



‘Absorbing the Potential of Wood Waste in EU Regions and Industrial Bio-based Ecosystems — BioReg’

## D2.1: MAPPING OF EU MODEL REGIONS CASE STUDIES AND CLASSIFICATION OF WOOD



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To the attention of the Research Executive Agency

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BioReg project proposes to create a platform of stakeholders who are able to influence and develop their regions towards bio-based industries and products.

The project runs from January 2017 to December 2019, it involves 8 partners and is coordinated by "le CABINET D'ETUDES SUR LES DECHETS ET L'ENERGIE" (CEDEN).

More information on the project can be found at <http://bioreg.eu/project/>.

## ABSTRACT

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Main goal of task 2.1 is to characterise and develop a map of EU regional wood waste ecosystems. Previous study shows that developed ecosystem depends on region. To show differences in regions, the theoretical biomass potential of wood waste from municipal waste, demolition wood and wood industry were used. Additionally, they were shown wood waste management plants, biomass power plants, waste to energy plants, research institute, associated members and panel producers. In model regions wood waste ecosystems are well developed. They have law directly relating to wood waste management, which is missing in recipient regions. Wood waste valorisation practises are well-built.

## EXECUTIVE SUMMARY

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This document is intended for public audience and it includes information about wood waste biomass as well as adequate stakeholders.

In deliverable 2.1 were characterised the regional wood waste potential (**Error! Reference source not found.**) which is also presented in the form of maps: Theoretical biomass potential of wood waste from municipal waste (**Error! Reference source not found.**), Theoretical potential of demolition wood (**Error! Reference source not found.**), Technical potential of wood waste from wood industry (**Error! Reference source not found.**), Density of theoretical wood waste biomass potential (**Error! Reference source not found.**), Density of theoretical demolition wood biomass potential (**Error! Reference source not found.**), Density of technical wood waste biomass from wood industry (**Error! Reference source not found.**). Furthermore the data for preparation fo maps: Map of biomass power plants localization (**Error! Reference source not found.**), Map of waste energy plants localization (**Error! Reference source not found.**), Map of associated members of Europanels (**Error! Reference source not found.**), Map of collaborating institute of Europanels (**Error! Reference source not found.**), Map of producers of Europanels (**Error! Reference source not found.**), Map of wood waste management plants **Error! Reference source not found.**5).



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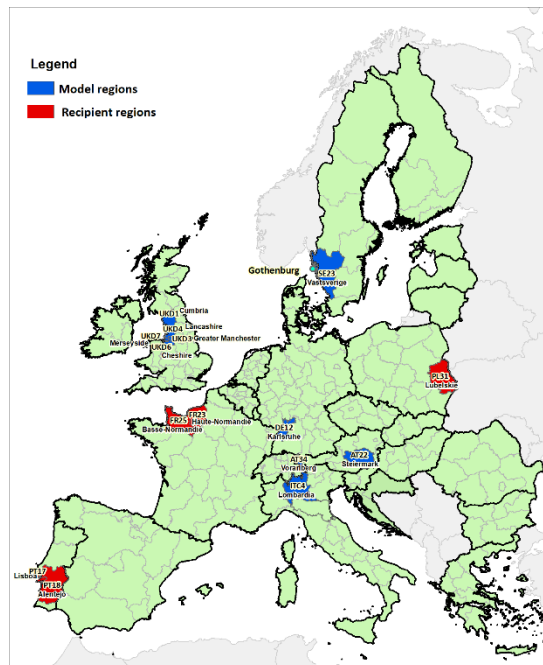
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## 1 INTRODUCTION

The BioReg project aims to identify good practices that could be implemented in the recipient Regions. Within the project we have identified five model regions which were analysed and presented in the workshop. The best practises from model regions were identified and presented to the stakeholders from recipient regions.



**Figure 1: The regions of BioReg project**

The aim of the related task was to develop a map of EU regional wood waste ecosystems typifying them according to their general character. The geo-portal will illustrate how the wood waste ecosystems vary along a number of selected attributes and dimensions.

Goals:

- Map out model wood waste ecosystems on the basis of the four geographical demonstrator regions studied;
- Classify model European wood waste ecosystems at the national and transnational comparative level;
- Understand which ecosystem components contribute to the successful development of European wood waste ecosystems.



## 2 WOOD WASTE ECOSYSTEMS

Data assembled in a previous task, and specially collected for this task allow us to determinate main ways in which wood waste is managed. We have distinguished three ecosystems: energy recovery, recycling and mixed.

“Energy recovery” means that most of the wood waste is used to obtain energy. This trend can be observed in Northern countries like Sweden and Finland. Based on our model region, Gotenburg, the table below shows main components which contribute to its success.

<b>National context</b>	<p>The supply of virgin wood probably reduces the incentives for reuse and recycling of waste wood fractions. The forest industries and pulp &amp; paper mills excel at recycling both wood and paper both within their processes and over life cycle time.</p> <p>Demand is pushing for renewable products that can be based on wood sources.</p>
<b>Regional context (Gotenburg)</b>	<p>In general, the regional context is very much the same as the national when it comes to the processing of waste wood.</p>
<b>Recycling or recovery rate:</b>	<p>Waste is a fuel used in Swedish district heating systems. Sweden recovers more energy from waste than any other country in Europe, approximately 3 MWh per ton. Sweden is strong on collection and recycling of waste, and wood waste tend mainly to be used in energy recovery.</p>
<b>Specifics policies/ regulation /classifications</b>	<p>According to the EU Framework Directive on Waste and the Swedish Waste Ordinance, waste incineration with efficient energy recovery is regarded as recycling. Swedish plants fulfil the energy efficiency criterion (R1 formula) by good margin. Energy recovery is a hygienic and environmentally sound treatment method for waste that cannot or should not be treated in any other manner. Taxation exempts on renewable fuels spurs production of biogas and renewable drop-in fuels that can be from wood waste sources. On a regular level all municipalities are obliged to deliver a municipal waste plan based on regulations and guidelines from the Swedish EPA.</p>
<b>Collecting /sorting /treatment /supply</b>	<p><i>Collection/sorting:</i> Households are responsible for separating and depositing waste at available collection points.</p> <p><i>Treatment/Supply:</i> As an example, Renova’s waste-to-energy plant at Sävenäs in Gothenburg is among the largest in Sweden and one of the world's most advanced facilities for the incineration of waste for the production of heating and electricity. The thermal energy generated is transformed into electricity and district heating. From every tonne of</p>



	waste combusted today, 3.3 MWh of energy is recovered in the form of electricity and district heating. 60 percent of the electricity production is labelled as biofuel-based origin. Hazardous waste dropped off at collection or waste treatment plants often requires pre-treatment. Impregnated timber can contain substances hazardous to the environment, such as arsenic, creosote and copper. Collected timber is chipped and incinerated in specially licensed energy recovery plants.
<b>Valorization</b>	Primarily recovery of energy
<b>Favorable environment (cluster, researcher centers, technologies providers...)</b>	Biogas production via the gasification of biomass and waste from forestry. Production of green diesel from renewable raw material from forestry. Tall oil is the renewable raw material in green diesel that is the most climate efficient of those currently on the market.

Recycling ecosystems can be observed in southern countries like Italy, Spain or Hungary, where most or wood waste are reused, energy recovery it's not very popular. Based on our model region, Lombardy, table below shows main components which contribute to the success.



<b>National context</b>	<p><b>Geographical context</b></p> <p>Low surfaces of forests or exploitable forests (promotes used wood in recycling) Low needs of heating for household (no heating district networks)</p> <p><b>Market</b></p> <p>4,5 Mt wood wastes</p> <p>Wood panel industry with the higher rate of recycled woods for production of panel in Europe</p> <p>Specific collecting of waste wood (Rilegno but also private companies as ECOLEGNO or VALORI)</p> <p>Import of 500 000 t of waste wood from France and Switzerland.</p> <p>Regulations/policies</p> <p>Specific landfill restriction (calorific value)</p> <p>Recycling of waste wood</p> <ul style="list-style-type: none"> <li>- Decree on recycling of non-hazardous waste</li> </ul> <p>Energy recovery</p> <ul style="list-style-type: none"> <li>- Decree for production of electricity of 2012.</li> <li>- Subsidies for the biodegradable part of waste which decreases with the power of the plant.</li> <li>- Minor incentives for heat production</li> <li>- Green certificates</li> <li>- Since 1 January 2012, landfilling of combustible waste &gt; 13 MJ / kg prohibited</li> <li>- End of waste status for high-quality CSR (CSR standard: UNI 9903)</li> </ul>
<b>Regional context (Lombardy)</b>	<p>1 Mt wood wastes</p> <p>Presence of numerous collecting centers for wood wastes</p> <p>PEAR adopted in June 2015: instrument of strategic planning (development of renewable energy sources)</p> <p>Several panel industrials of which at least 3 use recycled wood.</p> <p>Northern Italy = earth land of particle board industry</p> <p>Supply: establishment of railway infrastructures to ensure supplying from France (close to Lombardy).</p>
<b>Recycling or recovery rate</b>	<p>Close to 100 % wood waste valorization, of which (estimation):</p> <ul style="list-style-type: none"> <li>- &gt; 95 % recycling (including in-site energy recovery of refuses from sorting)</li> <li>- &lt; 5 % energy recovery (WTE plants, biomass plants)</li> </ul>
<b>Specifics policies /regulation /classifications</b>	<p>Waste management at provincial level (regional plans) and at municipal level (municipalities in charge of municipal waste collection and of collecting charges for managing waste).</p>



<b>Collecting /sorting/ treatment/ supply</b>	RILEGNO: organism in charge of the collecting of wood packaging mainly but also wood waste. ECOLEGNO, in Northern Italy, which collect waste wood for the industrial MAURO SAVIOLA (panel production).
<b>Valorization</b>	<p><b>Energy</b> No waste to energy plant dedicated to waste wood identified in Northern Italy WTE and biomass plants supply: biomass, municipal waste or refuse derive fuel (RDF) from municipal waste or industrials.</p> <p><b>Recycling</b> Waste wood is mainly valorized in panel industry. Higher rate of waste wood in the production of its panel in Europe Some plants use 100 % of recycled wood in their process. Main industrials: - MAURO SAVIOLA (recovery wood) / ECOLEGNO for the collection of waste wood - FRATI LUIGI (recovery wood) / VALORI for the collection of waste wood (4 platforms) - GRUPPO TROMBINI (recovery wood) - SAIB (recovery wood)</p>
<b>Favorable environment in Lombardy (cluster, researcher centers, technologies providers...)</b>	Associations, clusters and industrials (Assopannelli, Lombardy Energy Cluster, PAL, Texpan...)

