0,4-0,8 kg/m ³	present stock (pcs): 150.000 – 270.000
Vineyard posts	CKA, CKF CKB creosote HgCl ₂ CFA	5-6 kg/m ³ ca. 10 kg/m ³ 50-100 kg/m ³ ca. 0,6-1,0 kg/m ³ 5-6 kg/m ³	ca. 9 – 14
Wood from demolition of buildings, building sites	all WPs except creosote, chloronaphthaline and HgCl ₂ ; coatings, varnishes, impurities etc.	No specification possible	ca. 500 – 2.000
Wood for packaging/pallettes	rarely	-:-	ca. 470 – 970
Cable drums	CKB, CKF, CK (CKA?)	6-8 kg/m ³	31 – 45
Furniture	varnishes, glues, coatings	Unknown	ca. 2.500
Industry residues ²	rarely, known if applied	No specification possible	ca. 8.000
Total treated			1.300 – 3.400
Untreated			10.500
Grand total			11.800 – 13.900
<p>* Voss, A., Willeitner, H. 1994; Bucki, C., Willeitner, H. 1994; old German states. 1 Privat railways in some cases may use chromium containing salts (only pine). 2 Industry residues are solid wood cut-offs, chips, shavings, dust, bark. N.d.i. No definite information available</p>			

2 Classification concept

With regard to inspections and monitoring, the Waste Wood Ordinance is geared towards strengthening the personal responsibility of the installations, supplemented by moderate independent inspections and monitoring. The focus is on the operators of waste wood treatment installations that are obligated to allocate the waste wood to the given recovery paths. This allocation process is to be monitored regularly. This system of internal and independent monitoring is supported by documentation and reporting obligations. This provision produces a high level of precautionary environmental protection with the greatest possible personal responsibility while at the same time being enforcement-friendly.

Instead of elaborate and uncertain sampling and analysis provisions, assignment to the respective category can occur on the basis of origin and in accordance with strict requirements for keeping waste wood separate

and bans on mixing waste woods. To simplify assignment, the Ordinance contains a general rule to be assumed for the common types of waste wood. In the case of a mixture of different waste wood categories, the mixture must always be assigned to the category subject to the most stringent provisions.

In order to ensure safe recovery, the waste wood categories A I to A IV are then allocated to the individual substance recycling paths; energy recovery is governed by the provisions of the Federal Immission Control Act and the statutory ordinances issued on the basis thereof. Waste wood containing PCBs is classified, as a “special category” if it’s PCB content is more than 50 mg/kg. Waste wood containing PCBs must be disposed of in accordance with the PCB/PCT Waste Ordinance – only thermal treatment procedures come into question.

3 Re-use/recycling

The waste wood categories A I to A IV may be used for the manufacture of active carbon/industrial charcoal and the production of synthetic gas as well as in incineration and gasification plants that are licensed pursuant to the Fourth Ordinance on the Implementation of the Federal Immission Control Act and with regard to emissions are subject to the Seventeenth Ordinance on the Implementation of the Federal Immission Control Act (cf. Table 2). During these procedures, the organic pollutants contained in the waste wood are completely destroyed due to the high temperatures. Heavy metals are bound as solid in the residues or dispersed during waste gas purification.

Table 2: Methods for the substance recycling of waste wood

Recovery method	Permissible waste wood categories				Special requirements
	A I	A II	A III	A IV	
Processing of waste wood to wood chips for the manufacture of derived timber products	Yes	Yes	(Yes)		The processing of waste wood from category A III is only permissible if varnishes and coatings have been largely removed by pre-treatment or will be largely removed during processing.
Production of synthetic gas for further chemical use	Yes	Yes	Yes	Yes	Recycling is only permitted in installations licensed for this purpose under Article 4 of the Federal Immission Control Act.
Manufacture of active carbon/industrial charcoal	Yes	Yes	Yes	Yes	Recycling is only permitted in installations licensed for this purpose under Article 4 of the Federal Immission Control Act.

