Delivery of sustainable supply of non-food biomass to support a "resource-efficient" Bioeconomy in Europe

S2Biom Project Grant Agreement n°608622

D1.5

The data base of biomass cost supply data for EU 28, Western Balkan Countries, Moldavia, Turkey and Ukraine.

Version: 1.2

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About S2Biom project

The S2Biom project - Delivery of sustainable supply of non-food biomass to support a "resource-efficient" Bioeconomy in Europe - supports the sustainable delivery of non-food biomass feedstock at local, regional and pan European level through developing strategies, and roadmaps that will be informed by a "computerized and easy to use" toolset (and respective databases) with updated harmonized datasets at local, regional, national and pan European level for EU28, Western Balkans, Moldova, Turkey and Ukraine. Further information about the project and the partners involved are available under www.s2biom.eu.

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Executive summary

This report provides the technical specification of the spatial data base on sustainable biomass cost-supply of lignocellulosic biomass for EU 28, Western Balkan Countries, Moldavia, Turkey and Ukraine.

It provides information about the structure of the database including the spatial extent and the spatial unit at which data has been collected. Explanations about the naming of the attributes, and the levels and types of data are also included. The information provided can serve as a reference document for the users of the data.

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1 Introduction and Scope

This document defines the content and structure of the S2Biom geospatial database prepared under the WP1 and is an accompanying report to the deliverable D1.5. The database consists of a regional scale lignocellulosic biomass supply and cost data for EU28, western Balkans, Moldova and Turkey. It includes both current (2012) and future (2020 and 2030) lignocellulosic biomass supply potential and cost datasets collected on NUTS 3 and equivalent spatial level.

2 Database Structure Overview

2.1 Spatial level

The data which are included in this database correspond to the NUTS3 regional administrative units for the countries which have been included in the NUTS 2013 classification or earlier NUTS classifications. For other countries which are not included in the NUTS classification, an attempt has been made to adjust them to NUTS3 equivalent regions. This was done by using the variable levels of administrative unit boundaries for these countries in the EuroBoundaryMap version 9.0 (EBM v9.0). The data for the different biomass categories obtained at different levels of detail (national, regional, etc.) feature in this database in a disaggregated to a “NUTS3 equivalent” form.

2.2 Coverage and extent

This database consists of a total of 1486 “NUTS3 equivalent” regional units (polygons) and it is ensured that the lignocellulosic biomass datasets have been collected or disaggregated to this level. The regional administrative boundaries for all the regions for the countries included in S2Biom were obtained from EuroBoundaryMap (EBM v9.0) which is the European reference database of administrative units and boundaries established within the framework of EuroGeographics.

The regional extents and the spatial boundary information in the database have been defined according to the latest EUROSTAT NUTS 2013 classification, which will replace the NUTS 2010 classification from 2015 onwards. For the countries which have not been included in the NUTS 2013 or earlier classifications, the regional boundary information was obtained from the EBM v9.0.

The countries which are covered by this database are presented in the following Figure 1 and an overview of the source and level of spatial datasets for different countries is presented in Table 1.

EU28

These are the countries which belong to the European Union as of March 2013. A well-defined NUTS categorization is available for each of these countries and will form the basis of defining the regional scope of these countries. The NUTS 2013 boundaries from the EBM v9.0 have been used in the current spatial database to define the regional borders for these countries.