In many countries like Belgium, Germany or UK, both recycling and energy recovery are on similar level. This kind of ecosystem was named as mixed. In case one of them is slightly higher than other, we used the name oriented to recycling/ energy. Based on our model regions, Baden-Wurtemberg, NW England and Styria and Voralberg, the table below shows main components which contribute to the success.

<b>Baden-Wurtemberg</b>	<b>National context</b>	<p><b>Market</b> Around 8 million tons of waste wood: - 2 million tons are recycled in panel industry (rising market) in Germany (stable), Austria and Czech republic. - Energetic valorization concerns 6,3 million tons of waste wood (all types), burnt in 76 plants. Germany is a net importer of waste wood (750 kt- 900 kt). Landfill banned, incineration very expensive and already saturated, co-combustion very complicated, panel industry limited in capacity and in</p>
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		<p>quality. Given the maturity of the market and the evolution of regulation (EEG), there has been no commissioning since 2008 in Germany.</p>
		<p><b>Regulation/policies/background</b>  Ordinance of waste wood (2002)  Classification in 4 classes (model in Europe)  Producer responsibility: Packaging ordinance  Waste management act (2012)  Landfill forbidden  Incentive feed-in tariff  Necessity of stop using coal and decision to stop nuclear  Long experience of district heating network (few but big towns) with incineration of municipal waste  Long experience of separated collecting and recycling  Dedicated association (BVA) and dedicated guides</p>
	<b>Regional context</b>	<p>1 million tons wood waste  Presence of several districts heating network, included ULM, some of which were fueled by coal  Presence of several industrial producers of wood panel and numerous industrials with high needs of steam  BVA association headquarters  Several technical and research/technical centers (KIT, EIFER, Cluster of BW...)</p>
	<b>Recycling recovery rate</b> or	<p>100 % valorization, of which 35-40 % in energy in Baden-Wurttemberg</p>
	<b>Specifics policies /regulation /classifications</b>	<p>Regional waste management plan for municipal waste 2015</p>
	<b>Collecting /sorting /treatment /supply</b>	<p>Presence of at least 4 facilities for sorting of waste wood (Karlsruhe, Ulm...)</p>



	<b>Valorization</b>	<p>Waste wood disposal (outlet) in Baden-Wurttemberg:</p> <p>Recycling material = 60-65 % (4 particle board producers)</p> <ul style="list-style-type: none"> <li>- Panel industry after transit in sorting facilities: BTP, industry, packaging</li> </ul> <p>Energy recovery = 35-40 % (6 biomass plants)</p> <ul style="list-style-type: none"> <li>- Cogeneration plants: building and municipal waste</li> </ul>
	<b>Favorable environment (cluster, researcher centers, technologies providers...)</b>	<p>Relevant structures in Baden-Wurttemberg:</p> <ul style="list-style-type: none"> <li>- Fraunhofer institutes, Max Planck research centers (national)</li> <li>- KIT</li> <li>- EIFER</li> <li>- Cluster of BW</li> </ul>
<b>NW England</b>	<b>National /regional context</b>	Traditionally, the destination of waste wood recycling has been particle board manufacturing and animal bedding. More recently, the UK's Renewable Energy Policy has driven a shift in the use of woody biomass including waste wood, for energy purposes. The Renewable Obligation Scheme earlier and the Renewable Heat Incentive later, created the conditions for the use of woody biomass in large-scale plants for power generation, as well as for combined heat and power.
	<b>Recycling recovery rate or</b>	The estimated amount of wood waste available in the UK is 5 million tons. Around 75-80% of waste wood is recovered, while around 5% is incinerated and only a small share (0.6 to 1%) is landfilled. 3.5 million tons of wood waste were recovered in 2006 and 2017, 1.5 million tons of which were used for energy in 2016.
	<b>Specifics policies /regulation /classifications</b>	<p>Regulatory Position Statement 2007 UK Environment Protection Agency – Classifying waste wood from mixed wood sources: this document defines when treated or mixed waste wood can be classified as non-hazardous waste wood</p> <p>Publicly Available Specification 111 (BSI PAS 111:2012) for processing wood waste developed by Waste Resources and Action Program (WRAP UK) and the British Standards Institution (BSI)</p> <p>UK Environment Agency Revised Fire Prevention Plans</p>
	<b>Collecting /sorting /treatment /supply</b>	Collection: Household wood waste is usually collected at household waste recycling centers (HWRC) or via council's waste collection. Wood waste from construction and demolition is usually collected by waste management companies or delivered to the collector directly by the producer. Sorting: sorting is performed at the collection centers and at the processing centers. The wood waste is then graded and processes according to the feedstock requirements of the end market user (energy, particle board, mulching etc.)



	<b>Valorization</b>	Panel board, biomass for energy, mulches, equine surfaces, export
	<b>Favorable environment (cluster, researcher centers, technologies providers...)</b>	Waste and Resources Action Program UK, Waste Recycling Association.
<b>Styria and Vorarlberg</b>	<b>National /regional context</b>	The separated collection of different waste types (paper, glass, metals, organic waste, bulky waste) is well established on the municipal and industrial level in Austria and is promoted by the Austrian Waste Management Law. Since the amendment of the Landfill ordinance in 2004, organic waste is banned from landfilling, which promotes the reuse and recycling of organic material (including waste wood).
	<b>Regional context</b>	There are no panel manufacturers in Styria or Vorarlberg, so a certain share of the waste wood collected in these provinces is shipped to neighbouring provinces like The Tyrol (mainly from Vorarlberg) or Carinthia, Salzburg or Lower Austria (mainly from Styria).
	<b>Recycling recovery rate or</b>	Almost 100% (including thermal recovery). Large amounts of waste wood are used as a secondary raw material in the panel industry (located in other provinces of Austria). In Styria, close to 84% of the total amount of waste wood generated each year (about 157,000 t) is reused or recycled, the rest is used in incineration plants for energy generation. There are no exact numbers for Vorarlberg, but considering the capacity of the lone waste wood combustion plant in the province (about 15,000 t/h), the share of waste wood used for energy generation in Vorarlberg is about 30 to 40% of the annual amount generated (around 48,000 t/h).
	<b>Specifics policies /regulation /classifications</b>	Organic material is banned from landfilling --> waste wood needs to be reused, recycled or thermally recovered. Austrian Waste Management Law favors reuse and material recycling over thermal recovery. Recycling wood ordinance that promotes the recycling rate of waste wood in the panel industry.
	<b>Collecting /sorting /treatment /supply</b>	<p><u>Collection:</u> Local waste collection centers for municipal waste and waste from smaller companies are spread all over the provinces (and other parts of Austria, too). Among other wastes, also waste wood is collected there. Waste wood from larger industries is either reused or recycled internally or collected by specialized waste processing companies.</p> <p><u>Sorting/treatment:</u> At first, waste wood is usually manually presorted (by shovel excavators or similar equipment) in order to separate waste wood with hazardous materials (wood preservatives, halogenated organic compounds and similar substances). Waste wood suitable for further use is</p>



		<p>then mechanically sorted and treated (grinding, sieving, ferrous and non-ferrous metal separation). For specific applications, also other sorting methods (e.g. optical sorting) may be used.</p> <p><u>Supply:</u> the treated waste wood is then further used in various industries (panel industry, furniture manufacturer, paper industry, composting, energy generation).</p>
	<b>Valorization</b>	<p>Pre-sorted and treated waste wood represents a rather cheap resource for several industries, especially the panel industry, but is also a rather cheap fuel for energy plants. The reuse and material and thermal recycling of waste wood preserves natural resources and reduces the amount of wasted that needs to be landfilled.</p>
	<b>Favorable environment (cluster, researcher centers, technologies providers...)</b>	<p>Nationwide abundance of waste collection centers and waste treatment companies, favorable legal framework conditions. Close collaboration of waste treatment companies and end users (e.g. panel industry).</p>

Additionally, the collected data has been presented graphically on the map, the map presents the previously mentioned ecosystems (energies, recycling, mixed, mixed oriented to energy / recycling) for the EU countries.