Only certain pollution-free or low-pollution waste woods can be considered for use in manufacturing derived timber products. Compliance with this requirement is guaranteed by binding pollutant limit values (cf Table 3), including relevant sampling and analysis provisions, for the wood chips produced for use as raw materials for the manufacture of derived timber products (cf Table 4). Waste wood processed in this manner for the derived timber products industry ceases to be waste and can be processed there as a primary raw material.

Table 3: Limit values for wood chips used in the manufacture of derived timber products

Element/compound	Concentration (milligrams per kilogram dry mass)
Arsenic	2
Lead	30

Element/compound	Concentration (milligrams per kilogram dry mass)
Cadmium	2
Chromium	30
Copper	20
Mercury	0,4
Chlorine	600
Fluorine	100
PCP	3
Polychlorinated biphenyls	5

Table 4: General classing of waste timber arising from regular assortments (examples).

Common types of waste wood (examples)		Usual assignment
Wood waste from woodworking and machining	Waste, cuttings, shavings from solid wood in its natural state	A I
	Waste, cuttings, shavings from derived timber products and other treated wood (with no harmful contaminants)	A II
Packaging	Pallets	A I

		Palettes made from derived timber products	A II
		Other pallets with composite materials	A III
		Transport cases, crates made from solid wood	A I
		Boxes for fruit, vegetables and ornamental plants as well as similar boxes made from solid wood	A I
		Ammunition boxes	A IV
		Cable reels made from solid wood (made before 1989)	A IV
		Cable reels made from solid wood (made after 1989)	A I
Waste wood from the construction industry	Waste wood from building sites	Solid wood in its natural state	A I
		Derived timber products, barked wood, treated solid wood (with no harmful contaminants)	A II
	Waste wood from demolition and restoration work	Boards, false ceilings, planks from interior works (with no harmful contaminants)	A II
		Door leafs and frames (without harmful contaminants)	A II
		Profile boards for the fitting out of rooms, ceiling panels, ornamental beams etc. (without harmful contaminants)	A II
		Heat and sound insulating board treated with agents containing polychlorinated biphenyls	Disposal
		Chipboard used in construction	A II
		Wood used in construction for load-bearing elements	A IV
		Timber framework and rafters	A IV
		Windows, window posts, outer doors	A IV
		Impregnated wood used in external structures	A IV
Wood from construction and demolition work containing harmful contaminants		A IV	
Impregnated waste wood used in external structures	Railway sleepers	A IV	
	Transmission poles	A IV	
	Various wood used in horticulture and landscaping, impregnated garden furniture	A IV	
	Various wood used in agriculture	A IV	
Furniture	Furniture, solid wood in its natural state	A I	
	Furniture, with no halogenated organic compounds in the coating	A II	
	Furniture, with halogenated organic compounds in the coating	A III	
Waste wood from bulky refuse (mixed)		A III	
Waste wood from industrial use (e.g. industrial flooring, cooling towers)		A IV	
Waste wood from hydraulic engineering			
Waste wood from dismantled vessels and goods wagons			
Waste wood from damaged structures (e.g. burnt wood)			
Fine fraction from the processing of waste wood to make derived timber products			

4 Energy recovery

In the context of the energy recovery of waste wood, use of waste wood in installations where fodder is dried in direct contact with the installation's exhaust and flames is restricted to waste wood category A I. This ensures that fodder contamination is ruled out.

Priority must be given to energy recovery from such kind of waste wood, which cannot be used for the production of derived timber products (Table 5 and Figure 1). The energy recovery from waste wood treated with heavy duty wood preservatives is strongly regulated by e.g. the Fourth Ordinance on the Implementation of the Federal Emission Control Act – Ordinance on Installations subject to Licensing (4. BImSchV), Thirteenth Ordinance Implementing the Federal Immission Control Act - Ordinance on Large

Firing Installations (13. BImSchV) of 22. June 1983, and the Seventeenth Ordinance Implementing the Federal Immission Control Act - Ordinance on Incinerators for Waste and similar Combustible Material (17. BImSchV) of 23. November 1990.