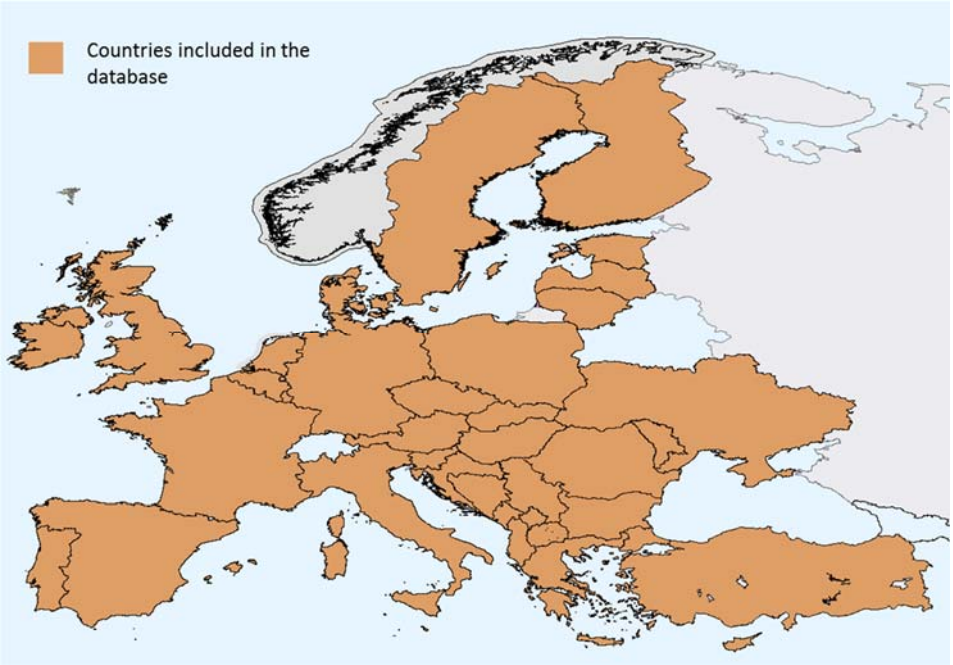

Figure 1: A representation of the countries included in S2biom project and form a part of the spatial database on lignocellulosic biomass cost and supply data

Candidate Countries included NUTS_2013

Serbia, The Former Yugoslav Republic of Macedonia

Both Serbia and The Former Yugoslav Republic of Macedonia (FYROM) are EU candidate countries and have been included in the NUTS 2013 regional classification system. For these countries, the NUTS 2013 boundaries from the EBM v9.0 have been used in the current spatial database to define the regional borders.

Candidate Countries in earlier NUTS:

Turkey

Turkey is an EU candidate country which does not feature in the NUTS 2013 classification, but was included in earlier versions. In this database the NUTS regional boundaries from an earlier version have been used.

Countries included in EBM_v9.0 but not NUTS classification system:

Ukraine, Moldova, Kosovo

These countries do not feature in the NUTS 2013 or earlier NUTS classifications. However all of them have been included in the EuroBoundaryMap v9.0. The relevant S2Biom NUTS3 equivalent boundaries from the EBM v9.0 were selected and used for the purpose of this database. Ukraine was divided into 25 regional units using the "oblast" level boundaries while Moldova and Kosovo were included as one national unit in this database.

Others:

Albania, Bosnia & Herzegovina, Montenegro

These are the countries which have been included in the EBM v9.0 only as one national entity and these national boundaries have been used for the purpose of this database.

An overview of spatial units per country is presented in Table 2.

Table 1: S2Biom countries and the administrative units which were used for this database

Category	Classification	Version	Data Source - Polygons	Administrative units used in S2Biom
EU 28	NUTS3 available for all countries	2013	EUROSTAT/ Eurogeographics	NUTS 3 level
Serbia, RS	NUTS3 available	2013	EUROSTAT/ Eurogeographics	NUTS 3 level (25 units)
FYROM,MK	NUTS3 available	2013	EUROSTAT/ Eurogeographics	NUTS 3 level (8 units)
Turkey, TR	NUTS3 available	2010, not included in NUTS 2013	EUROSTAT/ Eurogeographics	NUTS 3 level
Ukraine, UA	Administrative units available	2013	EUROSTAT/ Eurogeographics	24 Oblasts + 1
Moldova, MD	Administrative units available	2013	EUROSTAT/ Eurogeographics	1 national unit
Kosovo, KS	Administrative units available	2013	EUROSTAT/ Eurogeographics	1 national unit
Albania, AL	National Entity in EBM	2013	EUROSTAT/ Eurogeographics	1 national unit
Montenegro, ME	National Entity in EBM	2013	EUROSTAT/ Eurogeographics	1 national unit
Bosnia & Hezregovina, BA	National Entity in EBM	2013	EUROSTAT/ Eurogeographics	1 national unit

Table 2: List of countries, database ID and number of regional units per country included in the database

CODE	Database ID	Country	Instances (regional units) in the database
AT	1	Austria	35 NUTS3 2013 polygons
BE	2	Belgium	44 NUTS3 2013 polygons
BG	3	Bulgaria	28 NUTS3 2013 polygons
HR	13	Croatia	21 NUTS3 2013 polygons
CY	4	Cyprus	1 NUTS3 2013 polygon
CZ	5	Czech republic	14 NUTS3 2013 polygons
DK	7	Denmark	11 NUTS3 2013 polygons
EE	8	Estonia	5 NUTS3 2013 polygons
FI	11	Finland	19 NUTS3 2013 polygons
FR	12	France	100 NUTS3 2013 polygons
DE	6	Germany	402 NUTS3 2013 polygons
EL	9	Greece	53 NUTS3 2013 polygons
HU	14	Hungary	20 NUTS3 2013 polygons
IE	15	Ireland	8 NUTS3 2013 polygons
IT	16	Italy	110 NUTS3 2013 polygons
LV	19	Latvia	6 NUTS3 2013 polygons
LT	17	Lithuania	10 NUTS3 2013 polygons
LU	18	Luxembourg	1 NUTS3 2013 polygon
MT	20	Malta	2 NUTS3 2013 polygons
NL	21	Netherlands	40 NUTS3 2013 polygons
PL	22	Poland	72 NUTS3 2013 polygons
PT	23	Portugal	25 NUTS3 2013 polygons
RO	24	Romania	42 NUTS3 2013 polygons
SK	27	Slovakia	8 NUTS3 2013 polygons
SI	26	Slovenia	12 NUTS3 2013 polygons
ES	10	Spain	59 NUTS3 2013 polygons