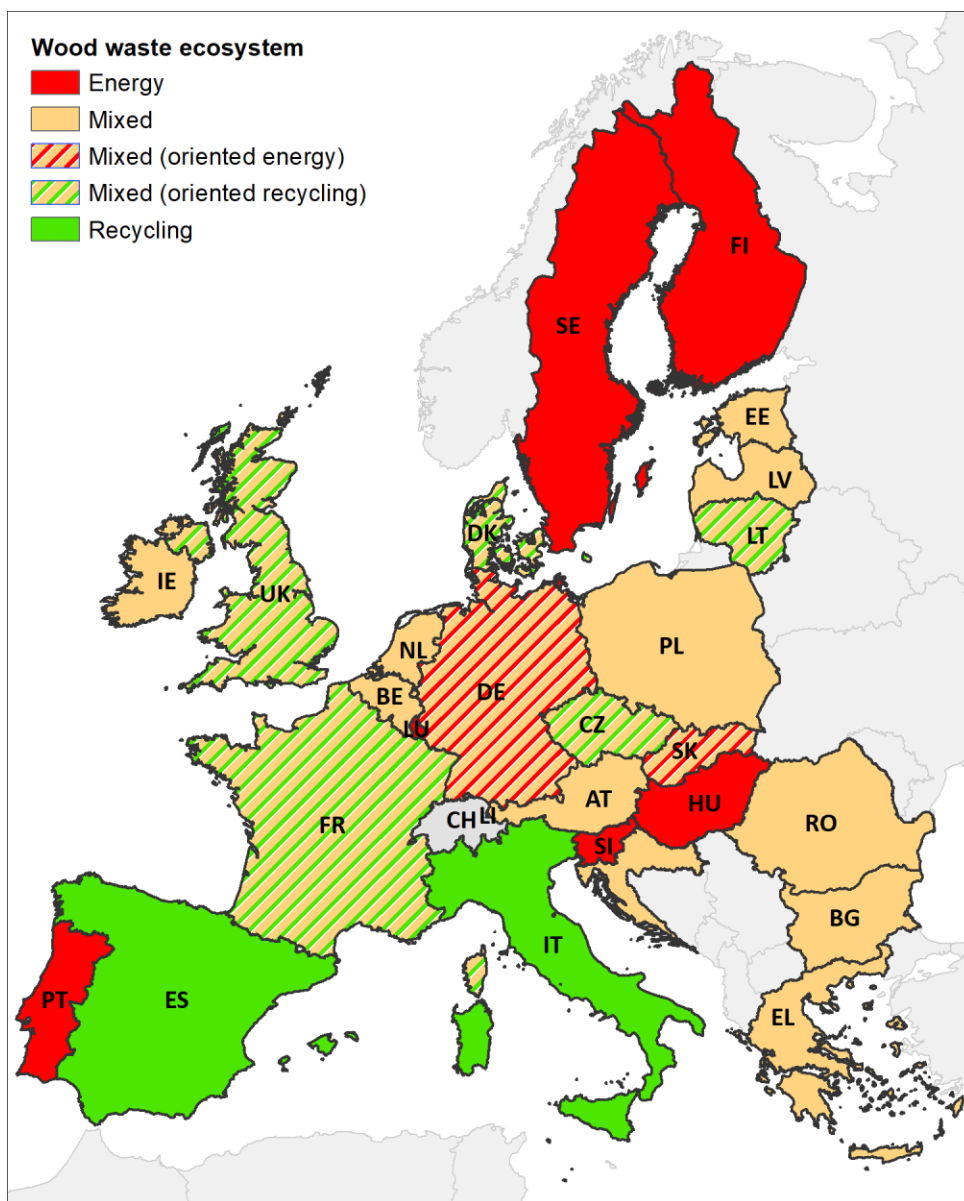


Figure 2: Map of wood waste ecosystems



### 3 MODEL REGIONS

As a part of the task 2.1, a data set from each model region was collected by the partner responsible, with the following table. Data on the amount of wood waste in most cases are not available. Collected data concern quantity of sites that use or can use wood waste, such as biomass power plant, waste energy plants. The data was collected in xls file and was prepared in shp or dbf as well as in jpg formats.

#### 3.1 TABLES FOR DATA COLLECTING

Figure 3: Waste wood management (collection) site for mode region

	Latitude	Longitude	Amount of waste wood collected (t/year)
VÄSTSVERIGE; GOTHENBURG (SE)			
VORARLBERG; STYRIA (AT)			
KARLSRUHE; BADEN- WURTTENBERG (DE).			
LOMBARDY (IT)			
NORTH WEST ENGLAND (UK)			

Figure 4: Energy site for model regions which use waste wood

	Latitude	Longitude	Power MW	Type Plant, Plant, Co-firing (Cement Biomass)
VÄSTSVERIGE; GOTHENBURG (SE)				
VORARLBERG; STYRIA (AT)				
KARLSRUHE; BADEN- WURTTENBERG (DE).				
LOMBARDY (IT)				
NORTH WEST ENGLAND (UK)				

Figure 5: The regional wood waste potential

	Theoretical biomass potential of wood waste	Theoretical biomass potential of demolition wood [kt]	Technical biomass potential of wood waste from industry



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	[thousand tonnes/year]		
VÄSTSVRIGE; GOTHENBURG (SE)	-	-	73,764103
VORARLBERG (AT)	17,4746	12,91	5,750114
Steiermark (AT)	69,0591	41,43	54,749776
KARLSRUHE; BADEN- WURTEMBERG (DE).	139,579	99,65	21,7317
LOMBARDY (IT)	487,03714	284,94	4,477451
NORTH WEST ENGLAND (UK)	246,927*	135,01*	4,4645

\*Data for Cumbria, Lancashire and G. Manchester

### 3.2 EUROPEAN WOOD WASTE MODEL AT THE NUTS2 COMPARATIVE LEVEL

The European wood waste model at the NUTS2 level was developed describing theoretical biomass potential of municipal (**Error! Reference source not found.**) and demolition wood waste **Error! Reference source not found.**, as well as technical biomass potential of wood waste from industry (**Error! Reference source not found.**). The detail description of those types of wood potentials can be found in deliverable 1.1. Additionally, density of those potentials was calculated to present in a more accurate way the amount of wood available (**Error! Reference source not found.**, **Error! Reference source not found.**, **Error! Reference source not found.**). Data presented directly for administrative units, such as NUTS3, or NUTS2, illustrate the absolute values specific for each region. On account of the methodology for determining these units (EUROSTAT), they vary according to size. It can be observed especially in densely populated agglomerations, covering small areas (e.g. Paris, London). A reverse situation takes place for regions with low population density (e.g. Scandinavia). In some cases we can observe a



lack of consistency in defining NUTS-3. For instance, a unit corresponding to Madrid does not specify a separate area of the city, but covers both the urban area and the surrounding agricultural area. Therefore, presenting the individual characteristics of the units on maps may lead to erroneous conclusions, especially when visualizing the agricultural production and biomass resources – both characteristics depend on the area size rather than population density.

Considering the above, the biomass potentials should be presented in an alternative way, i.e. normalized according to unit size. The values presented on the map are expressed in units of mass obtained from the given administrative unit or the area determined within the unit (e.g. from agricultural land, grassland, or forests).

Density map, compared to the map with absolute values, is spatially coherent when presenting the variability of described features, which means that the area size of units does not affect their actual spatial distribution.

Another advantage of the presented approach to the visualization of the analyses' results is lossless coding of information, due to the fact that areas of units or land use classes within these units are known and, therefore, on the basis of biomass density data the biomass potential can be easily calculated.