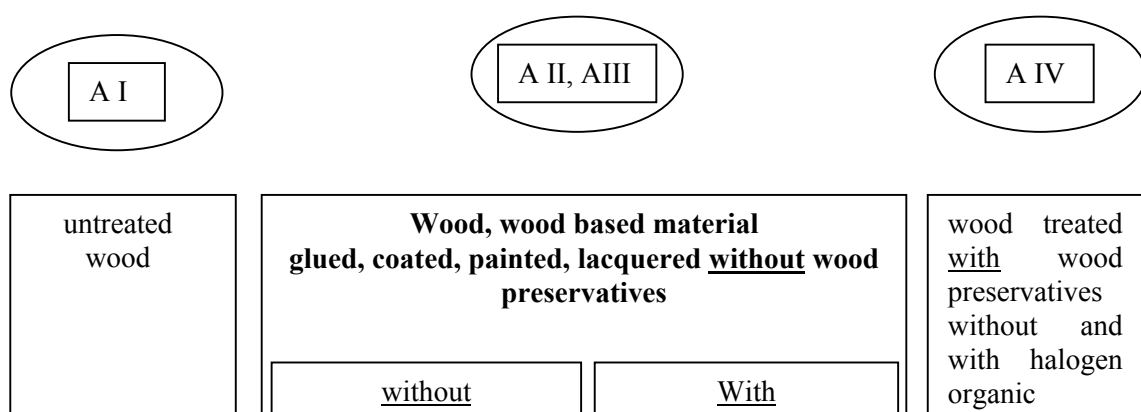
At present, only waste timber of contamination group A I may be processed in furnaces of a nominal thermal output of less than 50 kW (Figure 1). Furnaces with a nominal thermal output of more than 50 kW and less than 1 MW may use waste timber of contamination group A II but only in woodworking and wood manufacturing companies. Furnaces with less control of harmful substances may only process waste timber of contamination groups A I and A II. Furnaces, which fulfil higher requirements with regard to the control of harmful substances, may only process waste timber of contamination groups A I, A II and A III. If the furnace fulfils the highest requirements of the Seventeenth Ordinance Implementing the Federal Immission Control Act - Ordinance on Incinerators for Waste and similar Combustible Material, it is then also possible to process waste timber of contamination groups A III and A IV.

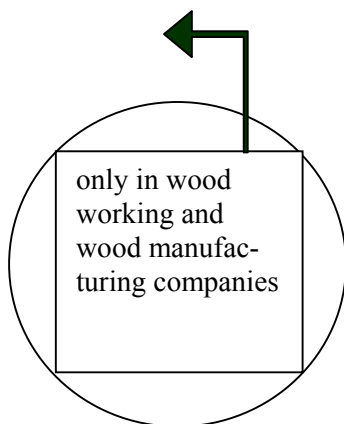
Table 5: Emission limit values for cement kilns (TA Luft) and for waste incinerators (17. BImSchV) as well as emissions detected (values given in mg/m³, Dioxins and Furans given in ng/m³ TEQ); Wiedemeier 1999, changed

Emission			incinerator ²⁾	Coal power plant (melting chamber combustor) ³⁾		17 BImSchV ⁵⁾
Total dust	n.t.	1 – 44	0,5 – 1	5 – 10	50	10
Total C	≤ 1 – 7,7	0,9 – 94	1 – 2	<10	---	10
CO	35 – 301	1350 – 3750	10 – 25	13 – 181	---	50
HCl	0,3 – 8,3	0,7 – 10	0,5 – 2	3 – 11	30	10
HF	0,3 – 29,6	0,7 1,5	<0,5	>2,5	5	1
SO ₂	n.t.	9 – 730	5 – 8	<250	400	50
NO _x	131 – 791	740 1.200	65 – 120	<200	1300	200
Cd+Pb	n.t.	0,0003 – 0,05	<0,01	0,0007 – 0,0016	0,2	0,05
Hg	n.t.	0,00014 – 0,017	<0,02	0,004 – 0,011	0,2	0,05
Sb+As+Co+Ni+Se+Te+Pb+Cr+Mn+V+Sn+Cu	0,1 – 1,9	0,002 – 0,106	<0,2	0,015 – 0,023	1	0,05
Dioxins and Furans	0,018 – 1,415	<0,03	<0,03	<0,002	---	0,1 TEQ