CODE	Database ID	Country	Instances (regional units) in the database
SE	25	Sweden	21 NUTS3 2013 polygons
UK	28	United kingdom	173 NUTS3 2013 polygons
ME	36	Montenegro	1 Country polygon
MK	29	FYROM	8 NUTS3 2013 polygons
AL	35	Albania	1 Country polygon
TR	31	Turkey	81 NUTS3 polygons
UA	32	Ukraine	25 NUTS3 equivalent polygons
BA	37	Bosnia and Herzegovina	1 Country polygon
RS	30	Serbia	25 NUTS3 2013 polygons
KS	34	Kosovo	1 Country polygon
MD	33	Moldova	1 Country polygon
		Total	**1486 Polygons**

2.3 Reference system

EuroBoundaryMap data, on which the spatial structure of this database has been developed, is stored in two-dimensional geographical coordinates, degrees (longitude, latitude) with decimal fraction. The spatial reference system used in the EBM v9.0 is the European Terrestrial Reference System 1989 (ETRS89) which is a geodetic Cartesian reference frame defined for Eurasian Plate. This reference system has negligible differences compared to the widely used World Geodetic System 1984 (WGS 84).

The EBM v9.0 is provided without any specific map projection. So, the NUTS3 2013 and NUTS3 equivalent administrative boundary polygons for the regions included in this database were projected to the Lambert Azimuthal Equal Area projection (LAEA) proposed by INSPIRE and suggested by the EBM v9.0 specifications.

2.4 Technical specifications

A dedicated open source long-term support (LTS) Ubuntu 12.04 class server was set up to host the data base.

The S2biom geospatial database is a PostgreSQL open source object-relational database. The geospatial extender PostGIS provides the support for integrating the database into a Geographic Information System (GIS). In addition, the database has been linked to MSAccess for easing the data entry tables and to QGIS for GIS processing and mapping support.

In the database the regional polygons are linked to the data tables by using the polygon ids as primary keys as shown in the entity relationship diagram in Figure 2. The tables which are now linked to the geographic objects can be handled and manipulated using PostgreSQL compatible GIS tools.

The biomass data in the current draft version of the database is available at the NUTS3_2013/ NUTS3_equivalent level. The spatial aggregation to NUTS2, NUTS1 and country level is possible by creating the specific level views in the database as per the requirements.

Figure 2: An entity relationship model of the final S2Biom spatial database[1]

[1] In addition to the tables shown in the figure, additionally a table "tbl_f_db_s2biom_other_land_use_cost" is also available in the data base.

3 Database tables

3.1 Introduction

The lignocellulosic biomass cost and supply data in the draft database has been arranged into different tables which have been separated based upon:

- type of data - whether it is cost data or supply data.
- source from which the lignocellulosic biomass has been collected (forestry, agriculture, other landuse, secondary or tertiary residues respectively).

The general structure of the database has been presented in Figure 3.

