Documentation of changes implemented in ecoinvent version 3.1

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1 Introduction

This report covers the changes in the ecoinvent database between version 3.0 and version 3.1. It describes both the database-wide changes that affect the whole database as well as the specific changes done in different sectors. These changes consist in the addition of new datasets to the sector, in the deletion of outdated ones, and in the remodeling or corrections of others.

The Version 3.1 Change Comparison File (available in the support section of the ecoinvent website; http://www.ecoinvent.org/support/documents-and-files/) is a complementary document to this one, as all changes in all datasets are described there, at an Exchange level of detail.

2 Database-wide changes

For the version 3.1, a few aspects have been corrected throughout the whole database.

2.1 Renamed exchanges and activities

Some activities or products were renamed for version 3.1. The renaming described here does not affect the content of the activity by any means; or does not indicate a change of the product itself.

Table 1. Activities renamed for version 3.1.

Name of activity in version 3.0	Name of activity in version 3.1
floor heating from air-water heat pump	market for floor heating from air-water heat pump
floor heating from borehole heat pump	market for floor heating from borehole heat pump
treatment of used industrial electronic device, WEEE collection	market for used industrial electronic device, WEEE collection
Silicon production, electronics grade	silicon production, electronics grade
treatment of digester sludge by municipal incineration, future	treatment of digester sludge, municipal incineration, future
anode production, for aluminium electrolysis	anode production, for metal electrolysis
market for anode, for aluminium electrolysis	market for anode, for metal electrolysis
electric conncetor production, peripheral type buss	electric connector production, peripheral type buss

Table 2. Intermediate exchanges renamed for version 3.1.

Name of exchange in version 3.0	Name of exchange in version 3.1
anode, for aluminium electrolysis	anode, for metal electrolysis
electric conncetor, peripheral type buss	electric connector, peripheral type buss
tap water, at user	tap water
water works	water works, capacity 1.1E10l/year

Table 3. Elementary exchanges renamed for version 3.1.

Name of exchange in version 3.0	Name of exchange in version 3.1
Lead, Pb 0.014%, Au 9.7E-4%, Ag 9.7E-4%, Zn 0.63%, Cu 0.38%, in ore, in ground	Lead, Pb 0.014%, in mixed ore, in ground
Lead, Pd 3.6E-1%, Ag 5.4E-3%, Au 1.8E-4%, Cu 2.0E-1%, Zn 3.1E+0% in ore, in ground	Lead, Pb 3.6E-1%, in mixed ore, in ground
Silver, Ag 9.7E-4%, Au 9.7E-4%, Zn 0.63%, Cu 0.38%, Pb 0.014%, in ore, in ground	Silver, Ag 9.7E-4%, in mixed ore, in ground

Silver, Ag 5.4E-3%, Au 1.8E-4%, Cu 2.0E-1%, Pd 3.6E-1%, Zn 3.1E+0% in ore, in ground	Silver, Ag 5.4E-3%, in mixed ore, in ground
Gold, Au 1.8E-4%, Ag 5.4E-3%, Cu 2.0E-1%, Pd 3.6E-1%, Zn 3.1E+0% in ore, in ground	Gold, Au 1.8E-4%, in mixed ore, in ground
Gold, Au 9.7E-4%, Ag 9.7E-4%, Zn 0.63%, Cu 0.38%, Pb 0.014%, in ore, in ground	Gold, Au 9.7E-4%, in mixed ore, in ground
Zinc, Zn 0.63%, Au 9.7E-4%, Ag 9.7E-4%, Cu 0.38%, Pb 0.014%, in ore, in ground	Zinc, Zn 0.63%, in mixed ore, in ground
Zinc, Zn 3.1E+0%, Ag 5.4E-3%, Au 1.8E-4%, Cu 2.0E-1%, Pd 3.6E-1% in ore, in ground	Zinc, Zn 3.1%, in mixed ore, in ground
Copper, Cu 0.38%, Au 9.7E-4%, Ag 9.7E-4%, Zn 0.63%, Pb 0.014%, in ore, in ground	Copper, Cu 0.38%, in mixed ore, in ground
Copper, Cu 2.0E-1%, Ag 5.4E-3%, Au 1.8E-4%, Pd 3.6E-1%, Zn 3.1E+0% in ore, in ground	Copper, Cu 0.2%, in mixed ore, in ground
Sulphur	Sulfur
Sulphur trioxide	Sulfur trioxide
Sulphur dioxide	Sulfur dioxide

2.2 Changes in the GLO datasets

Some GLO datasets have been edited for the version 3.1, resulting in what has been considered as a minor update of the activity. They are listed separately here and not in the following chapters which contain only major updates, new datasets or individual corrections to errors.

Changes are considered minor updates when the only changes in the activity were related to Production Volumes, addition of new flows to take into account new flows in corresponding local activities, and additions of Activity links.

This type of update is most often triggered because of the inclusion of new local data.

Table 4. New GLO activities that have gone through a minor update. If solely the Production Volumes or the Activity Links were added, this is not mentioned here, and shall be found in the Change Comparison file.

Activity name	Time period
corrugated board box production	2008 - 2008
distribution network construction, electricity, low voltage	1988 - 2000
energy and auxilliary inputs, metal working factory, with heating from hard coal	2006 - 2007
glued laminated timber production, for indoor use	1986 - 2002
gold-silver mine operation with refinery	2004 - 2006
hydropower plant construction, reservoir	1945 - 1970
hydropower plant construction, run-of-river	1945 - 1970
iron pellet production	1999 - 2002
limestone production, crushed, for mill	2000 - 2002
limestone production, crushed, washed	2000 - 2002
limestone quarry operation	1992 - 2002

natural gas production	1989 - 2000
paper production, newsprint, virgin	2000 - 2000
paper production, woodfree, uncoated, at integrated mill	2000 - 2000
potassium chloride production	2000 - 2000
quicklime production, in pieces, loose	2000 - 2002
steel production, electric, chromium steel 18/8	2001 - 2001
steel production, electric, low-alloyed	2001 - 2001
transmission network construction, electricity, high voltage	1988 - 1994
transmission network construction, electricity, medium voltage	1988 - 2000
treatment of recovered paper to linerboard, testliner	2008 - 2008
treatment of used vegetable cooking oil, purification	2003 - 2006
treatment of waste cooking oil, purified, esterification	1996 - 2006

As explained in the Documentation of changes implemented in ecoinvent Data 3.0., some activities were missing their GLO counterparts. Now, some of those GLO have been added.

Table 5. GLO activities that were missing, and have been added in the version 3.1.

Activity name	Time period
ammonium nitrate phosphate production	1999 - 1999
natural gas, burned in gas turbine, for compressor station*	2010 - 2010
natural gas pressure reduction from high to low pressure	2010 - 2010
operation, computer, laptop, 68% active work with internet access 0.2 Mbit/s, label-certified electricity	2005 - 2009
operation, computer, laptop, 68% active work, label-certified electricity	2005 - 2009
operation, computer, laptop, video mode, label-certified electricity	2005 - 2009
operation, computer, laptop, videoconference, label-certified electricity	2005 - 2009
operation, internet access equipment, label-certified electricity	2005 - 2009
tissue paper production	2000 - 2000

*This is part of a larger update, see Table 18

2.3 Overall update of water flows

2.3.1 Water use related exchanges on the input and output side of an activity

In all activities, water consumption must be represented by both water input exchanges and water output exchanges (see Figure 1). These exchanges can be either with the environment (e.g. water to air) or with the technosphere (e.g. wastewater, water contained in products). For further understanding of the terminology related to water use modelling in the ecoinvent v3 database please see the glossary section on our ecoinvent.org webpage.

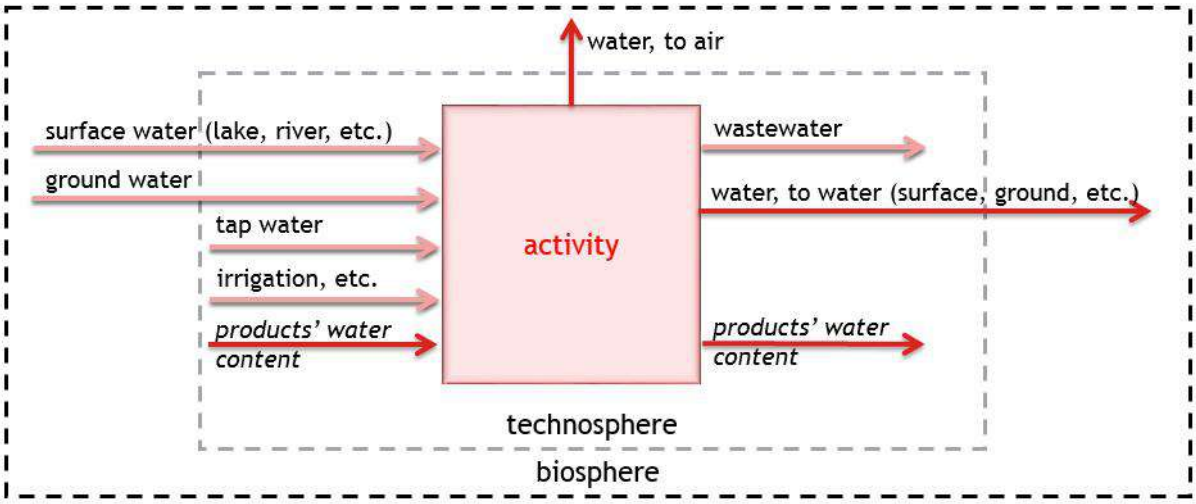

Figure 1 Sketch of an activity with water use-related exchanges

The elementary exchanges related to water use introduced in ecoinvent v3.0 have been maintained (see Table 6). The database also contains many intermediate exchanges which are related to water use (such as tap water, wastewater, etc.).