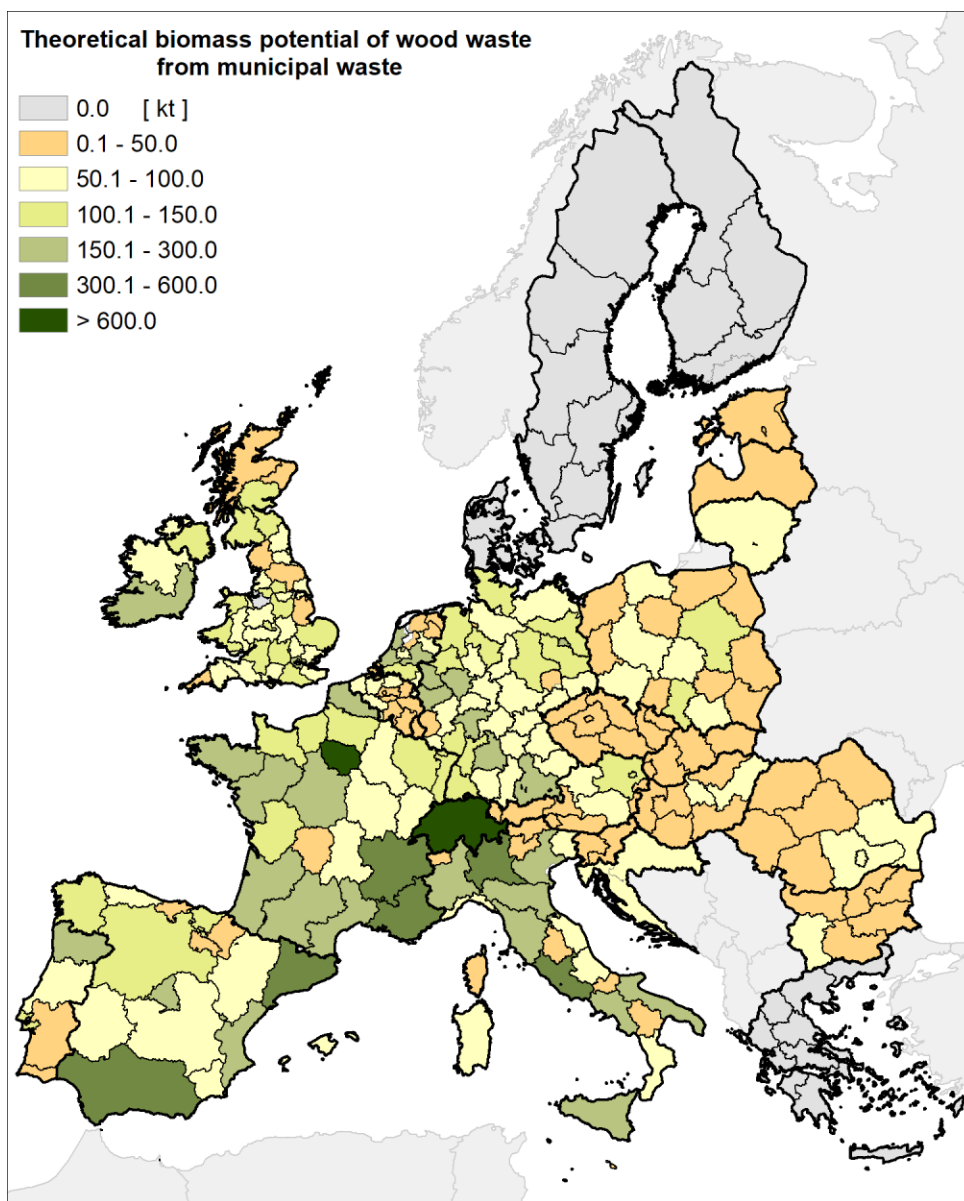


Figure 6: Theoretical biomass potential of wood waste from municipal waste



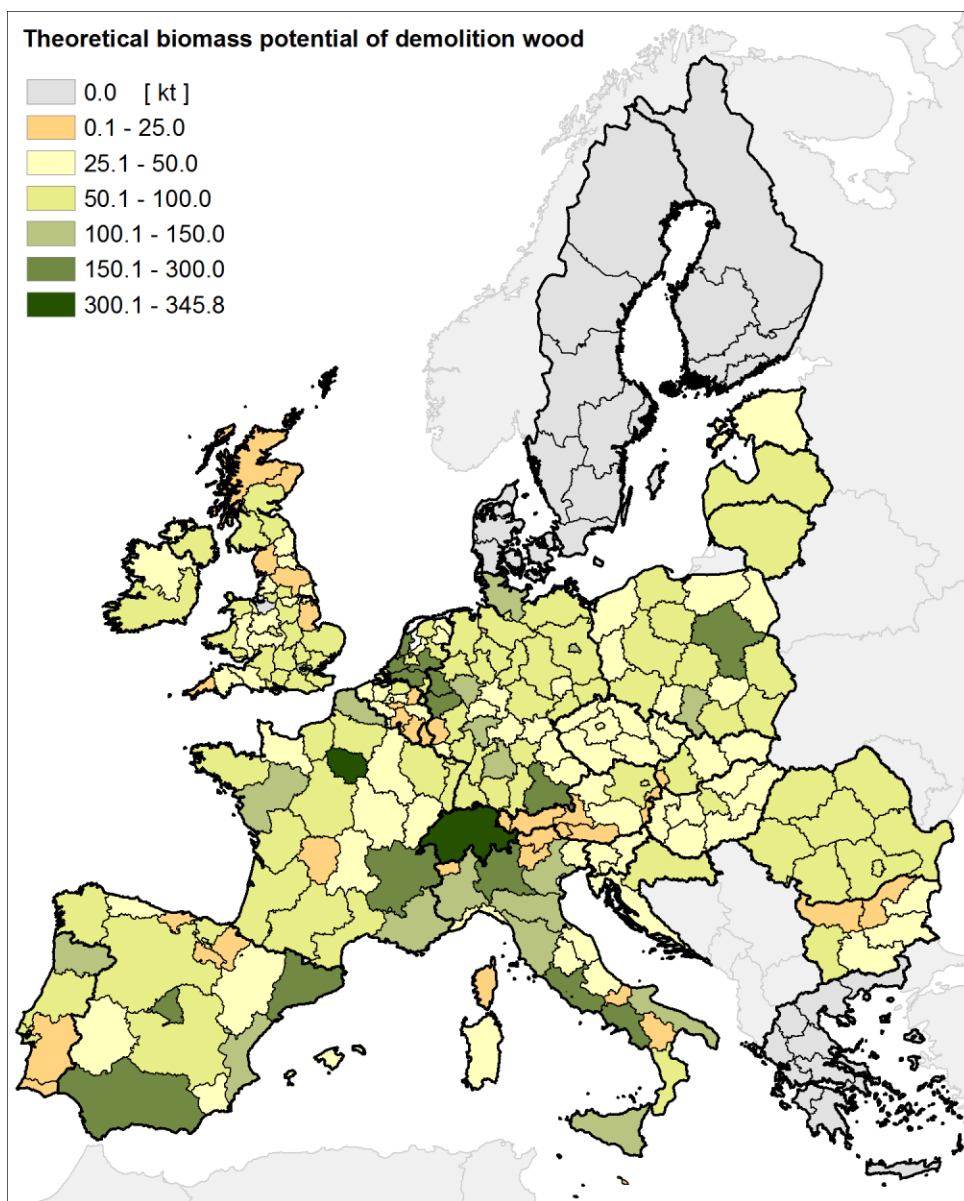


Figure 7: Theoretical potential of demolition wood



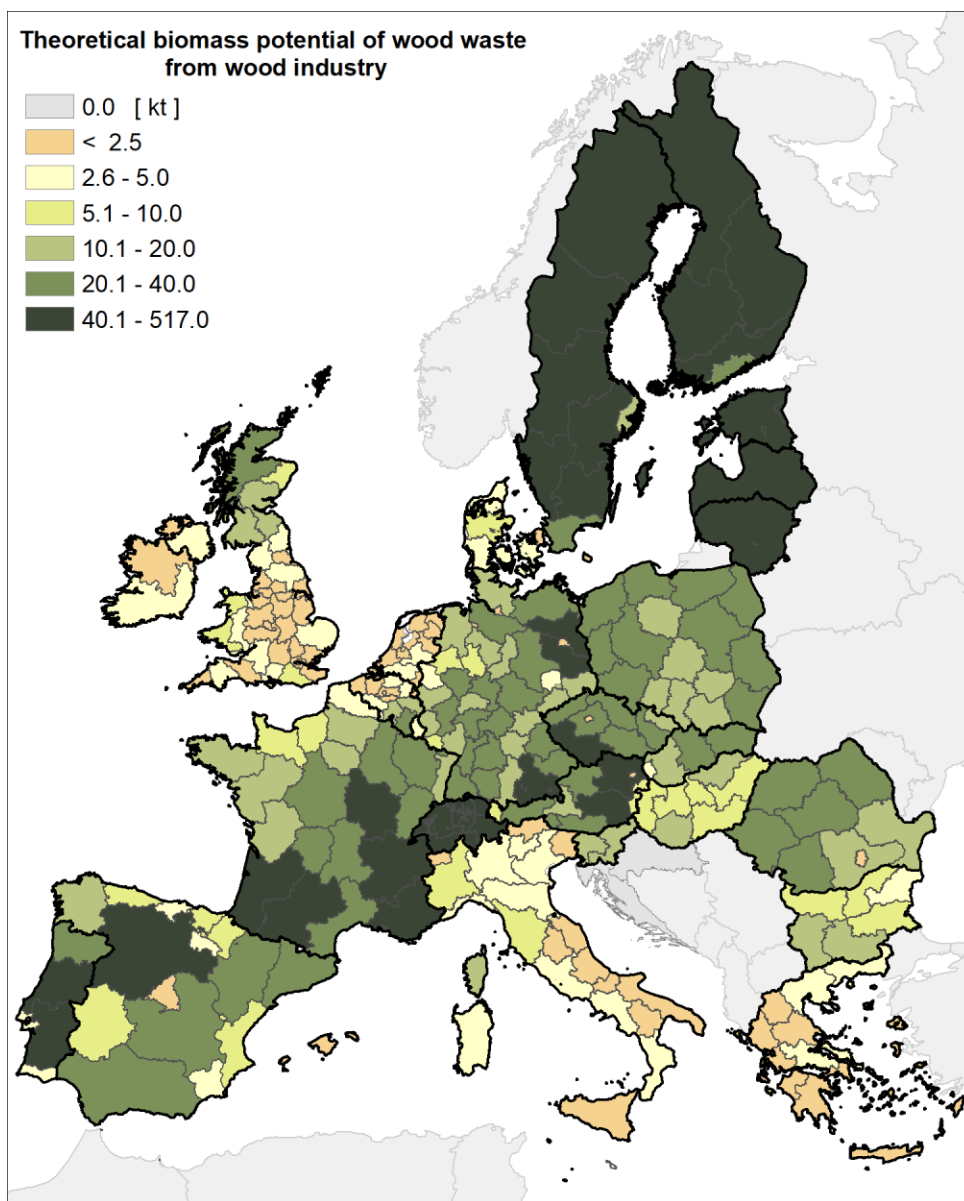


Figure 8: Technical potential of wood waste from wood industry



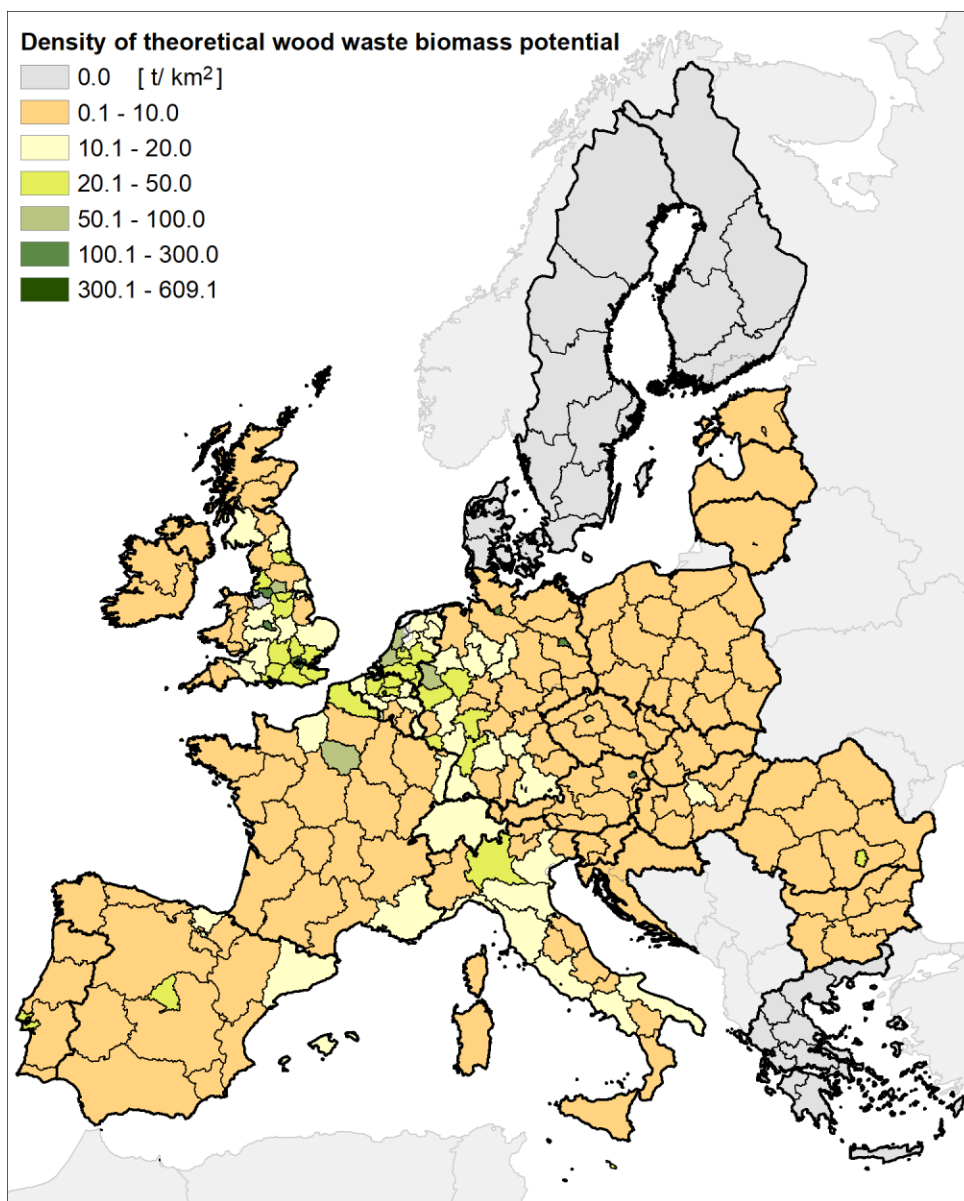


Figure 9: Density of theoretical wood waste biomass potential



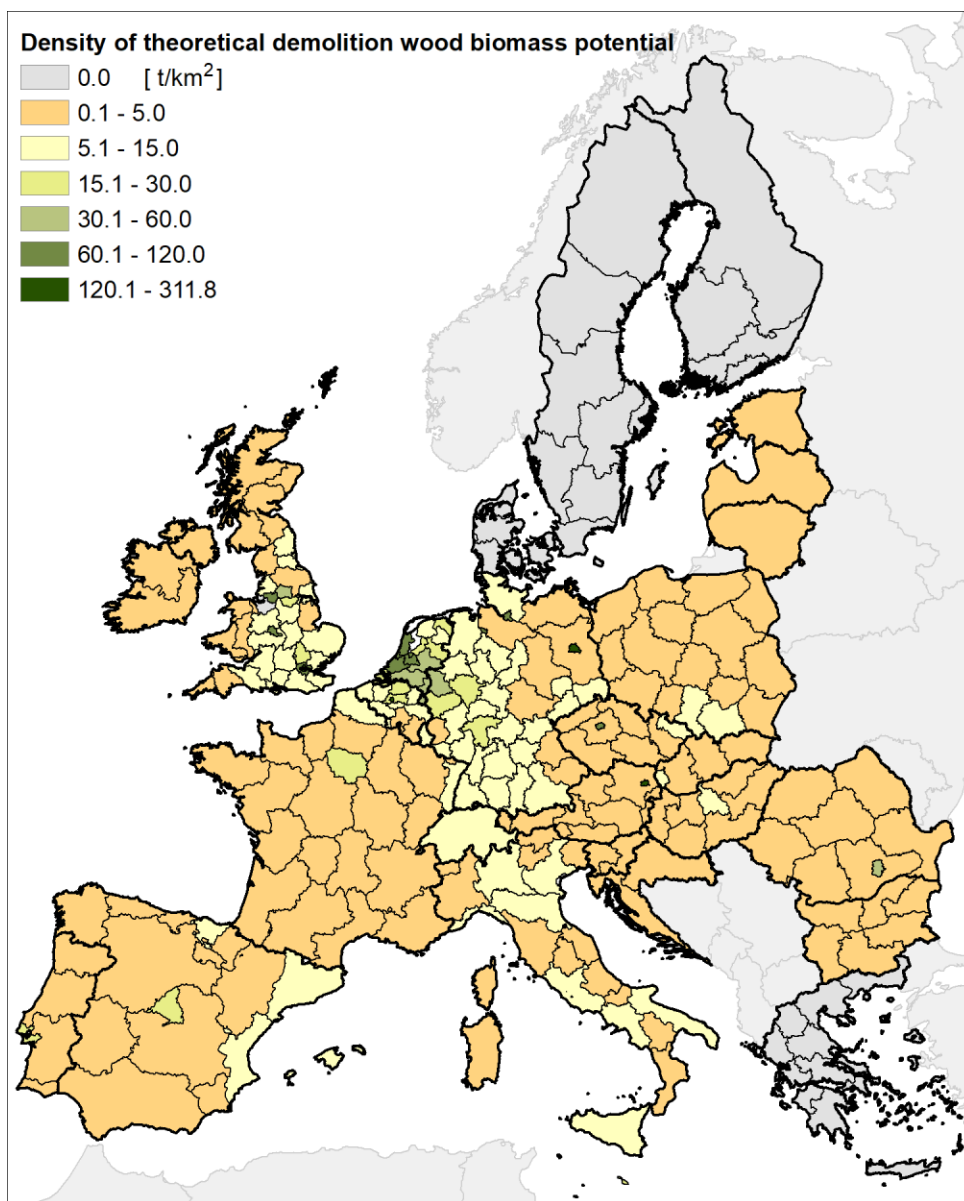


Figure 10: Density of theoretical demolition wood biomass potential



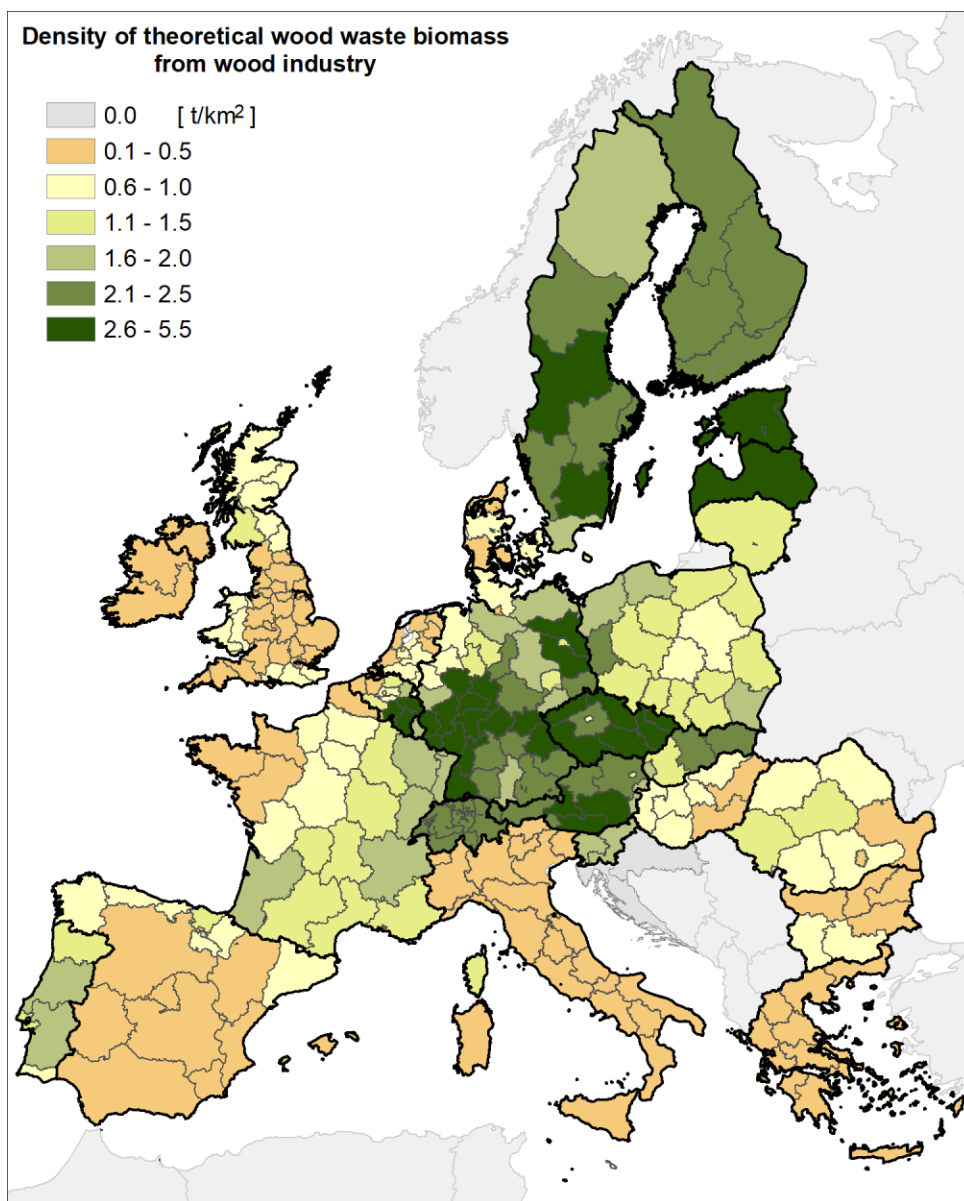