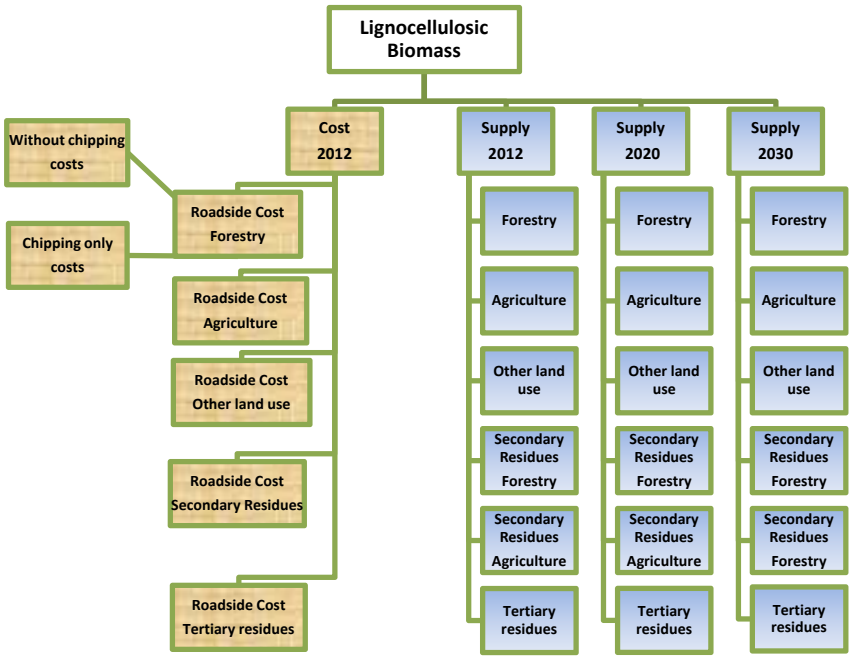

Figure 3: The different levels at which the lignocellulosic biomass data sets are included in the database.

The cost supply draft database in S2Biom consists of a total of 9 data tables which have been named using the biomass origin (e.g., forestry) and data type (e.g., supply)). Table 3 lists the names of all the tables included in the database. Except for forestry, agriculture on arable and grassed land, and other land uses, all other biomass types have only supply tables and the roadside cost for all biomass categories from these origins are assumed to be zero.

Table 3: The naming codes used in the S2Biom lignocellulosic biomass database

Origin	Database Table Names
1. Forestry	tbl_f_db_s2biom_forestry_supply
	tbl_f_db_s2biom_forestry_cost
2. Agriculture on arable land & grassland	tbl_f_db_s2biom_agriculture_supply
	tbl_f_db_s2biom_agriculture_cost
3. Other land use	tbl_f_db_s2biom_other_land_use_supply
	tbl_f_db_s2biom_other_land_use_cost
4. Secondary forestry residues	tbl_f_db_s2biom_sec_residues_forestry_supply
5. Secondary agriculture residues	tbl_f_db_s2biom_sec_residues_agriculture_supply
6. Tertiary residues (Wastes)	tbl_f_db_s2biom_tertiaryresidues_supply

3.2 Basic attributes:

For each of the table in the database, the following basic attributes have been included:

Attribute id: **id_s2biom_db_l3**
Definition: This is the NUTS3_2013 and equivalent code of the polygon representing the regions included in the database
Attribute id: **year**
Definition: The reference year of the data
Attribute id: **area_polygon_km2**
Definition: The total area of the polygon in square kilometers
Attribute id: **area_stats_km2**
Definition: The total statistical area of the regional unit represented by the polygon
Attribute id: **grouping**
Definition: Whether the polygon belongs to EU or non-EU (other) country
Attribute id: **country_id**
Definition: The unique numeric ID for S2Biom country to which the polygon belongs
Attribute id: **potential_type**
Definition: The type of lignocellulosic potential under consideration. The list of potential types per source is given in the dedicated biomass source sections.

In addition, there are additional attributes which appear separately in the tables for specific biomass origins:

Forestry:

Attribute id: **area_faws_km2**
Definition: Total forest area available for wood supply in km^2-
Attribute id: **area_faws_percent**
Definition: Total forest available for wood supply in percentage of total area

Agriculture:

Attribute id: **area_agriculture_km2**
Definition: Total agricultural area in km^2
Attribute id: **area_grassland_km2**
Definition: Total grassland area (in km^2)

Other land uses:

Attribute id: **area_olu_km2**
Definition: Total area under other land uses in km^2

Secondary agricultural residues:

none

Secondary residues from Forestry:

Attribute id: **forest_nc_km2**
Definition: Total non-conifer forest area in km^2
Attribute id: **forest_c_km2**
Definition: Total conifer forest area in km^2
Attribute id: **forest_total_km2** Definition: Total forest area in km^2

Tertiary residues:

none

3.3 Potential Type Coding

The attribute "**potential_type**" refers to the type of potential which differ based on the level of constraint which has applied when determining the potentials. For a detailed description of the potential types and the corresponding constrains, please refer to the S2Biom deliverable D1.6.

The potential types included in the database tables are shown in Table 4. The thematic attributes on biomass supply and cost are structured as explained in the following chapters.