Table 6 Water user related elementary exchanges

	exchange name	compartment	Subcompartment	fraction, origin;
FromEnvironment	Water, cooling, unspecified natural origin	natural resource	in water	unspecified
	Water, lake	natural resource	in water	fresh water
	Water, river	natural resource	in water	fresh water
	Water, salt, ocean	natural resource	in water	salt water
	Water, salt, sole	natural resource	in water	salt water
	Water, turbine use, unspecified natural origin	natural resource	in water	fresh water
	Water, unspecified natural origin	natural resource	in water	unspecified
	Water, well, in ground	natural resource	in water	fresh water
ToEnvironment	Water	water	Unspecified	
	Water	water	Ground	
	Water	water	surface water	
	Water	water	Ocean	
	Water	water	ground-, long-term	
	Water	air	Unspecified	
	Water	air	urban air close to ground	
	Water	air	lower stratosphere + upper troposphere	
	Water	air	non-urban air or from high stacks	
	Water	air	low population density, long-term	

2.3.2 Updated and new data

2.3.2.1 Amounts of the exchanges

Some datasets in the database have been updated in ecoinvent v3.1 so they are water balanced. For concrete changes in concrete datasets, please see the Change Comparison file. The most significant update is related to the electricity and heat production activities in all available regions. All these activities now contain systematic and consistent data created using one single methodology.

2.3.2.2 New properties

Next to the updates on values of the exchanges the Water, to water and Water, to air elementary exchanges have three new properties (see Table 7).

Table 7 Water use, new properties of Water, to water and Water, to air elementary exchanges

property name	Unit
fraction, origin: fresh water	Dimensionless
fraction, origin: salt water	Dimensionless
fraction, origin: unspecified	Dimensionless

The amount of water which evaporates to air during the activity is in the database represented by the Water, to air elementary exchange. This water which evaporates to air might have entered the activity either as fresh, salt or unspecified water. Since this difference might be crucial when applying different LCIA methodologies the three new properties have been added to the exchange (see Table 7).

For example, the electricity production, hard coal, GLO has an exchange Water, to air, unspecified. This exchange has following properties; fraction, origin: fresh water = 0.0478, fraction, origin: salt water = 0 and fraction, origin: unspecified = 0.952. Which means, that 4.78% of the water which evaporates to air originally comes from fresh water sources, 95.2% comes from unspecified sources and none of the water comes from salt water source.

Table 8 Water use related intermediate (from technosphere) exchanges

	exchange name	unit	compartment	subcompartment	fraction, origin;
From Technosphere	tap water	kg			fresh water
	water, completely softened, from decarbonised water, at user	kg			fresh water
	water, decarbonised, at user	kg			fresh water
	water, deionised, from tap water, at user	kg			fresh water

water, ultrapure	kg			fresh water
irrigation	m3			fresh water
Water, turbine use, unspecified natural origin	m3	natural resource	in water	fresh water
Water, unspecified natural origin	m3	natural resource	in water	unspecified
Water, well, in ground	m3	natural resource	in water	fresh water

2.3.3 Water balance

2.3.3.1 What is water balance

The ideal water balance happens when the amount of water entering an activity is equal to the amount of water leaving the activity. The sum of all the water entering the activity is calculated as the amount of an exchange multiplied by the property of the exchange called water in wet mass. In case of tap water, for example, the water in wet mass property is 0.99966 kg of water per 1kg of tap water (due to particles in the water this is not exactly 1 kg). All the amounts of all exchanges multiplied by its water in wet mass properties are then summed up on both input and output side. If these two values are equal the dataset is water balanced.

2.3.3.2 What is the status of water balance in ecoinvent v3.1 database

Water balances can be established on the unit process level (UPR) as well as on the level of life cycle inventories (LCIs). While not all datasets on the unit process (UPR) level in the database are balanced completely, an analysis of the overall LCI scores suggests that all the datasets with significant water use in version 3.1 are balanced.

Each system model has its specifics which might disturb or prevent the possibility of establishing the water balance of the final LCI.

In, for example, the allocation, cut-off by classification system model currently around 75% of the LCI datasets are water balanced within a -0.1% to 0.1% deviation from an ideal water balance (see Figure 2) and 93.7% are water balanced within -5% to 5% (see Figure 2) from an ideal water balance. On the other side only around 2.3% of LCI datasets are water unbalanced with more than +-5% deviation from the ideal water balance.

The two other system models currently offered in the database have similar results.

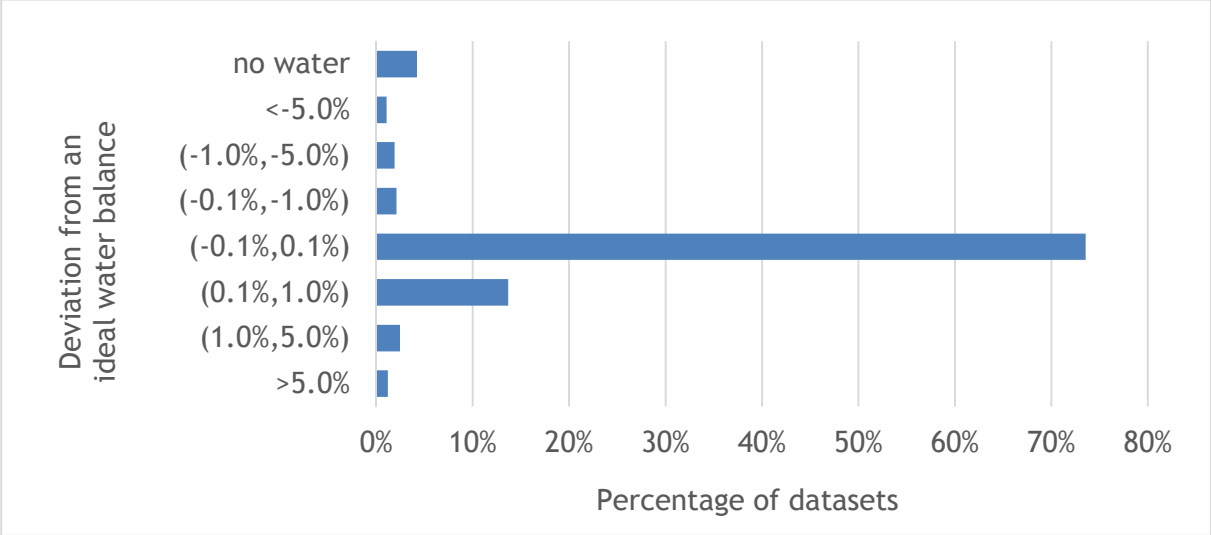

Figure 2 Water balance statistics of the whole database, life cycle inventory (LCI), Allocation, cut-off by classification system model, (∑water IN-∑water OUT)/∑water IN

2.4 Prices and production volumes

2.4.1 Production volumes

2.4.1.1 Current status of the production volumes in the database

In addition to all the new datasets published in ecoinvent v3.1, more than 700 products (both reference products and by-products) have had their production volumes updated. For more detailed information on all the concrete changes see the Change Comparison file.

2.4.2 Prices

The main function of prices in the ecoinvent database is to serve for the economic allocation. A price is only needed if the dataset requires economic allocation. Other allocation methods or datasets without by-products do not need price information. In ecoinvent v3.0 there were prices for approximately 1070 products. In ecoinvent v3.1 more than 150 products' prices have been updated or newly collected. Thus in total more than 50% of the products present in the database have a price.

For more detailed information on all the concrete changes see the Change Comparison file.

2.5 Energy exchanges

While in ecoinvent v3.0 the exchanges for renewable energy uptake (see Table 9) were excluded, all of them have been reintroduced in ecoinvent v3.1. In total around 1000 energy exchanges have been added to more than 900 activities.

Table 9 List of energy elementary exchanges available in the ecoinvent v3.1 database

exchange name	unit
Energy, gross calorific value, in biomass	MJ
Energy, gross calorific value, in biomass, primary forest	MJ
Energy, kinetic (in wind), converted	MJ
Energy, solar, converted	MJ
Energy, geothermal, converted	MJ
Energy, potential (in hydropower reservoir), converted	MJ

For more detailed information on all the concrete changes see the Change Comparison file.

2.6 Supply chains adjusted

Activity links have been added to many datasets, in order to better represent the supply of given products (very often, heat). Furthermore, the default transport distances used in market datasets were updated to better reflect the transport of specific products. For more detailed information on all the concrete changes see the Change Comparison file.