Figure 11: Density of technical wood waste biomass from wood industry

The model also includes the localisation of main consumers of waste wood like Biomass Power Plants (**Error! Reference source not found.**) and Waste Energy Plants (**Error! Reference source not found.**). Data was collected based on [www.industcards.com](http://www.industcards.com).



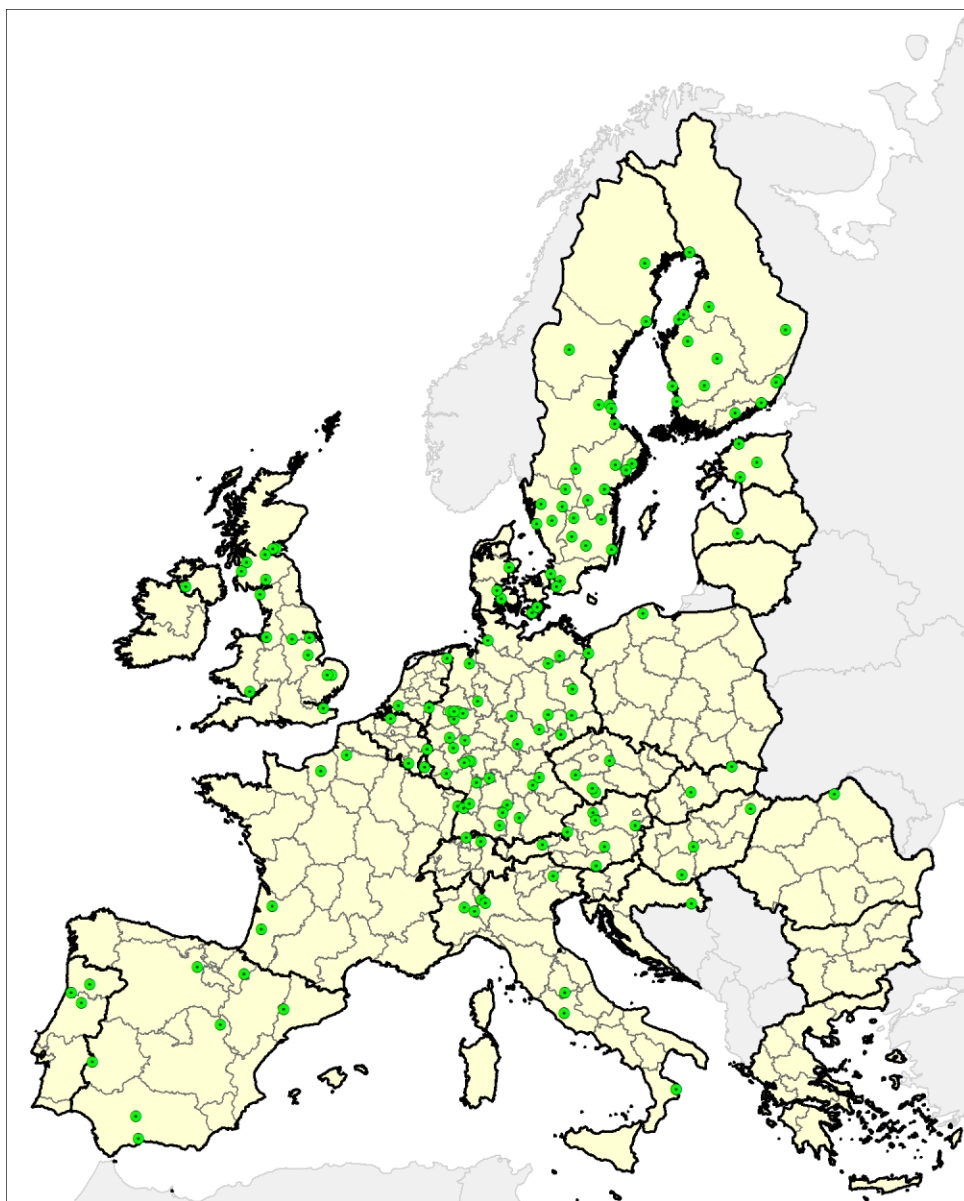


Figure 12: Map of biomass power plants localization



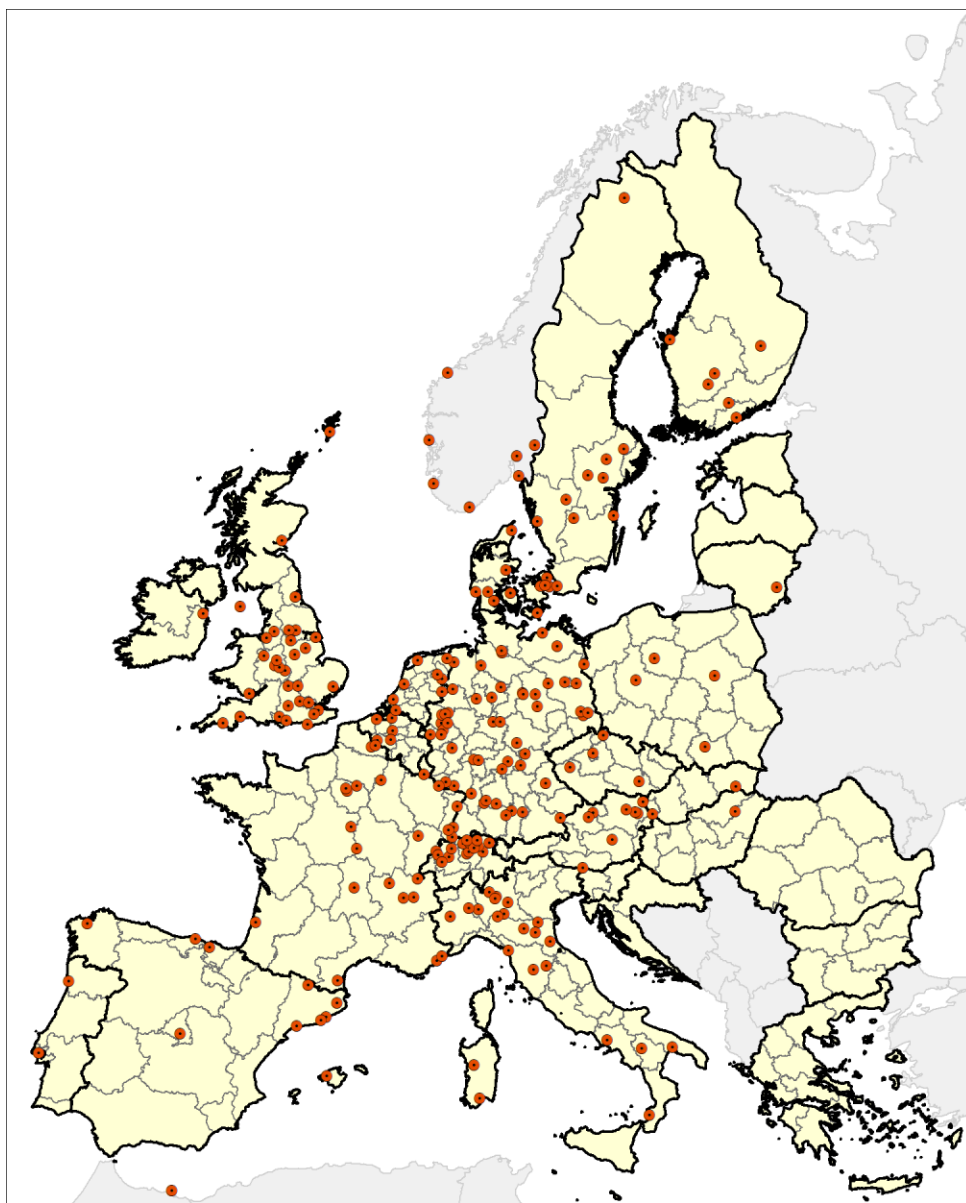


Figure 13: Map of waste energy plants localization

The model also includes data from [www.europanel.org](http://www.europanel.org) presented in the **Error! Reference source not found., Error! Reference source not found., Error! Reference source not found.** . European Panel Federation is an organization operating from 1999, it currently has members from 25 EU countries, unites wood based panel



producers and also collaborating institutes and associated members. It's main goal is to act as a meeting point of all producers, represent the branch and provide all interested parties with general information on the sector.