Table 4: The potential types included in S2Biom database and the corresponding IDs

Biomass Origin Type	Potential	Potential ID
Forestry	Base potential	bp_f
	Technical potential	tp_f
	High potential	hp_f
	User defined potential 1	ud1_f
	User defined potential 2	ud2_f
	User defined potential 3	ud3_f
	User defined potential 4	ud4_f
	User defined potential 5	ud5_f
	User defined potential 6	ud6_f
	User defined potential 7	ud7_f
	User defined potential 8	ud8_f
Agriculture on arable land & grassland	Base potential	bp_a
	Technical potential	tp_a
	User defined potential 1	ud1_a
Other land use	Base potential	bp_o
	Technical potential	tp_0
	User defined potential 1	ud1_o
Secondary forestry residues	Base potential	bp_sr_f
	Technical potential	tp__sr_f
	User defined potential 1	ud1_sr_f
	User defined potential 2	Ud2_sr_f
Secondary agriculture residues	Base potential	bp_sr_a
	Technical potential	tp__sr_a
Tertiary residues (Wastes)	Base potential	bp_t
	Technical potential	tp_t
	User defined potential 1	ud1_t

3.4 Biomass category coding

The coding sequence of the biomass attribute IDs has been done using the following information:

- unit of measurement (***m*** for ***Kilotonnes***; ***v*** for ***1000m^3***)
- origin of data (forestry, agriculture, other landuse, secondary residues or tertiary residues)
- level of the data (to which aggregation/disaggregation level does the particular attribute belong to).

An example from the forestry supply database table has been given below to clarify the coding scheme presented on the following page.

In the same way for data on volumes (which is an important unit when dealing with forestry based biomass), the corresponding attributes in supply database have been coded by replacing the prefix **m** for mass with **v** for volume in each of the attribute IDs. The naming of attributes for all the other lignocellulosic biomass sources is done in a similar way.

The biomass data is always collected at the most detailed category level (e.g. **mf1_2_1_1_lr_ff_nc, mf1_2_1_2_lr_ff_c, mf1_2_1_3_lr_th_nc** and **mf1_2_1_4_lr_th_c**) and then other lower levels (e.g. **mf1_2_1, mf1_2** and **mf1**) are filled by summing up the totals from corresponding detailed level categories.

Database Table: **tbl_f_db_s2biom_forestry_supply**
Attribute id: **mf1**
Definition: The total supply potential of lignocellulosic biomass from forestry (in *Kilotonnes*) which is the sum of corresponding level 2 categories, namely, **mf1_1** and **mf1_2**
Attribute id: **mf1_2**
Definition: The total supply potential of lignocellulosic biomass from primary residues from forests (in *Kilotonnes*) which is the sum of corresponding level 3 categories, namely, **mf1_2_1** and **mf1_2_2**
Attribute id: **mf1_2_1**
Definition: The total supply potential of lignocellulosic biomass available as logging residues from final fellings & thinnings (in *Kilotonnes*) which is the sum of corresponding final level 4 categories, namely, **mf1_2_1_1_lr_ff_nc**, **mf1_2_1_2_lr_ff_c**, **mf1_2_1_3_lr_th_nc** and **mf1_2_1_4_lr_th_c**
Attribute id: **mf1_2_1_1_lr_ff_nc**[12]
Definition: The total supply potential of lignocellulosic biomass available as logging residues from final fellings from nonconifer trees (in *Kilotonnes*)
Attribute id: **mf1_2_1_2_lr_ff_c**[1]
Definition: The total supply potential of lignocellulosic biomass available as logging residues from final fellings from conifer trees (in *Kilotonnes*)
Attribute id: **mf1_2_1_3_lr_th_nc**[1]
Definition: The total supply potential of lignocellulosic biomass available as logging residues from thinnings from nonconifer trees (in *Kilotonnes*)
Attribute id: **mf1_2_1_4_lr_th_c**[1]
Definition: The total supply potential of lignocellulosic biomass available as logging residues from thinnings from conifer trees (in *Kilotonnes*)
[1] *This is the biomass category level at which the data has been collected for each of the S2Biom regional polygons*

3.5 Forestry based datasets

Table 5: List showing the category codes for all level 4 forestry categories included in the database