2.7 Updates in sectors

In the following chapters, all major updates done to the database are described following a sectorial approach, i.e. analysing the database per activity sectors.

The datasets listed as New in the following pages are new to the database. They might be a new geography instance of a given activity, or a completely new activity (with one or more geographies).

The datasets listed as Updated in the following pages have been updated compared to version 3.01.

Finally, some datasets in the Quebec (CA-QC) geography bear the label "Recontextualization". Those datasets were selected based on the relative importance of relative contribution of direct electricity consumption to cradle-to-gate impacts[1]. To create them, the existing GLO datasets were used as a basis and a Child dataset was created for Quebec. They are therefore linked to regional supply chains.

The information on the different tables should guide the reader of this document on the distinctions described above.

[1] Lesage, P., and Samson, R., The Quebec Life Cycle Inventory Database Project, International Journal of LCA, 2013, 10.1007/s11367-013-0593-1

3 Agricultural sector

3.1 Changes in activities

The main novelties in this sector concern two topics: agricultural activities located in the Québec region, and food and animal production. The following tables list all new datasets in the sector.

Table 10. New activities in the sector, concerning agricultural operations. If an activity is present in several geographies all of them are listed under "Geographies". The column 3.1 labels the activities as: **R**: Recontextualization. **U**: Updated. **N**: New.

Activity name	Time period	Geographies	3.1
application of plant protection product, by field sprayer	1991 - 2002	CA-QC	N
bale loading	1991 - 2002	CA-QC	N
baling	1991 - 2002	CA-QC	N
combine harvesting	1991 - 2002	CA-QC	N
drying of feed grain	1985 - 2002	CA-QC	N
drying of maize grain	2000 - 2013	GLO, CA-QC	N
fertilising, by broadcaster	1991 - 2002	CA-QC	N
fodder beet production, Swiss integrated production, intensive	1996 - 2003	CH, GLO	U
fodder loading, by self-loading trailer	1991 - 2002	CA-QC	N
harvesting, by complete harvester, potatoes	1991 - 2002	CA-QC	N
haying, by rotary tedder	1991 - 2002	CA-QC	N
irrigation	1997 - 2006	CA-QC	N
liquid manure spreading, by vacuum tanker	1991 - 2002	CA-QC	N
operation, dried roughage store, air dried, solar	1994 - 2002	CA-QC	R
operation, dried roughage store, cold-air dried, conventional	1994 - 2002	CA-QC	N
operation, dried roughage store, non ventilated	1994 - 2002	CA-QC	R
operation, housing system, cattle, loose	1994 - 2002	CA-QC	N
operation, housing system, cattle, tied	1994 - 2002	CA-QC	N
operation, housing system, pig, fully-slatted floor	1994 - 2002	CA-QC	R
operation, housing system, pig, label-certified	1994 - 2002	CA-QC	R
potato grading	2002 - 2002	CA-QC	R
potato planting	1991 - 2002	CA-QC	N
solid manure loading and spreading, by hydraulic loader and spreader	1991 - 2002	CA-QC	N
sowing	1991 - 2002	CA-QC	N
swath, by rotary windrower	1991 - 2002	CA-QC	N
tillage, cultivating, chiselling	1991 - 2002	CA-QC	N
tillage, hoeing and earthing-up, potatoes	1991 - 2002	CA-QC	N
tillage, ploughing	1991 - 2002	CA-QC	N
tillage, rolling	1991 - 2002	CA-QC	N
tillage, rotary cultivator	1991 - 2002	CA-QC	N

Table 11. New activities in the sector, concerning food and animal production. If an activity is present in several geographies all of them are listed under "Geographies". The column 3.1 labels the activities as: R: Recontextualization. U: Updated. N: New.

Activity name	Time Period	Geography	3.1
butter production, from cow milk	2007 - 2014	GLO	N
butter production, from cream, from cow milk	2007 - 2014	GLO	N
buttermilk, from cow milk to generic market for protein feed	2014 - 2014	GLO	N
cattle for slaughtering, live weight to generic market for red meat, live weight	2014 - 2014	GLO	N
cheese production, soft, from cow milk	2007 - 2014	GLO	N
dairy construction	2005 - 2014	GLO	N
milk production, from cow	2009 - 2011	GLO, CA-QC	N
milk evaporation	2004 - 2004	GLO, CA-QC	N
milk spray-drying	2004 - 2004	GLO, CA-QC	N
polar fleece production, energy use only	1997 - 1997	CA-QC	R
sheep for slaughtering, live weight to generic market for red meat, live weight	2014 - 2014	GLO	N
skimmed milk, from cow milk to generic market for protein feed	2014 - 2014	GLO	N
soybean beverage production	2010 - 2013	GLO, CA-Qc	N
soybean meal and crude oil production, mechanical extraction	2010 - 2013	GLO, CA-QC	N
tofu production	2010 - 2013	GLO, CA-QC	N
yogurt production, from cow milk	2010 - 2012	GLO, CA-QC	N

On the other hand, the activities "treatment of whey, anaerobic digestion", CH, GLO, 2000 – 2004, have been deleted.

3.2 Changes in products

The introduction of some of those new activities has also resulted in the generation of new products.

Table 12. New products in the agricultural sector.

Product name	Unit
butter, from cow milk	kg
buttermilk, from cow milk	kg
cattle for slaughtering, live weight	kg
cheese, from cow milk, fresh, unripened	kg
cow milk	kg
cream, from cow milk	kg
drying of maize grain	m3
evaporation of milk	kg
red meat, live weight	kg
skimmed milk, from cow milk	kg
soybean beverage	l
spray-drying of milk	kg
tofu	kg
yogurt, from cow milk	kg

3.2.1 Constrained markets introduced

All constrained markets in the sector, together with the marginal consumer are listed in Table 13. When the product was present in the version 3.0 as a material for treatment, the treatment activity has also been remodeled; this is sometimes reflected in a name change and also expressed in the Table 13.

Table 13. Constrained markets in the agricultural sector.

Constrained market	Marginal consumer in 3.1	Marginal consumer in 3.0
market for straw	heat production, straw, at furnace 300kW, GLO, 1983 – 2007	treatment of straw, in furnace 300kW, GLO, 1983 – 2007
market for straw, organic	heat production, straw, organic, at furnace 300kW, GLO, 1983 – 2007	treatment of straw, organic, in furnace 300kW, GLO, 1983 – 2007
market for buttermilk, from cow milk	buttermilk, from cow milk to generic market for protein feed, GLO, 2014 - 2014	
market for cattle for slaughtering, live weight	cattle for slaughtering, live weight to generic market for red meat, live weight, GLO, 2014 - 2014	
market for skimmed milk, from cow milk	skimmed milk, from cow milk to generic market for protein feed, GLO, 2014 - 2014	
market for whey	ethanol production from whey, CH, GLO, 2000 - 2004	treatment of whey by fermentation, CH, GLO, 2000 - 2004
market for cream, from cow milk	butter production, from cream, from cow milk, GLO, 2007 - 2014	

4 Building materials: from extraction

4.1 New activities and products

New activities and products have been introduced concerning extraction of raw materials and production of building materials themselves. They are listed in the tables below.

All infrastructure construction have been described associated to their relevant sector.

Table 14. New activities in the building sector. If an activity is present in several geographies all of them are listed under "Geographies". The column 3.1 labels the activities as: **R**: Recontextualization. **U**: Updated. **N**: New.

Activity name	Time period	Geographies	3.1
bitumen seal production, V60	1994 - 2000	CA-QC	R
bitumen seal production, polymer EP4 flame retardant	1994 - 2000	CA-QC	R
brick production facility construction	1954 - 2029	CA-QC, GLO	N
brick shale production	2012 - 2012	CA-QC, GLO	N
cement production, Portland	2005 - 2009	CA-QC	N
cement production, alternative constituents 6-20%	2005 - 2009	CA-QC	N
clay plaster production	1995 - 2001	CA-QC	R
clinker production	2008 - 2012	CA-QC	N
concrete production 20MPa, RNA only	2006 - 2006	CA-QC, GLO	N
concrete production 25MPa, RNA only	2006 - 2006	CA-QC, GLO	N
concrete production 30-32MPa, RNA only	2006 - 2006	CA-QC, GLO	N
concrete production 35MPa, RNA only	2006 - 2006	CA-QC, GLO	N
concrete production 50MPa, RNA only	2006 - 2006	CA-QC, GLO	N
glass wool mat production	1993 - 2000	CA-QC	R
gravel production, crushed	1997 - 2001	CA-QC	R
lime production, hydrated, loose weight	2012 - 2012	CA-QC	N
lime production, milled, loose	2012 - 2012	CA-QC	N
limestone production, crushed, for mill	2012 - 2012	CA-QC	N
limestone production, crushed, washed	2012 - 2012	CA-QC	N
limestone quarry operation	2012 - 2012	CA-QC	N
mine construction, open cast, steatite	1988 - 2012	CA-QC, GLO	N
peat moss production, horticultural use	2010 - 2010	CA-QC, GLO	N
plaster mixing	2001 - 2001	CA-QC	R
propane, burned in building machine	2013 - 2013	GLO	N
quicklime production, in pieces, loose	2012 - 2012	CA-QC	N
quicklime production, milled, loose	2012 - 2012	CA-QC	N
shale quarry operation	2012 - 2012	CA-QC, GLO	N
steatite quarry operation	2011 - 2012	CA-QC, GLO	N
recultivation, shale quarry	2014 - 2014	GLO	N

Table 15. New products present in the version 3.1 associated to the building material sector.