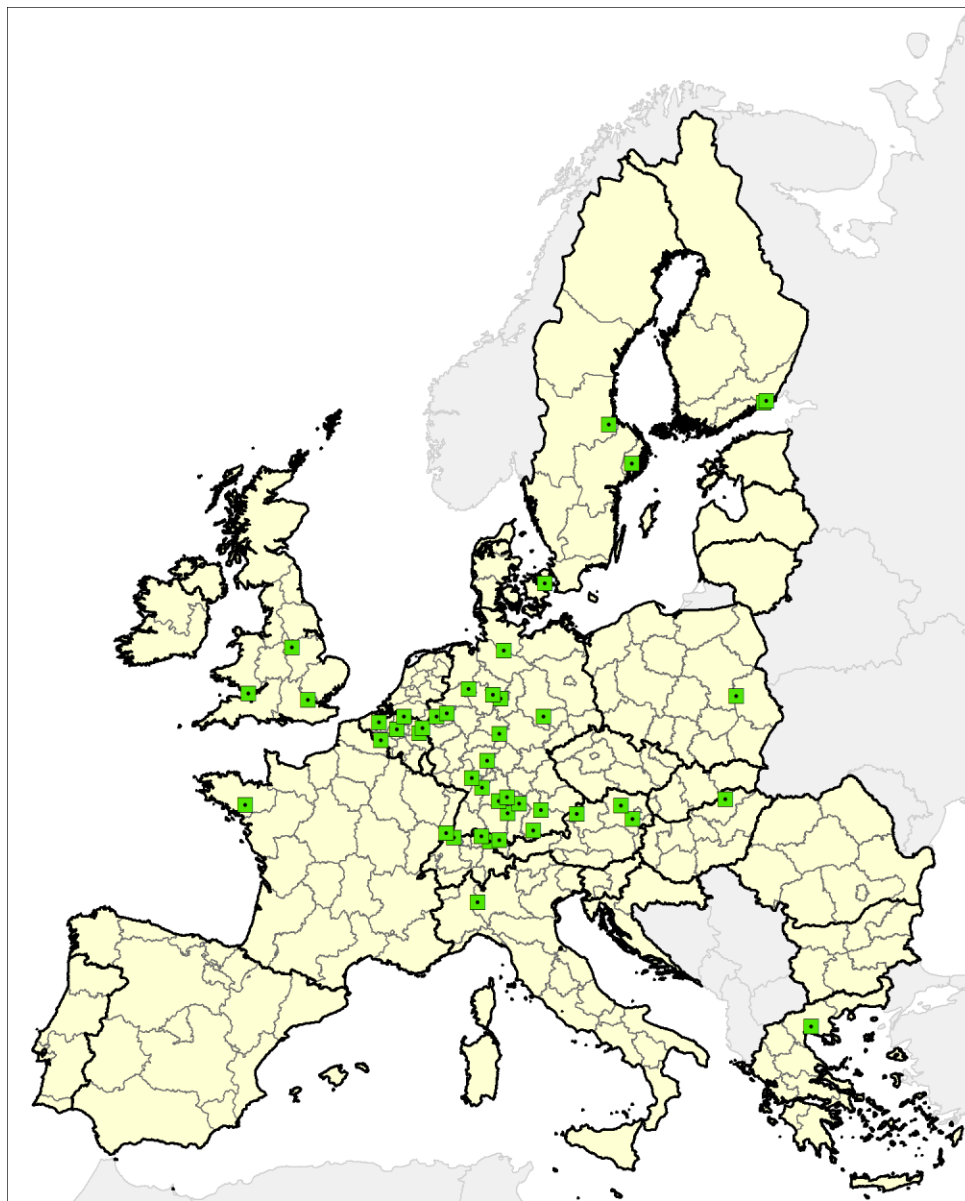


Figure 14: Map of associated members of Europanel



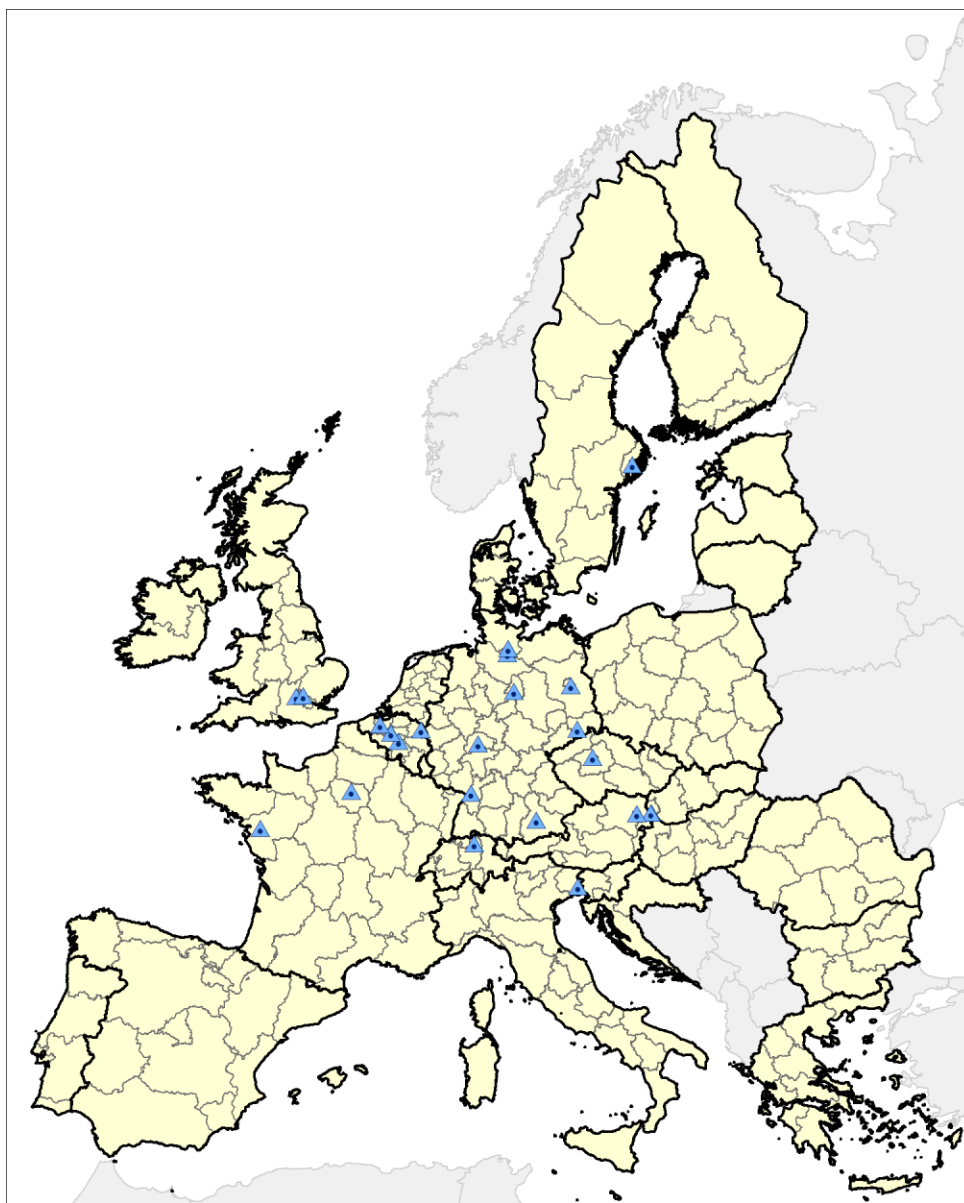


Figure 15: Map of collaborating institute of Europanels



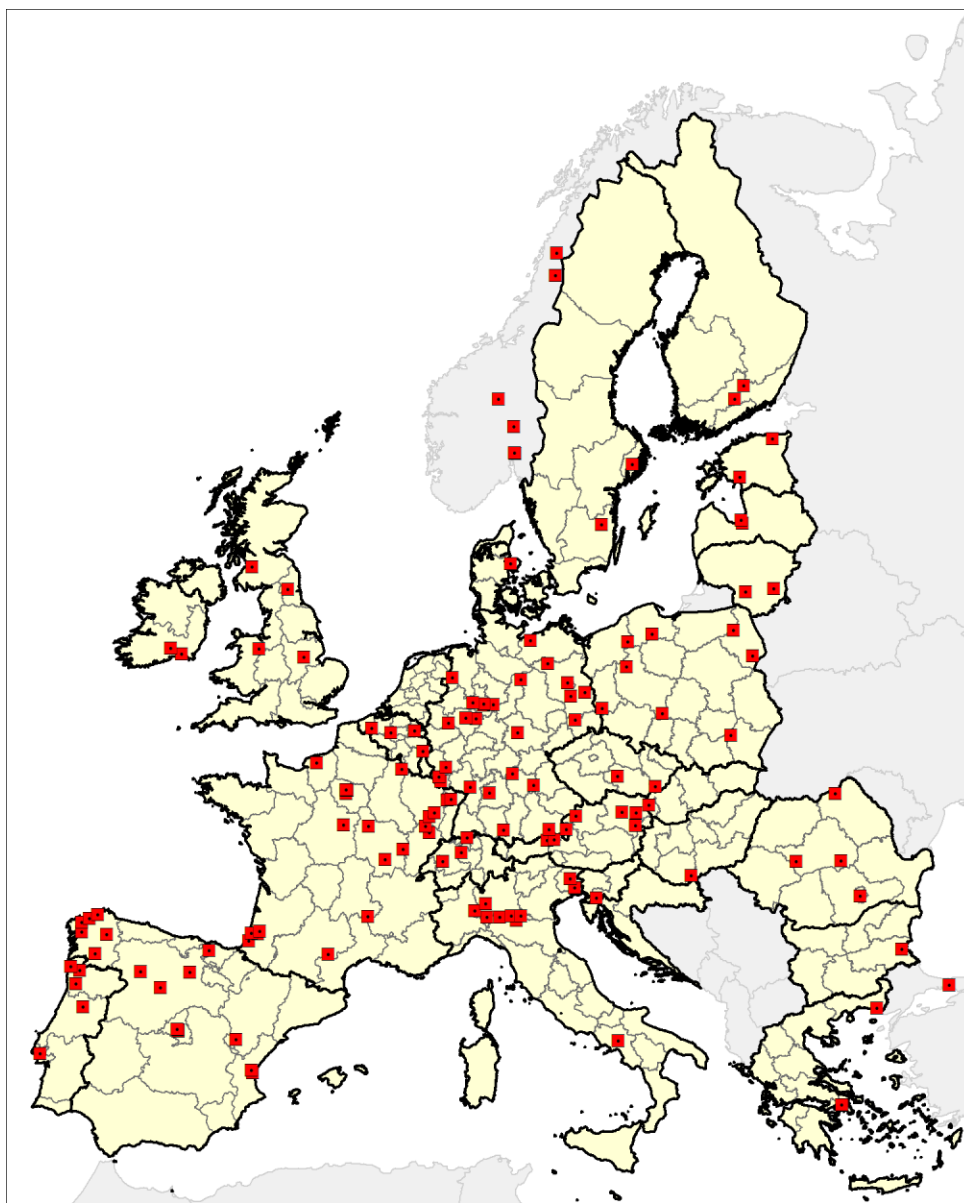


Figure 16: Map of producers of Europanel panels



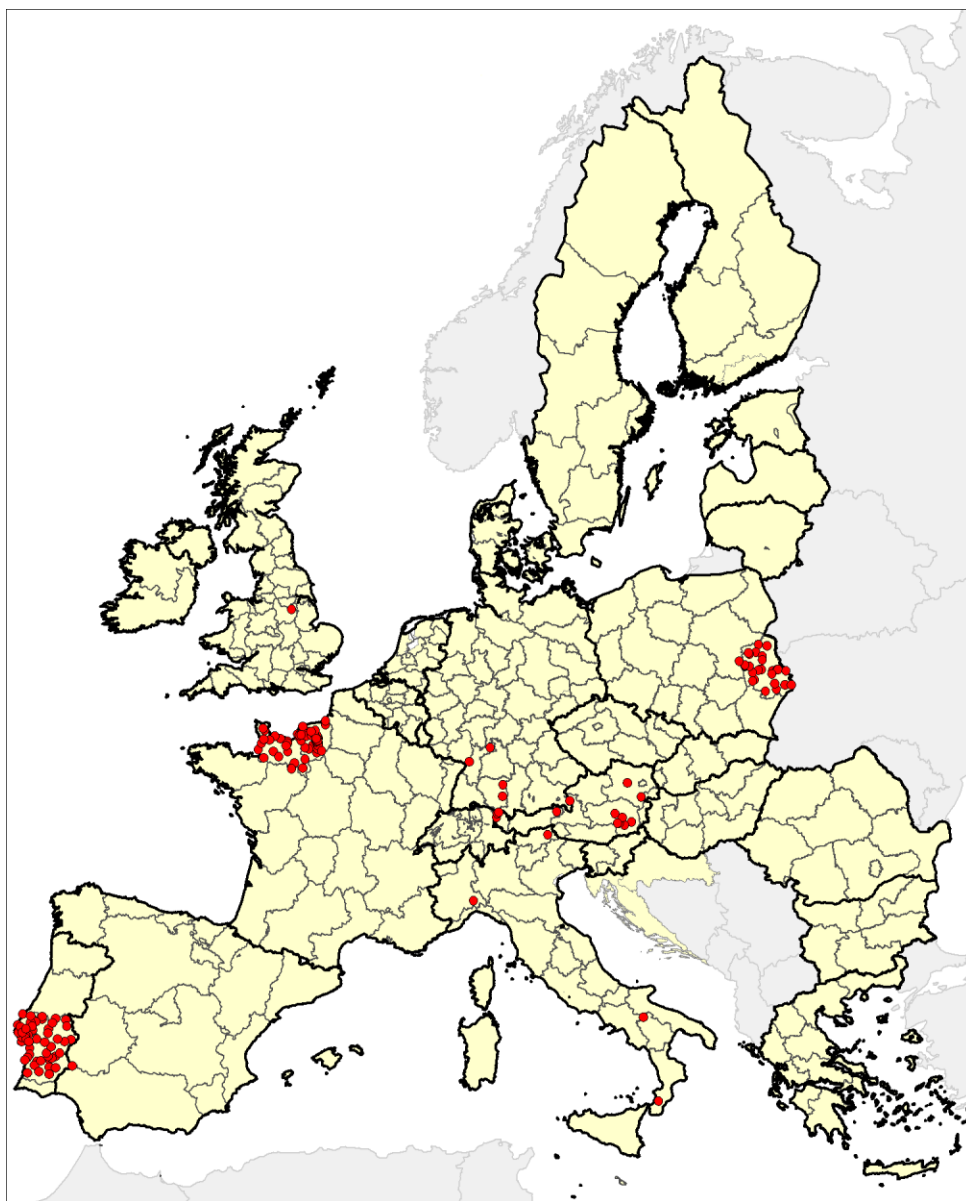


Figure 17: Map of wood waste management plants.

## 4 CONCLUSION

The model presents classification of wood waste systems in European Union. The model is a basis for the Geoportal that is being developed in task 3.2.2, as well as will help to identify success factors in task 2.2. from which the classification of EU success factors will be formed. All data prepared in the form of shape files as well as xls.



In model regions wood waste ecosystems are well developed. They have law directly relating to wood waste management, which is missing in recipient regions. Wood waste valorisation practises are well-built.

Law relating to waste defines overall framework conditions of waste management. For example, in Austria “*Austrian Waste Management Law*” terms specify priorities for waste management measure (waste prevention, preparation for re-use, recycling, other utilization, disposal). There are also laws about wood waste like “*Recycling wood ordinance*” which was prepared to increase recycling rate of wood waste in the timber production. Local waste management plants are not only responsible for general waste management, but also there are some specific practises for wood waste management.

Wood waste valorisation practices define how wood waste should be used. Preferred way of using wood waste is material use in wood-fiber industries. If the material doesn’t fulfil the requirement for its purpose, then it can be used for energy production. In Styria around 84% of wood waste is reused/recycled, rest is used in incineration plants.