Forestry Category – Level 4	Database Attribute ID	Units Supply; Cost
1.1.1.1 Stemwood from final fellings originating from nonconifer trees - mass	mf1_1_1_1_sw_ff_nc	Ktonnes DM; EUR/t
1.1.1.1 Stemwood from final fellings originating from nonconifer trees - volume	vf1_1_1_1_sw_ff_nc	1000m^3; EUR/m^3
1.1.1.2 Stemwood from final fellings originating from conifer trees - mass	mf1_1_1_2_sw_ff_c	Ktonnes DM; EUR/t
1.1.1.2 Stemwood from final fellings originating from conifer trees - volume	vf1_1_1_2_sw_ff_c	1000m^3; EUR/m^3
1.1.1.3 Stemwood from thinnings originating from nonconifer trees - mass	mf1_1_1_3_sw_th_nc	Ktonnes DM; EUR/t
1.1.1.3 Stemwood from thinnings originating from nonconifer trees - volume	vf1_1_1_3_sw_th_nc	1000m^3; EUR/m^3
1.1.1.4 Stemwood from thinnings originating from conifer trees - mass	mf1_1_1_4_sw_th_c	Ktonnes DM; EUR/t
1.1.1.4 Stemwood from thinnings originating from conifer trees - volume	vf1_1_1_4_sw_th_c	1000m^3; EUR/m^3
1.2.1.1 Logging residues from final fellings from nonconifer trees - mass	mf1_2_1_1_lr_ff_nc	Ktonnes DM; EUR/t
1.2.1.1 Logging residues from final fellings from nonconifer trees - volume	vf1_2_1_1_lr_ff_nc	1000m^3; EUR/m^3
1.2.1.2 Logging residues from final fellings from conifer trees - mass	mf1_2_1_2_lr_ff_c	Ktonnes DM; EUR/t
1.2.1.2 Logging residues from final fellings from conifer trees - volume	vf1_2_1_2_lr_ff_c	1000m^3; EUR/m^3
1.2.1.3 Logging residues from thinnings from nonconifer trees - mass	mf1_2_1_3_lr_th_nc	Ktonnes DM; EUR/t
1.2.1.3 Logging residues from thinnings from nonconifer trees - volume	vf1_2_1_3_lr_th_nc	1000m^3; EUR/m^3
1.2.1.4 Logging residues from thinnings from conifer trees - mass	mf1_2_1_4_lr_th_c	Ktonnes DM; EUR/t
1.2.1.4 Logging residues from thinnings from conifer trees - volume	vf1_2_1_4_lr_th_c	1000m^3; EUR/m^3
1.2.2.1 Stumps from final fellings originating from nonconifer trees - mass	mf1_2_2_1_st_ff_nc	Ktonnes DM; EUR/t
1.2.2.1 Stumps from final fellings originating from nonconifer trees - volume	vf1_2_2_1_st_ff_nc	1000m^3; EUR/m^3
1.2.2.2 Stumps from final fellings originating from conifer trees - mass	mf1_2_2_2_st_ff_c	Ktonnes DM; EUR/t
1.2.2.2 Stumps from final fellings originating from conifer trees - volume	vf1_2_2_2_st_ff_c	1000m^3; EUR/m^3

3.6 Agriculture based datasets

Table 6: List showing the category codes for all level 4 agricultural categories included in the database