Product name	Unit
shale	kg
steatite	kg
peat moss	m3
brick shale	kg
concrete, 20MPa	m3
concrete, 25MPa	m3
concrete, 30-32MPa	m3
concrete, 35MPa	m3
concrete, 50MPa	m3

4.2 Corrections in the sector

In the activities “natural stone plate production, cut, 2000 - 2004” CH and GLO, the PM emissions were corrected.

5 Chemicals

5.1 New activities and products

The chemical sector has also been improved with the addition of new activities and products. Also, a few RER markets have been added, to better represent the European supply chains for those chemicals.

Table 16. New activities on chemical production. If an activity is present in several geographies all of them are listed under "Geographies". The column 3.1 labels the activities as: **R**: Recontextualization. **N**: New.

Activity name	Time period	Geographies	3.1
activated silica production	2012 - 2012	GLO	N
air separation, cryogenic	1997 - 2001	CA-QC	R
air separation, xenon krypton purification	1998 - 2001	CA-QC	R
alkylbenzene production, linear	1995 - 1995	CA-QC	R
aluminium sulfate production, without water, in 4.33% aluminium solution state	2013 - 2013	CA-QC, GLO	N
blow moulding production	1993 - 1997	CA-QC	R
chlor-alkali electrolysis, membrane cell	2000 - 2000	CA-QC	R
extrusion production, plastic film	1993 - 1997	CA-QC	R
extrusion production, plastic pipes	1993 - 1997	CA-QC	R
frit production, for ceramic tile	2012 - 2012	GLO	N
heavy water production	2000 - 2000	CA, GLO	N
hydrochloric acid production, from the reaction of hydrogen with chlorine	1997 - 2000	CA-QC	R
injection moulding	1993 - 1997	CA-QC	R
iron sulfate production	1993 - 1993	CA-QC	R
iron(II) chloride production	2013 - 2013	GLO	N
iron(III) chloride production, without water, in 12% iron solution state	2013 - 2013	CA-QC, GLO	N
iron(III) chloride production, without water, in 14% iron solution state	2013 - 2013	CA-QC, GLO	N
iron(III) sulfate production, without water, in 12.5% iron solution state	2013 - 2013	CA-QC, GLO	N
ortho-phenylene diamine production	2012 - 2012	GLO	N
paint production, for electrostatic painting for aluminium	2013 - 2013	GLO	N
para-phenylene diamine production	2012 - 2012	GLO	N
phenylenediamine production	2002 - 2002	GLO	N
polyacrylamide production	2012 - 2012	GLO	N
polyethylene terephthalate production, granulate, amorphous	1999 - 2000	CA-QC	R

polyethylene terephthalate production, granulate, bottle grade	1999 - 2000	CA-QC	R
polymer foaming	1995 - 1995	CA-QC	R
polystyrene production, extruded, CO2 blown	1994 - 2006	CA-QC	R
polystyrene production, extruded, HFC-134a blown	1994 - 2006	CA-QC	R
polysulfone production, for membrane filtration production	2012 - 2012	GLO	N
potassium chloride production	2000 - 2000	CA-SK	N
purified terephthalic acid production	1999 - 2000	CA-QC	R
silicon production, multi-Si, casted	1997 - 2005	CA-QC	R
sodium aluminate production, powder	2012 - 2012	GLO	N
sodium chlorate production, powder	1990 - 1995	CA-QC	R
sodium hypochlorite production, product in 15% solution state	1997 - 2000	CA-QC	R
sodium pyrophosphate production	2012 - 2012	GLO	N
stretch blow moulding production	1993 - 1997	CA-QC	R
tellurium production, semiconductor-grade	1992 - 2005	CA-QC	R
tetraethyl orthosilicate production	2013 - 2013	GLO	N
trimesoyl chloride production, for membrane filtration production	2012 - 2012	GLO	N
venting of nitrogen, liquid	2008 - 2012	RER	N
water production, ultrapure	2000 - 2007	CA-QC	R
New local markets added			
market for carbon dioxide, liquid	RER	2011	N
market for carbon monoxide	RER	2011	N
market for chlorine, gaseous	RER	2011	N
market for fluorine, liquid	RER	2011	N
market for nitrogen, liquid	RER	2011	N
market for oxygen, liquid	RER	2011	N
market for ozone, liquid	RER	2011	N
market for phosgene, liquid	RER	2011	N
market for sulfur dioxide, liquid	RER	2011	N

Table 17. New products in the chemical sector.

Product name	Unit
activated silica	Kg
aluminium sulfate, without water, in 4.33% aluminium solution state	Kg
electrostatic paint	Kg
frit, for ceramic tile	Kg
heavy water	Kg
iron(II) chloride	Kg
iron(III) chloride, without water, in 14% iron solution state	Kg

iron(III) chloride, without water, in a 12% iron solution state	Kg
iron(III) sulfate, without water, in 12.5% iron solution state	Kg
meta-phenylene diamine	Kg
ortho-phenylene diamine	Kg
para-phenylene diamine	Kg
polyacrylamide	Kg
polysulfone	Kg
sodium aluminate, powder	Kg
sodium pyrophosphate	Kg
tetraethyl orthosilicate	Kg
trimesoyl chloride	Kg

5.2 Corrections in the sector

In the activities “molybdenum production, 2000 – 2003,” (GLO and RER), the input of electricity was changed from “electricity, medium voltage, aluminium industry” to “electricity, high voltage”.

The datasets “dehydrogenation of butan-1,4-diol, 2000 – 2007, GLO” has been generally corrected and amended.

6 Energy

All activities related to the aluminium industry are listed in the Chapter 8.1 Aluminium update, and are excluded from this Chapter.

6.1 Petroleum and natural gas extraction

This petroleum and natural gas extraction sector has a few new activities.

Table 18. New activities regarding petroleum and natural gas extraction. If an activity is present in several geographies all of them are listed under "Geographies". The column 3.1 labels the activities as: N: New.

Activity name	Time period	Geographies	3.1
natural gas production	2010 - 2010	CA-AB, US	N
natural gas, burned in gas turbine, for compressor station	2010 - 2010	CA-AB, CA-QB, GLO	N
petroleum and gas production, on-shore	2010 - 2010	CA-AB, US	N
natural gas, high pressure, import from CA-AB	2010 - 2010	CA-QC	N
market for natural gas, high pressure	2010 - 2010	CA-AB, CA-QC, US	N

In addition, all petroleum and gas production activities (including the new ones) are modelled as combined production, with "petroleum" and with "natural gas, high pressure" as reference products. This allowed the deletion of the activities called "gas and petroleum production" that were temporary introduced for the version 3.01 release.

6.2 Electricity and heat production

6.2.1 Changes in heat and electricity production

Some of the new activities in version 3.1 concern the production of heat and electricity and the corresponding infrastructures. This is detailed in this chapter, except when it concerns wood incineration, which is discussed in chapter 6.2.2 (New activities concerning wood incineration). The municipal waste incineration activities also complement the information regarding heat and electricity production, please read Chapter 12.1 (Update of the waste incineration activities).

Table 19. New activities concerning electricity and heat production. If an activity is present in several geographies all of them are listed under "Geographies". The column 3.1 labels the activities as: **R**: Recontextualization. **U**: Updated. **N**: New. **U/C**: the activity was Updated and its name was Changed.

Activity name	Time period	Geographies	3.1
Electricity production			
electricity production, hydro, reservoir, non-alpine region	2008	CA-QC	U
electricity production, hydro, run-of-river	2008	CA-QC	U
electricity production, nuclear, pressure water reactor, heavy water moderated	2008	CA-NB, CA-ON, CA-QC, GLO	U/C*
electricity production, wind, 1-3MW turbine, onshore	2008	CA-QC, CH	U
electricity production, wind, <1MW turbine, onshore	2008	CA-QC, CH	U
electricity production, wind, 2.3MW turbine, precast concrete tower, onshore	2008	CA-QC, GLO	U/C**
wind turbine construction, 2.3MW, precast concrete tower, onshore	2008	CA-QC, GLO	N
wind turbine construction, 750kW, onshore	2008	CA-QC, GLO	N
wind turbine network connection construction, 2MW, onshore	2008	CA-QC	N
wind turbine network connection construction, 750kW, onshore	2008	CA-QC, GLO	N
nuclear power plant construction, pressure water reactor 650MW	1982 - 2008	CA-QC, GLO	N
transmission network construction, electricity, high voltage	1983 - 2013	CA-QC	N
transmission network construction, electricity, medium voltage	2008 - 2013	CA-QC	N
distribution network construction, electricity, low voltage	2008 - 2013	CA-QC	N
hydropower plant construction, reservoir	1945 - 2045	CA-QC	N
hydropower plant construction, run-of-river	1945 - 2045	CA-QC	N
Heat production			
heat production, at coal coke industrial furnace 1-10MW	1995 - 2015	GLO	U
heat production, at coal coke industrial furnace 1-10MW	1995 - 2015	CA-QC	R
heat production, at hard coal industrial furnace 1-10MW	1995 - 2015	CA-QC	R
heat production, heavy fuel oil, at industrial furnace 1MW	2000 - 2015	CA-QC	R
heat production, light fuel oil, at industrial furnace 1MW	2000 - 2015	CA-QC	R
heat production, natural gas, at boiler condensing modulating >100kW	2000 - 2015	CA-QC	R
heat production, natural gas, at boiler modulating >100kW	2000 - 2015	CA-QC	R
heat production, natural gas, at industrial furnace >100kW	2000 - 2015	CA-QC	R
heat production, natural gas, at industrial furnace low-NOx >100kW	1990 - 2015	CA-QC	R
heat production, propane, at industrial furnace >100kW	2013 - 2013	GLO, CA-QC	N
market for heat, district or industrial, natural gas	2005 - 2009	CA-QC	N
market for heat, district or industrial, other than natural gas	2005 - 2009	CA-QC	N
operation, solar collector system, Cu flat plate collector, […]	2002 - 2002	CA-QC	R