In model regions the wood waste collection system is well developed. In UK wood waste is collected via different routes. Household wood waste is usually collected at household waste recycling centres (HWRC) or via council’s waste collection systems, if such are available. Wood waste from construction and demolition is usually collected by waste management companies or delivered by the collector or directly by the producer. Small volumes of waste wood are also informally disposed by burning in small scale appliances.

In proper wood waste management can help wood waste classification. There is no unified wood waste classification in EU law. Each country can use they own scale, but most countries don’t use any. For example, UK uses a 4 grade classification.

- Grade A – “clean recycled wood”. It includes ‘clean’ recycled waste wood mainly from packaging waste, scrap pallets, packing process off-cuts from the manufacture of untreated products.
- Grade B – “industrial feedstock grade”. It may contain Grade A wood together with other waste wood sourced from construction and demolition activities, transfer stations, civic amenity sites and the manufacture of furniture from solid wood. It is mainly used in panel manufacture.
- Grade C – “Fuel grade”. It consists predominantly of panel products such as panel board, MDF, plywood, including products bonded using heat treatment. It can be used as fuel but only in facilities compliant with the Waste Incineration Directive (WID) and not in small-scale appliances.
- Grade D – “hazardous waste” consisting of wood contaminated with heavy metals or creosote applied. It can only be disposed of by incineration or hazardous waste landfill.