Agricultural Category – Level 4	Database Attribute ID	Units Supply; Cost
2.1.1.2 Miscanthus (Perennial grass) - mass	ma2_1_1_2_miscanthus	Ktonnes DM; EUR/t
2.1.1.2 Miscanthus (Perennial grass) - volume	va2_1_1_2_miscanthus	1000m^3; EUR/m^3
2.1.1.3 Switchgrass (Perennial grass) - mass	ma2_1_1_3_switchgrass	Ktonnes DM; EUR/t
2.1.1.3 Switchgrass (Perennial grass) - volume	va2_1_1_3_switchgrass	1000m^3; EUR/m^3
2.1.1.4 Giant reed (Perennial grass) - mass	ma2_1_1_4_giantreed	Ktonnes DM; EUR/t
2.1.1.4 Giant reed (Perennial grass) - volume	va2_1_1_4_giantreed	1000m^3; EUR/m^3
2.1.1.5 Cardoon (Perennial crop) - mass	ma2_1_1_5_cardoon	Ktonnes DM; EUR/t
2.1.1.5 Cardoon (Perennial crop) - volume	va2_1_1_5_cardoon	1000m^3; EUR/m^3
2.1.1.6 Reed Canary Grass (Perennial grass) - mass	ma2_1_1_6_reedcanary	Ktonnes DM; EUR/t
2.1.1.6 Reed Canary Grass (Perennial grass) - volume	va2_1_1_6_reedcanary	1000m^3; EUR/m^3
2.1.2.1 SRC Willow – mass	ma2_1_2_1_willow	Ktonnes DM; EUR/t
2.1.2.1 SRC Willow - volume	va2_1_2_1_willow	1000m^3; EUR/m^3
2.1.2.2 SRC Poplar - mass	ma2_1_2_2_poplar	Ktonnes DM; EUR/t
2.1.2.2 SRC Poplar - volume	va2_1_2_2_poplar	1000m^3; EUR/m^3
2.1.2.3 Other SRC - mass	ma2_1_2_3_other_inc_eucalyptus	Ktonnes DM; EUR/t
2.1.2.3 Other SRC - volume	va2_1_2_3_other_inc_eucalyptus	1000m^3; EUR/m^3
2.2.1.1 Rice straw - mass	ma2_2_1_1_ricestraw	Ktonnes DM; EUR/t
2.2.1.1 Rice straw - volume	va2_2_1_1_ricestraw	1000m^3; EUR/m^3
2.2.1.2 Cereals straw - mass	ma2_2_1_2_cerealsstraw	Ktonnes DM; EUR/t
2.2.1.2 Cereals straw - volume	va2_2_1_2_cerealsstraw	1000m^3; EUR/m^3
2.2.1.3 Oil seed rape straw - mass	ma2_2_1_3_oilseedrapestraw	Ktonnes DM; EUR/t
2.2.1.3 Oil seed rape straw - volume	va2_2_1_3_oilseedrapestraw	1000m^3; EUR/m^3
2.2.1.4 Maize stover - mass	ma2_2_1_4_maizestover	Ktonnes DM; EUR/t
2.2.1.4 Maize stover - volume	va2_2_1_4_maizestover	1000m^3; EUR/m^3
2.2.1.5 Sugarbeet leaves - mass	ma2_2_1_5_sugarbeetleaves	Ktonnes DM; EUR/t
2.2.1.5 Sugarbeet leaves - volume	va2_2_1_5_sugarbeetleaves	1000m^3; EUR/m^3
2.2.1.6 Sunflower straw - mass	ma2_2_1_6_sunflowerstraw	Ktonnes DM; EUR/t
2.2.1.6 Sunflower straw - volume	va2_2_1_6_sunflowerstraw	1000m^3; EUR/m^3
2.2.2.1 Residues from vineyards - mass	ma2_2_2_1_vineyard_res	Ktonnes DM; EUR/t
2.2.2.1 Residues from vineyards - volume	va2_2_2_1_vineyard_res	1000m^3; EUR/m^3
2.2.2.2 Residues from fruit tree plantations (apples, pears and soft fruit) - mass	ma2_2_2_2_fruittree_p_res	Ktonnes DM; EUR/t
2.2.2.2 Residues from fruit tree plantations (apples, pears and soft fruit) - volume	va2_2_2_2_fruittree_p_res	1000m^3; EUR/m^3

2.2.2.3 Residues from olives tree plantations - mass	ma2_2_2_3_olivetree_p_res	Ktonnes DM; EUR/t
2.2.2.3 Residues from olives tree plantations - volume	va2_2_2_3_olivetree_p_res	1000m^3; EUR/m^3
2.2.2.4 Residues from citrus tree plantations - mass	ma2_2_2_4_citrustree_p_res	Ktonnes DM; EUR/t
2.2.2.4 Residues from citrus tree plantations - volume	va2_2_2_4_citrustree_p_res	1000m^3; EUR/m^3
2.3.1.1 Unused grassland cuttings (abandoned grassland, managed grasslands not used for feed) - mass	ma2_3_1_1_unused_grassland	Ktonnes DM; EUR/t
2.3.1.1 Unused grassland cuttings (abandoned grassland, managed grasslands not used for feed) - volume	va2_3_1_1_unused_grassland	1000m^3; EUR/m^3

3.7 Other land use based datasets

Table 7: List showing the category codes for all level 4 other land uses categories included in the database

Other Land uses Category – Level 4	Database Attribute ID	Units Supply; Cost
3.1.2.1 grassy biomass from roadside verges - mass	mo3_1_2_1_roadsideverges_g	Ktonnes DM; EUR/t
3.1.2.1 grassy biomass from roadside verges - volume	vo3_1_2_1_roadsideverges_g	1000m^3/ha; EUR/ m^3

3.8 Secondary forestry residues based datasets

Table 8: List showing the category codes for all level 4 secondary forestry residues categories included in the database