*Was: "electricity production, nuclear, pressure water reactor, 2008", CA-NB, CA-ON, CA-QC

**Was: "electricity production, wind, >3MW turbine, onshore, 2008", CA-QC.

The activities “electricity production, hydro, reservoir, non-alpine region, 2008”, CA-QC; and “electricity production, hydro, run-of-river, 2008”, CA-QC have changed their technology level from Modern to Current.

New products have also been introduced, mainly related to infrastructure for the electricity production.

Table 20. New products regarding heat and electricity production.

Product name	Unit
wind turbine, 2.3MW, precast concrete tower, onshore	unit
wind turbine, 750kW, onshore	unit
wind turbine network connection, 750kW, onshore	unit
nuclear power plant, pressure water reactor 650MW	unit

The following datasets were deleted, as obsolete: “electricity production, nuclear, pressure water reactor, 2008”, CA-NB, CA-ON, CA-QC; and “electricity production, wind, >3MW turbine, onshore, 2008”, CA-QC.

6.2.2 New activities concerning wood incineration

The wood incineration activities have been fully updated. Modern activities have been introduced as well.

Table 21. New wood incineration activities. If an activity is present in several geographies all of them are listed under "Geographies". The column 3.1 labels the activities as: **R**: Recontextualization. **U**: Updated. **N**: New. **U/C**: the activity was Updated and its name was Changed.

Activity name	Time period	Geographies	3.1	In v3.0
heat and power co-generation, wood chips, 2000 kW	2000 - 2001	CH, GLO	U	Was: heat and power co-generation, wood chips, organic Rankine cycle, 1400kW thermal
heat and power co-generation, wood chips, 2000 kW, state-of-the-art 2014	2000 - 2001	CH, GLO	U	Was: heat and power co-generation, wood chips, organic Rankine cycle, 1400kW thermal, with extensive emission control
heat and power co-generation, wood chips, 6667 kW	2008 - 2008	CH, CL, GLO, IN, MX, PE, RU, TH, TR, TW, ZA	U	Was: heat and power co-generation, wood chips, 6400kW thermal, with multicyclone emission control
heat and power co-generation, wood chips, 6667 kW, state-of-the-art 2014	2008 - 2008	ASCC, AT, AU, BE, BR, CA-AB, CA-BC, CA-NS, CA-ON, CA-PE, CH, CN, CZ, DE, DK, ES, FI, FR, FRCC, GB, GLO, HICC, HU, IE, IT, JP, KR, MRO, US only, NL, NO, NPCC, US only, PL, PT, CA-QC, RFC, RO, SE, SERC, SI, SK, SPP, TRE, WECC, US only	U	Was: heat and power co-generation, wood chips, 6400kW thermal, with extensive emission control
heat and power co-generation, wood chips, 6667 kW, state-of-the-art 2014, label-certified	2009 - 2009	CH, GLO	U	Was: heat and power co-generation, wood chips, 6400kW thermal, with extensive emission control, label-certified
heat production, hardwood chips from forest, at furnace 1000kW	2000 - 2014	CH, GLO	U	
heat production, hardwood chips from forest, at furnace 1000kW, state-of-the-art 2014	2014 - 2014	CH, GLO	N	
heat production, hardwood chips from forest, at furnace 300kW	2000 - 2014	CH, GLO	U	
heat production, hardwood chips from forest, at furnace 300kW, state-of-the-art 2014	2014 - 2014	CH, GLO	N	
heat production, hardwood chips from forest, at furnace 5000kW	2000 - 2014	CH, GLO	U	
heat production, hardwood chips from forest, at furnace 5000kW, state-of-the-art 2014	2014 - 2014	CH, GLO	N	
heat production, hardwood chips from forest, at furnace 50kW	2000 - 2014	CH, GLO	U	
heat production, hardwood chips from forest, at furnace 50kW, state-of-the-art 2014	2014 - 2014	CH, GLO	N	

heat production, mixed logs, at furnace 100kW	2000 - 2014	CH, GLO	U	
heat production, mixed logs, at furnace 100kW, state-of-the-art 2014	2014 - 2014	CH, GLO	N	
heat production, mixed logs, at furnace 30kW	2000 - 2014	CH, GLO	U	
heat production, mixed logs, at furnace 30kW, state-of-the-art 2014	2014 - 2014	CH, GLO	N	
heat production, mixed logs, at wood heater 6kW	2000 - 2014	CH, GLO	U	
heat production, mixed logs, at wood heater 6kW, state-of-the-art 2014	2014 - 2014	CH, GLO	N	
heat production, softwood chips from forest, at furnace 1000kW	2000 - 2014	CH, GLO	U	
heat production, softwood chips from forest, at furnace 1000kW, state-of-the-art 2014	2014 - 2014	CH, GLO	N	
heat production, softwood chips from forest, at furnace 300kW	2000 - 2014	CH, GLO	U	
heat production, softwood chips from forest, at furnace 300kW, state-of-the-art 2014	2014 - 2014	CH, GLO	N	
heat production, softwood chips from forest, at furnace 5000kW	2000 - 2014	CH, GLO	U	
heat production, softwood chips from forest, at furnace 5000kW, state-of-the-art 2014	2014 - 2014	CH, GLO	N	
heat production, softwood chips from forest, at furnace 50kW	2000 - 2014	CH, GLO	U	
heat production, softwood chips from forest, at furnace 50kW, state-of-the-art 2014	2014 - 2014	CH, GLO	N	
heat production, untreated waste wood, at furnace 1000-5000 kW	2000 - 2014	CH, GLO	U	
heat production, untreated waste wood, at furnace 1000-5000 kW, state-of-the-art 2014	2014 - 2014	CH, GLO	N	
heat production, wood chips from industry, at furnace 1000kW	2000 - 2014	CH, GLO	U	Hardwood and softwood chips from industry not distinguished anymore in activity name
heat production, wood chips from industry, at furnace 1000kW, state-of-the-art 2014	2014 - 2014	CH, GLO	N	Hardwood and softwood chips from industry not distinguished anymore in activity name
heat production, wood chips from industry, at furnace 300kW	2000 - 2014	CH, GLO	U	Hardwood and softwood chips from industry not distinguished anymore in activity name
heat production, wood chips from industry, at furnace 300kW, state-of-the-art 2014	2014 - 2014	CH, GLO	N	Hardwood and softwood chips from industry not distinguished anymore in activity name

heat production, wood chips from industry, at furnace 5000kW	2000 - 2014	CH, GLO	U	Hardwood and softwood chips from industry not distinguished anymore in activity name
heat production, wood chips from industry, at furnace 5000kW, state-of-the-art 2014	2014 - 2014	CH, GLO	N	Hardwood and softwood chips from industry not distinguished anymore in activity name
heat production, wood chips from industry, at furnace 50kW	2000 - 2014	CH, GLO	U	Hardwood and softwood chips from industry not distinguished anymore in activity name
heat production, wood chips from industry, at furnace 50kW, state-of-the-art 2014	2014 - 2014	CH, GLO	N	Hardwood and softwood chips from industry not distinguished anymore in activity name
heat production, wood pellet, at furnace 25kW	2000 - 2001	CH, GLO	U	Was: heat production, wood pellet, at furnace 50kW
heat production, wood pellet, at furnace 25kW, state-of-the-art 2014	2014 - 2014	CH, GLO	N	
heat production, wood pellet, at furnace 300kW	2000 - 2014	CH, GLO	U	
heat production, wood pellet, at furnace 300kW, state-of-the-art 2014	2014 - 2014	CH, GLO	N	
heat production, wood pellet, at furnace 9kW	2000 - 2001	CH, RER w/o CH, GLO	U	Was: heat production, wood pellet, at furnace 15kW
heat production, wood pellet, at furnace 9kW, state-of-the-art 2014	2014 - 2014	CH, RER w/o CH, GLO	N	

6.3 Other changes in the energy sector

The electricity mix in Switzerland has been remodelled, it is now based on the supply mix instead of in production mix and known shares of imports. This has been done by adjusting the relative Production Volumes of all electricity producing activities.