- 1) according to Reiter and Stroh 1995
- 2) values by RZR-Herten, 1997 avi-Twente/NL 1999
- 3) Technical Supervision Association (TÜV) North, coal power plant Ibbenbüren, June 1999
- 4) Technical Guidance Air (TA Luft)
- 5) Ordinance on Incinerators for Waste and Similar Combustible Materials (17th BImSchV), same limit values as in the draft EU proposal for the emissions from waste incinerators (COM(98)0558 – C4-0668/98 – 98/0289(SYN)) with the exception of NO_x = 500 mg/m³ (EU proposal).

Figure 1: Classing of untreated and treated waste timber with furnaces of different standard (Anonymus 1998)





5 Waste management for treated wood in the different European Countries

The waste management for treated wood is different in the European countries and varies between strongly regulated and no regulation at all. On the occasion of the 6th Workshop 21 - 23 September 2003 Zagreb, a survey was carried out among the signature countries of the EU COST Action E22 'Environmental **Question 1:**

How much waste wood (to) do you produce in your country annually?

Thereof: treated waste*

Thereof: treated with CCA

*wood treated with any kind of preservative, including CCA

Question 2:

What is your country doing with waste wood?

Question 3:

What is the legal situation for waste wood in your country (legislation/regulation)? Please tick the respective box and note the related regulations, directives etc that you are aware of.

The following tables (Table 6, Table 7, and Table 8) present the results received. Further information on this topic can be found at URL <http://www.bfafh.de/cost22.htm> . Please note that the figures presented can only be considered as preliminary and are still a matter of improvement as soon as new results are available.

6 Conclusions

The German Waste Wood Ordinance (AltholzVO) is intended to considerably increase the re-use of waste wood, thus to ensure its orderly and harmless disposal and to prevent the transporting of waste into those states which have the "easiest" way of disposal.

In Germany the disposal of waste wood led to great uncertainty at those owning waste wood as well as at the approval authorities. With the Waste Wood Ordinance Germany is breaking new ground. Thus far there are no European regulations in this field. This Ordinance promotes the environmentally sound management of waste wood. It ensures a binding and nationwide standard for waste wood management and thus leads to greater equality in competition, in particular for small and medium-sized recovery and disposal enterprises. From the standpoint of its structure and system, this Ordinance is also intended to serve as a pilot ordinance for future requirements specific to material flows for waste recovery.

Table 6: Production of wood wastes

Country	Untreated amount [to]	treated amount [to]	CCA treated amount [to]
B	1,200.000	N/D	200.000
CH	N/D	N/D	N/D
D	8,000.000	1.900 – 2.800	-
FIN (VTT)	530.000	10.000	9.000
GR	90.000 - 100.000	10.000	1.000
IRL	N/D	N/D	N/D
NL	N/D	400.000***	120.000***
NO	1,200.000	100.000	15.000
RO*	2,320.000	42.300**	-
UK	7,300.000	80.000	40.000

* Unfortunately there are no available data (N/D) concerning the amount of treated wood waste (including those treated with CCA).

There are no collects (recoveries) of treated wood waste organized at national level.