Secondary Agricultural Residues Category – Level 4	Database Attribute ID	Units Supply Only
4.1.1.1 Sawdust from sawmills from conifers - mass	mr4_1_1_1_sawdst_sawmills_c	Ktonnes DM
4.1.1.1 Sawdust from sawmills from conifers - volume	vr4_1_1_1_sawdst_sawmills_c	1000 m^3
4.1.1.2 Sawdust from sawmills from nonconifers - mass	mr4_1_1_2_sawdst_sawmills_nc	Ktonnes DM
4.1.1.2 Sawdust from sawmills from nonconifers - volume	vr4_1_1_2_sawdst_sawmills_nc	1000 m^3
4.1.1.3 Sawmill residues: excluding sawdust, conifers - mass	mr4_1_1_3_sawmill_res_exc_sawdust_c	Ktonnes DM
4.1.1.3 Sawmill residues: excluding sawdust, conifers - volume	vr4_1_1_3_sawmill_res_exc_sawdust_c	1000 m^3
4.1.1.4 Sawmill residues: excluding sawdust, nonconifers - mass	mr4_1_1_4_sawmill_res_exc_sawdust_nc	Ktonnes DM
4.1.1.4 Sawmill residues: excluding sawdust, nonconifers - volume	vr4_1_1_4_sawmill_res_exc_sawdust_nc	1000 m^3
4.1.2.1 Residues from industries producing semi -finished wood based panels - mass	mr4_1_2_1_res_wbp_industry	Ktonnes DM
4.1.2.1 Residues from industries producing semi -finished wood based panels - volume	vr4_1_2_1_res_wbp_industry	1000 m^3
4.1.2.2 Residues from further wood processing - mass	mr4_1_2_2_res_frthr_wood_process	Ktonnes DM
4.1.2.2 Residues from further wood processing - volume	vr4_1_2_2_res_frthr_wood_process	1000 m^3
4.1.3.1 Bark residues from pulp and paper industry - mass	mr4_1_3_1_bark	Ktonnes DM
4.1.3.1 Bark residues from pulp and paper industry - volume	vr4_1_3_1_bark	1000 m^3
4.1.3.2 Black liquor - mass	mr4_1_3_2_blackliqour	Ktonnes DM
4.1.3.2 Black liquor - volume	vr4_1_3_2_blackliqour	1000 m^3

3.9 Secondary agricultural residues based datasets

Table 8: List showing the category codes for all level 4 secondary agricultural residues categories included in the database

Secondary Agricultural Residues Category – Level 4	Database Attribute ID	Units Supply Only
4.2.1.1 Olive stones - mass	mr4_2_1_1_olive_stones	Ktonnes DM
4.2.1.1 Olive stones - volume	vr4_2_1_1_olive_stones	1000 m^3
4.2.1.3 Rice husk - mass	mr4_2_1_3_other_res_foodfruit_ind	Ktonnes DM
4.2.1.3 Rice husk - volume	vr4_2_1_3_other_res_foodfruit_ind	1000 m^3
4.2.1.4 Pressed grapes dregs - mass	mr4_2_1_4_pressed_grapes_dregs	Ktonnes DM
4.2.1.4 Pressed grapes dregs- volume	vr4_2_1_4_pressed_grapes_dregs	1000 m^3
4.2.1.5 Cereal bran - mass	mr4_2_1_5_cereal_bran	Ktonnes DM
4.2.1.5 Cereal bran- volume	vr4_2_1_5_cereal_bran	1000 m^3

3.10 Tertiary residues (waste) based datasets

Table 9: List showing the category codes for all level 4 tertiary residues categories included in the database

Tertiary Residues Category – Level 4	Database Attribute ID	Units Supply Only
5.1.1.1 Biowaste as part of integrally collected municipal waste: Biodegradable waste of not separately collected municipal waste (excluding textile and paper) - mass	mt5_1_1_1_biowaste_in_mixed	Ktonnes[2]
5.1.1.1 Biowaste as part of integrally collected municipal waste: Biodegradable waste of not separately collected municipal waste (excluding textile and paper) - volume	vt5_1_1_1_biowaste_in_mixed	1000m^3
5.1.1.2 Separately collected biowaste: Biodegradable waste of separately collected municipal waste (excluding textile and paper) - mass	mt5_1_1_2_biowaste_separate	Ktonnes[3]
5.1.1.2 Separately collected biowaste: Biodegradable waste of separately collected municipal waste (excluding textile and paper) - volume	vt5_1_1_2_biowaste_separate	1000m^3
5.2.1.1 Hazardous post consumer wood - mass	mt5_2_1_1_hazardous_pcw	Ktonnes[4]
5.2.1.1 Hazardous post consumer wood - volume	vt5_2_1_1_hazardous_pcw	1000m^3
5.2.1.2 Non hazardous post consumer wood - mass	mt5_2_1_2_nonhazardous_pcw	Ktonnes[5]
5.2.1.2 Non hazardous post consumer wood - volume	vt5_2_1_2_nonhazardous_pcw	1000m^3

[2] Moisture Content ($w\%_{ar}$) is 27.20%
[3] Moisture Content ($w\%_{ar}$) is 55.60%
[4] Moisture Content ($w\%_{ar}$) is 13.90%
[5] Moisture Content ($w\%_{ar}$) is 13.10%