All electricity markets (low, medium and high voltage) have had their emissions adjusted.

Small changes have been made in the following activities: “electricity production, hydro, run-of-river, CH, 1945 – 1970”, and “electricity production, hydro, run-of-river, label-certified, CH, 1945 – 1970”.

The following activities had their by-products corrected, as they were wrongly introduced during the documentation of the dataset for version 3.0:

“furnace production, logs, hardwood storage area, 6kW, 2000 - 2001” (GLO and CH)
“transformer production, high voltage use, 1994 – 2007, GLO”
“transformer production, low voltage use, 1994 – 2007, GLO”

The following datasets have been edited to use the latest versions of the wood preservation services (see Chapter 13.5 Wood preservation):
“distribution network construction, electricity, low voltage, 1998 – 2000”, CH
“transmission network construction, electricity, high voltage, 1988 – 1994”, GLO
“transmission network construction, electricity, medium voltage, 1988 – 2000”, CH

7 Machinery

Apart from the machinery and machinery operation related to forestry that are described in Chapter 13.2 (Machinery and machinery operation in the forestry sector), new activities and products related to machinery operation modelling have been introduced in version 3.1.

Table 22. New activities on machinery operation. If an activity is present in several geographies all of them are listed under "Geographies". The column 3.1 labels the activities as: **R**: Recontextualization. **N**: New.

Activity name	Time period	Geography	3.1
machine operation, diesel, < 18.64 kW, generators	2014 - 2014	GLO	N
machine operation, diesel, >= 18.64 kW and < 74.57 kW, generators	2014 - 2014	GLO	N
machine operation, diesel, >= 74.57 kW, generators	2014 - 2014	GLO	N
machine operation, diesel, >= 74.57 kW, underground mining	2014 - 2014	GLO	N
machine operation, diesel, < 18.64 kW, high load factor	2014 - 2014	GLO	N
machine operation, diesel, < 18.64 kW, low load factor	2014 - 2014	GLO	N
machine operation, diesel, < 18.64 kW, steady-state	2014 - 2014	GLO	N
machine operation, diesel, < 18.64 kW, underground mining	2014 - 2014	GLO	N
machine operation, diesel, >= 18.64 kW and < 74.57 kW, high load factor	2014 - 2014	GLO	N
machine operation, diesel, >= 18.64 kW and < 74.57 kW, low load factor	2014 - 2014	GLO	N
machine operation, diesel, >= 18.64 kW and < 74.57 kW, steady-state	2014 - 2014	GLO	N
machine operation, diesel, >= 18.64 kW and < 74.57 kW, underground mining	2014 - 2014	GLO	N
machine operation, diesel, >= 74.57 kW, high load factor	2014 - 2014	GLO	N
machine operation, diesel, >= 74.57 kW, low load factor	2014 - 2014	GLO	N
machine operation, diesel, >= 74.57 kW, steady-state	2014 - 2014	GLO	N
switch production, toggle type	2004 - 2006	CA-QC	R

Table 23. New products related to machinery operation.

Product name	Unit
machine operation, diesel, < 18.64 kW, generators	hour
machine operation, diesel, >= 18.64 kW and < 74.57 kW, generators	hour
machine operation, diesel, >= 74.57 kW, generators	hour
machine operation, diesel, >= 74.57, underground mining	hour

8 Metals

8.1 Aluminium update

8.1.1 New and updated datasets

The aluminium sector is highly enriched in data in version 3.1. The new data concerns both the aluminium production supply chain and the electricity production specific to that industry.

Table 24. New activities in the aluminium industry. All activities are new, unless otherwise stated in brackets next to the geography code.

Activity	Time Period	Geographies
Aluminium production		
aluminium oxide production	2012 - 2012	GLO (update)
aluminium hydroxide production	2012 - 2012	GLO (update)
anode production, paste, for aluminium electrolysis	2012 - 2012	CA-QC GLO (update)
anode production, prebake, for aluminium electrolysis	2012 - 2012	CA-QC GLO (update)
aluminium production, primary, ingot	2012 - 2012	CN, GLO (update), IAI Area 1, IAI Area 2, without Quebec, IAI Area 3, IAI Area 4&5 without China, IAI Area 8, CA-QC, UN-EUROPE, UN-OCEANIA
aluminium production, primary, liquid, Söderberg	2012 - 2012	GLO (update), IAI Area 2, without Quebec, IAI Area 3, IAI Area 4&5 without China, CA-QC, UN-EUROPE
aluminium production, primary, liquid, prebake	2012 - 2012	CN, GLO (update), IAI Area 1, IAI Area 2, without Quebec, IAI Area 3, IAI Area 4&5 without China, IAI Area 8, CA-QC, UN-EUROPE, UN-OCEANIA
Electricity production for aluminium industry		
electricity production, coal, aluminium industry	2012 - 2012	CN, GLO (update), IAI Area 1, IAI Area 2, without Quebec, IAI Area 4&5 without China, UN-EUROPE, UN-OCEANIA
electricity production, hydro, aluminium industry	2012 - 2012	CN, GLO (update), IAI Area 1, IAI Area 2, without Quebec, IAI Area 3, IAI Area 4&5 without China, CA-QC, UN-EUROPE, UN-OCEANIA
electricity production, natural gas, aluminium industry	2012 - 2012	GLO (update), IAI Area 2, without Quebec, IAI Area 3, IAI Area 8, UN-EUROPE
electricity production, nuclear, aluminium industry	2012 - 2012	GLO (update), IAI Area 2, without Quebec, CA-QC, UN-EUROPE
electricity production, oil, aluminium industry	2012 - 2012	GLO (update), IAI Area 2, without Quebec, IAI Area 8, UN-EUROPE, UN-OCEANIA
electricity voltage transformation from high to medium voltage, aluminium industry	2012 - 2012	CN, GLO (update), IAI Area 1, IAI Area 2, without Quebec, IAI

		Area 3, IAI Area 4&5 without China, IAI Area 8, CA-QC, UN-EUROPE, UN-OCEANIA
market for electricity, high voltage, aluminium industry	2012 - 2012	CN, GLO (update), IAI Area 1, IAI Area 2, without Quebec, IAI Area 3, IAI Area 4&5 without China, IAI Area 8, CA-QC, UN-EUROPE, UN-OCEANIA
market for electricity, medium voltage, aluminium industry	2012 - 2012	CN, GLO (update), IAI Area 1, IAI Area 2, without Quebec, IAI Area 3, IAI Area 4&5 without China, IAI Area 8, CA-QC, UN-EUROPE, UN-OCEANIA

8.1.2 Deleted datasets

The following datasets were deleted, as considered obsolete: “electricity production, hard coal, aluminium industry, 2010 – 2010”, GLO; “electricity production, lignite, aluminium industry, 2010 – 2010”, GLO

8.2 Mining and metal working

8.2.1 New datasets

The mining and metal working aspects of the metal sector have receive some new data for version 3.1. This is detailed in this chapter.

Table 25. New activites concerning mining or metal working. If an activity is present in several geographies all of them are listed under “Geographies”. The column 3.1 labels the activities as: **R**: Recontextualization. **U**: Updated. **N**: New.

Activity	Time Period	Geography	
Mining			
bauxite mine operation	2010 – 2010	GLO	U
barite production	1978 – 1978	CA-QC	R
gold-silver mine operation with refinery	2012 – 2012	CA-QC	N
gold-silver-zinc-lead-copper mining and benefication	2012 – 2012	CA-QC, GLO	N
iron mine operation and iron ore beneficiation to 65% Fe	2011 – 2011	CA-QC, GLO	N
portafer production	2000 – 2000	CA-QC	R
stibnite mine operation, 70% stibnite	1994 – 2003	CA-QC	R
Metal working			
anodising, aluminium sheet	1996 - 2003	CA-QC	R
casting, aluminium, lost-wax	2012 - 2012	CA-QC, GLO	N
casting, steel, lost-wax	2012 - 2012	CA-QC, GLO	N
contouring, brass	1997 - 2002	CA-QC	R
contouring, bronze	1997 - 2002	CA-QC	R
enamelling	1993 - 1998	CA-QC	R

ferrosilicon production	2008 - 2012	CN, GLO	N
forging, steel, large open die	2011 - 2011	CA-QC, GLO	N
iron pellet production	2011 - 2011	CA-QC	N
laser machining, metal, […]		CA-QC	R
magnesium production, electrolysis	2011 - 2012	IL, GLO	N
magnesium production, pidgeon process	2011 - 2012	CN, GLO	N
molybdenum trioxide production	2008 - 2008	GLO	N
selective coating, copper sheet, […]		CA-QC	R
steel production, electric, low-alloyed	2011 - 2011	CA-QC	N
welding, arc, aluminium	1997 - 2002	CA-QC	R
wax production, for lost-wax metal casting	2013	GLO	N

8.2.2 New products

Table 26. New products in the metal sector, concerning mining or metal working.