** This quantity has resulted from the sawdust and shaves, which were obtained from some wood, based products manufacturing. (In their manufacturing we use also different chemicals – not preservatives)

*** Figures in m³ * 0,5 (~ to)

Table 7: Kind of waste wood reuse

Kind of reuse/Country	untreated amount [to]	Treated Amount [to]	CCA treated Amount [to]	
Recycling / reuse e.g. particle board	B	816.000	156.000	N/D
	CH	N/D	N/D	N/D
	D	N/D	N/D	-
	FIN (VTT)	5.000	N/D	N/D
	GR	50.000	N/D	N/D
	IRL*	N/D	N/D	N/D
	NL	844.000	127.000	5.100

	NO	N/D	N/D	N/D
	RO	260.000	-	-
	UK	0.63 Mto reused 0.84 Mto recycled to panel prodn	80.000	40.000
Landfill	B	N/D	N/D	N/D
	CH	banned	banned	banned
	IRL*	N/D	N/D	N/D
	D	banned	banned	banned
	FIN (VTT)	5.000	N/D	N/D
	GR	N/D	5.000	N/D
	NL	0	0	0
	NO	20 %	30 % (?)	0 % (?)
	RO	110 000	-	-
	UK	ca 5,530.000	80.000 to	All - ~ 40.000
Energy production	B	336.000	164.000	N/D
	CH	N/D	N/D	N/D
	D	N/D	N/D	N/D
	FIN (VTT)	295.000	10.000	9.000
	GR	20.000	2.000	N/D
	IRL*	N/D	N/D	N/D
	NL	200.000	1.200	500
	NO	80 %	70 % (?)	100 % (?)*
	RO	1,520.000	-	-
	UK	unknown		
Special dumps	B	N/D	N/D	N/D
	CH	N/D	N/D	N/D
	D	-	-	-
	FIN (VTT)	225.000	N/D	N/D
	GR	N/D	N/D	N/D
	IRL*	N/D	N/D	N/D
	NL	0	0	0
	NO	1,200.000	100.000	15.000
	RO	430.000	-	-
	UK	Very little		

* IRL - Again, N/D available. However, much of construction waste currently goes into landfill. There are re-cycling programmes underway to reduce this. At present, there is, to my knowledge, any separation of any wood waste.

There is a lot of interest at present at sawmill level to use wood waste for energy production and it is expected that this is a good possibility. At present, sawmill wood residue goes to the various particle-board plants (chipboard, OSB, MDF, hardboard).

There is at least one company which will go to a factory to grind up waste wood eg pallets into chips.

We have no special dumps. If something is classified as a hazardous wood waste, it will be shipped to eg Finland for high temperature incineration – at a high cost!

Table 8: Waste wood regulations

Kind of use	Regulation			
	Exists	Does not exist	In preparation	Coming into force (year)
Recycling / reuse e.g. particle board	B			
	CH		X	
	D	X		
	FIN (VTT)	X		
	GR		X	
	IRL	X (in principle)		

	NL	X			
	NO		X		No
	RO*		X		
	UK			X	2004
Landfill	B	X			
	CH	banned			
	D	X			
	FIN (VTT)		X		
	GR	X			
	IRL	X			
	NL	X			
	NO		X		
	RO*		X		
	UK			X	2004 (I think - maybe 2007)
Energy production	B	X			
	CH	+			
	D	X			
	FIN (VTT)			X	
	GR			X	
	IRL		X		
	NL	X			
	NO		X	X	1 - 3 years
	RO*				
	UK		X		
Special dumps	B	X			
	CH	banned			
	D	X			
	FIN (VTT)		X		
	G				N/D
	IRL	X			
	NL	X			
	NO		X		
	RO*		X		
	UK	X			

* In RO there is no specific legislation concerning the use of wood waste as you have indicated.

In accordance with EU legislation that covers that field, respectively the Council Directive 75/442/CEE – the European Catalogue for Waste, published by Council Decision 94/3/CE and reviewed by the Decision 2000/532/EC, the following regulations have been issued:

G 155/8.03.1999 – Decision regarding the introduction of waste management and of the European Catalogue for Waste;

OUG no. 78/16.06.2000 – Regulation regarding waste (storage, manipulating, utilization, destruction);

HG 128/14.02.2002 – Decision regarding the waste incineration.