Product name	Unit
casting, aluminium, lost-wax	kg
casting, steel, lost-wax	kg
Ferrosilicon	kg
forging, steel	kg
molybdenum trioxide	kg
wax, lost-wax casting	kg

8.2.3 Deleted activities or products

The activities “magnesium production, 1998”, GLO and RER have been deleted as obsolete; now two new activities (“magnesium production, electrolysis” and “magnesium production, pidgeon process”, see Table 25) cover this process with a higher level of detail.

8.3 Stockpiling and storage

A few activities in version 3.0 were created to take care of stockpiling or storage of different metals or chemicals that were classified as materials for treatment. For the version 3.1, this modelling has been revised, constrained markets have been introduced and activities have been created, edited or deleted.

The stockpiling activities are modelled as services.

Table 27. Constrained markets generated related to stockpiling. The column 3.1 labels the activities as: **U**: Updated. **N**: New.

Constrained market in version 3.1	Constraint set to	3.1
market for helium, crude	helium, crude stockpiling, 2012, US	N
market for sulfur	sulfur stockpiling, 2012, CA-AB	N
market for lead concentrate	lead concentrate stockpilling, 2012, US	N
market for cadmium sludge from zinc electrolysis	cadmium sludge from zinc electrolysis stockpiling, 2012, US	N
market for anode slime, silver and tellurium containing, from primary copper production	anode slime, silver and tellurium containing, from primary copper production stockpiling, 2012, US	N
market for indium rich leaching residues, from zinc production	indium rich leaching residues, from zinc production stockpiling, 2012, US	U

Table 28. Edited activities related to stockpiling.

Edited activity (all geographies)	Changes made
petroleum refinery operation	Produce “sulfur” instead of “refinery sulfur”
primary lead production	Not a treatment activity of “lead concentrate”, but “lead concentrate” moved to be an input as it’s not MFT anymore. The reference product is “lead”
cadmium production, primary	Not a treatment activity of “cadmium sludge from zinc electrolysis”, but “cadmium sludge from zinc electrolysis” moved to be an input as it’s not MFT anymore. A new activity has been created in CA-QC (as “Recontextualized”)
electrolytic refining of primary copper	Produce “anode slime, silver and tellurium containing, from primary copper production” instead of “anode slime, silver and tellurium containing, for storage”
natural gas liquids production	Produce “helium, crude”; instead of “helium, crude, for storage”

Table 29. Deleted activities and products related to stockpiling. Those activities and products were generated for the version 3.0, and have been deleted now, as the supply chains have been remodeled, using constrained markets.

Deleted activities	Deleted products (unit)
helium storage, crude, 2012, GLO	helium storage, crude (kg)
refinery sulfur storage, 2012, GLO,	refinery sulfur (kg)
cadmium stockpilling, 2012, GLO	cadmium for stockpiling (kg)
lead stockpilling, 2012, GLO	lead for stockpiling (kg)
storage of anode slime, silver and tellurium containing, 2005, GLO	anode slime, silver and tellurium containing, for storage (kg)

8.4 Other corrections in the sector

The activity “copper production, primary, 1994 – 2003, RER” had the Sulfuric acid emission deleted.

The RER and GLO activities “treatment of aluminium scrap, post-consumer, by collecting, sorting, cleaning, pressing, 2005 – 2005” had the input of infrastructure corrected.

The activity “treatment of copper scrap by electrolytic refining, RER, 1994 – 2003” had some inputs that were wrongly added during version 3.0 update corrected.

9 Paper

The following table lists all the new activities that can be found in the paper sector in version 3.1.

Table 30. Those are the new datasets in the paper sector. If an activity is present in several geographies all of them are listed under "Geographies". The column 3.1 labels the activities as: **R**: Recontextualization. **U**: Updated. **N**: New.

Activity name	Time period	Geographies	3.1
carton board box production service, with gravure printing	1993 - 1993	CA-QC	R
carton board box production service, with offset printing	1993 - 1993	CA-QC	R
core board production	2000 - 2000	CA-QC	R
corrugated board box production	2008 - 2008	CA-QC	N
laminating service, foil, with acrylic binder	1996 - 1996	CA-QC	R
linerboard production, kraftliner	2008 - 2008	CA-QC	R
operation, computer, desktop, […]		CA-QC	R
operation, computer, laptop, […]		CA-QC	R
operation, printer, laser, black/white, per kg printed paper	2002 - 2006	CA-QC	R
operation, printer, laser, colour, per kg printed paper	2002 - 2006	CA-QC	R
paper production, newsprint, virgin	2012 - 2012	CA-QC	N
paper production, woodcontaining, lightweight coated	2000 - 2000	CA-QC	R
paper production, woodcontaining, supercalendred	2000 - 2000	CA-QC	R
paper production, woodfree, uncoated, 100% recycled content, at non-integrated mill	2009 - 2009	CA-QC, GLO	N
paper production, woodfree, uncoated, 30% recycled content, at integrated mill	2011 - 2012	CA-QC, GLO	N
paper production, woodfree, uncoated, 50% recycled content, at non-integrated mill	2009 - 2009	CA-QC, GLO	N
paper production, woodfree, uncoated, at integrated mill	2011 - 2012	CA-QC	N
solid bleached board production	2000 - 2000	CA-QC	R
treatment of recovered paper to fluting medium, semichemical fluting, 40% recycled content	2009 - 2009	CA-QC, GLO	N
treatment of recovered paper to linerboard, testliner	2007 - 2007	CA-QC	N
treatment of waste paper to pulp, wet lap, totally chlorine free bleached	2007 - 2007	CA-QC, GLO	N

There is only one **new product** in this sector: "deinked pulp, wet lap" (kg).

9.1 Corrections

Otherwise, the activities “chipboard production, white lined, 2000”, GLO and RER have been remodelled in order to have an input of “waste paperboard, sorted” (as other boards), instead of being a specialty production for “waste paper, sorted” (MFT). The consequence is that this activity is not a treatment activity anymore, but an ordinary transforming activity, as “waste paperboard, sorted” has a constrained market. The product “folding boxboard/chipboard” becomes now the reference product of the activity.

The RER and GLO activities “treatment of recovered paper to fluting medium, wellenstoff, 2008”, GLO” have been corrected to remove a wrong by-product of “wood pellet”.

10 Tap water

10.1 Tap water production

10.1.1 New datasets in ecoinvent v3.1

In ecoinvent v3.1 new datasets on tap water production are included. The one generic tap water production is thus disaggregated (replaced) by several activities representing different technologies of tap water production (see table Table 31).

Next to these datasets which replace older datasets already present in the database, many new tap water production datasets are present for the region of Quebec (Canada).

Table 31 New and updated tap water production activities in ecoinvent v3.1

v3.0	**tap water production and supply, CH, 2000 - 2000**	
	has been disaggregated into	
v3.1		tap water production, underground water with chemical treatment, CH, 2012 - 2012
		tap water production, underground water without treatment, CH, 2012 - 2012
		tap water production, underground water with disinfection, CH, 2012 - 2012
		tap water production, conventional treatment, CH, 2012 - 2012
		tap water production, conventional with biological treatment, CH, 2012 - 2012
		tap water production, direct filtration treatment, CH, 2012 - 2012
v3.0	**tap water production and supply, RER-CH, 2000 - 2000**	
	has been disaggregated into	
v3.1		tap water production, conventional with biological treatment, Europe without Switzerland, 2012 - 2012
		tap water production, underground water without treatment, Europe without Switzerland, 2012 - 2012
		tap water production, underground water with disinfection, Europe without Switzerland, 2012 - 2012
		tap water production, conventional treatment, Europe without Switzerland, 2012 - 2012
		tap water production, underground water with chemical treatment, Europe without Switzerland, 2012 - 2012
		tap water production, direct filtration treatment, Europe without Switzerland, 2012 - 2012
		tap water production, ultrafiltration treatment, Europe without Switzerland, 2012 - 2012
		tap water production, microstrainer treatment, Europe without Switzerland, 2012 - 2012
v3.0	**tap water production and supply, GLO, 2000 - 2000**	
	has been disaggregated into	
v3.1		tap water production, artificial recharged wells, GLO, 2012 - 2012
		tap water production, conventional treatment, GLO, 2012 - 2012
		tap water production, conventional with biological treatment, GLO, 2012 - 2012
		tap water production, direct filtration treatment, GLO, 2012 - 2012
		tap water production, microstrainer treatment, GLO, 2012 - 2012

		tap water production, seawater reverse osmosis, conventional pretreatment, baseline module, single stage, GLO, 2004 - 2012
		tap water production, seawater reverse osmosis, conventional pretreatment, enhance module, single stage, GLO, 2004 - 2012
		tap water production, seawater reverse osmosis, conventional pretreatment, enhance module, two stages, GLO, 2004 - 2012
		tap water production, seawater reverse osmosis, ultrafiltration pretreatment, baseline module, single stage, GLO, 2004 - 2012
		tap water production, seawater reverse osmosis, ultrafiltration pretreatment, enhance module, single stage, GLO, 2004 - 2012
		tap water production, seawater reverse osmosis, ultrafiltration pretreatment, enhance module, two stages, GLO, 2004 - 2012
		tap water production, ultrafiltration treatment, GLO, 2012 - 2012
		tap water production, underground water with chemical treatment, GLO, 2012 - 2012
		tap water production, underground water with disinfection, GLO, 2012 - 2012
		tap water production, underground water without treatment, GLO, 2012 - 2012
	new tap water production datasets in ecoinvent v3.1	
		tap water production, conventional with biological treatment, CA-QC, 2012 - 2012
		tap water production, underground water with disinfection, CA-QC, 2012 - 2012
		tap water production, ultrafiltration treatment, CA-QC, 2012 - 2012
		tap water production, direct filtration treatment, CA-QC, 2012 - 2012
v3.1		tap water production, conventional treatment, CA-QC, 2012 - 2012
		tap water production, artificial recharged wells, CA-QC, 2012 - 2012
		tap water production, microstrainer treatment, CA-QC, 2012 - 2012
		tap water production, underground water without treatment, CA-QC, 2012 - 2012
		tap water production, underground water with chemical treatment, CA-QC, 2012 - 2012

10.1.2 Changes to the product names and markets

The product “tap water, at user” is renamed to “tap water”.

The new technologies of tap water production are created using data from Canada. The production volumes are adjusted using information specific to the other geographies (Switzerland and Europe without Switzerland). By using the tap water from the market the user will receive a consumption mix of all the geographies respecting the region-specific production volumes.

While in version 3.0 the markets are very simple (only tap water in and tap water out), in version 3.1 the markets also contain geography specific water losses (see Table 32).

Table 32 New and updated market for tap water activities in ecoinvent v3.1

v3.0	**market for tap water, at user, CH, 2000 - 2000**	
	has been replaced by	
v3.1		market for tap water, GLO, 2012 - 2012
v3.0	**market for tap water, at user, RER-CH, 2000 - 2000**	
	has been replaced by	
v3.1		market for tap water, RER-CH, 2012 - 2012
v3.0	**market for tap water, at user, CH, 2000 - 2000**	
	has been replaced by	
v3.1		market for tap water, CH, 2012 - 2012
	new market dataset in ecoinvent v3.1	
v3.1		market for tap water, CA-QC, 2012 - 2012

10.2 Water works construction

10.2.1 New datasets in version 3.1

In version 3.1 new datasets on water works construction have been supplied. The one generic water works construction is thus replaced by two activities representing different technologies of water works construction (see Table 33).

Next to these datasets which replace older datasets already present in the database many new water works construction datasets are present for the region of Europe without Switzerland and Quebec (Canada).

Table 33 New and updated water works construction activities in version 3.1

v3.0	**water works construction, CH, 1993 - 1998**	
	has been disaggregated into	
v3.1		water works construction, capacity 1.1E10l/year, conventional treatment, CH, 2009 - 2009
		water works construction, capacity 1.1E10l/year, direct filtration treatment, CH, 2009 - 2009
v3.0	**water works construction, GLO, 1993 - 1998**	
	has been disaggregated into	
v3.1		water works construction, capacity 1.1E10l/year, microstrainer treatment, GLO, 2009 - 2009
		water works construction, capacity 1.1E10l/year, direct filtration treatment, GLO, 2009 - 2009
		water works construction, capacity 1.1E10l/year, ultrafiltration treatment, GLO, 2009 - 2009
		water works construction, capacity 1.1E10l/year, conventional treatment, GLO, 2009 - 2009
		water works construction, capacity 6.23E10l/year, seawater reverse osmosis, conventional pre-treatment, GLO, 2004 - 2012
		water works construction, capacity 6.23E10l/year, seawater reverse osmosis, ultrafiltration pre-treatment, GLO, 2004 - 2012
	new water works construction dataset in version 3.1	
v3.1		water works construction, capacity 1.1E10l/year, ultrafiltration treatment, CA-QC, 2009 - 2009

	water works construction, capacity 1.1E10l/year, microstrainer treatment, CA-QC, 2009 - 2009
	water works construction, capacity 1.1E10l/year, direct filtration treatment, CA-QC, 2009 - 2009
	water works construction, capacity 1.1E10l/year, conventional treatment, CA-QC, 2009 - 2009
	water works construction, capacity 1.1E10l/year, conventional treatment, Europe without Switzerland, 2009 – 2009
	water works construction, capacity 1.1E10l/year, ultrafiltration treatment, Europe without Switzerland, 2009 – 2009
	water works construction, capacity 1.1E10l/year, direct filtration treatment, Europe without Switzerland, 2009 - 2009
	water works construction, capacity 1.1E10l/year, microstrainer treatment, Europe without Switzerland, 2009 – 2009

10.2.2 Changes to the product names and markets

The version 3.0 product “water works” is renamed to “water works, capacity 1.1E10l/year”. Now two types of water works are present in the database with two different capacities. The new technologies of water works construction are created using data from Canada. The production volumes are adjusted using information specific to the geographies (Switzerland and Europe without Switzerland). By using the water works from the market the user will receive a consumption mix of all the new geographies respecting the region-specific production volumes (see Table 34).

Table 34 New and updated market for water works activities in ecoinvent v3.1

v3.0	**market for water works, GLO, 2011 - 2011**	
	has been replaced by	
v3.1		market for water works, capacity 1.1E10l/year, GLO, 2011 - 2011
	new markets for water works construction datasets in version 3.1	
v3.1		market for water works, capacity 1.1E10l/year, CH, 2011 - 2011
		market for water works, capacity 1.1E10l/year, RER-CH, 2011 - 2011
		market for water works, capacity 1.1E10l/year, CA-QC, 2011 - 2011
		market for water works, capacity 6.23E10l/year, GLO, 2004 - 2012

10.3 Additional activities and products

New activities (and products) related to tap water production are present in the version 3.1

Table 35. New activities. The column 3.1 labels the activities as: **R**: Recontextualization. **U**: Updated. **N**: New.

Activity name	Time period	Geographies	3.1
ultrafiltration module production, hollow fiber	2012 - 2012	GLO	N
ultraviolet lamp production, for water desinfection	2013 - 2013	GLO	N
water supply network construction	2012 - 2012	GLO	U

Table 36. New products.

Activity name	Unit
ultrafiltration module	unit
ultraviolet lamp	unit

11Transport

11.1 New activities and products

The freight transport by lorry has been updated in version 3.1.

Table 37. New activities on transport. If an activity is present in several geographies all of them are listed under “Geographies”. The column 3.1 labels the activities as: **U**: Update. **N**: New.

Activity name	Time period	Geographies	3.1
transport, freight, lorry 16-32 metric ton, EURO3	2009 - 2013	RER, GLO	U
transport, freight, lorry 16-32 metric ton, EURO4	2009 - 2013	RER, GLO	U
transport, freight, lorry 16-32 metric ton, EURO5	2009 - 2013	RER, GLO	U
transport, freight, lorry 16-32 metric ton, EURO6	2009 - 2013	RER, GLO	N
transport, freight, lorry 3.5-7.5 metric ton, EURO3	2009 - 2013	RER, GLO	U
transport, freight, lorry 3.5-7.5 metric ton, EURO4	2009 - 2013	RER, GLO	U
transport, freight, lorry 3.5-7.5 metric ton, EURO5	2009 - 2013	RER, GLO	U
transport, freight, lorry 3.5-7.5 metric ton, EURO6	2009 - 2013	RER, GLO	N
transport, freight, lorry 7.5-16 metric ton, EURO3	2009 - 2013	RER, GLO	U
transport, freight, lorry 7.5-16 metric ton, EURO4	2009 - 2013	RER, GLO	U
transport, freight, lorry 7.5-16 metric ton, EURO5	2009 - 2013	RER, GLO	U
transport, freight, lorry 7.5-16 metric ton, EURO6	2009 - 2013	RER, GLO	N
transport, freight, lorry >32 metric ton, EURO3	2009 - 2013	RER, GLO	U
transport, freight, lorry >32 metric ton, EURO4	2009 - 2013	RER, GLO	U
transport, freight, lorry >32 metric ton, EURO5	2009 - 2013	RER, GLO	U
transport, freight, lorry >32 metric ton, EURO6	2009 - 2013	RER, GLO	N
road maintenance	1990 - 2000	CH, GLO	N
treatment of brake wear emissions, lorry	2009 - 2013	RER, GLO	N
treatment of road wear emissions, lorry	2009 - 2013	RER, GLO	N
treatment of tyre wear emissions, lorry	2009 - 2013	RER, GLO	N

Table 38. New products associated to the transport sector.

Product name	Unit
transport, freight, lorry 16-32 metric ton, EURO6	metric ton*km
transport, freight, lorry 3.5-7.5 metric ton, EURO6	metric ton*km
transport, freight, lorry 7.5-16 metric ton, EURO6	metric ton*km
transport, freight, loryy >32 metric ton, EURO6	metric ton*km
road maintenace	m*year
brake wear emissions, lorry	kg
road wear emissions, lorry	kg
tyre wear emissions, lorry	Kg

11.2 Corrections in the transport sector

The RER and GLO activities “treatment of tyre wear emissions, passenger car, 2012” had some emissions corrected.

12 Waste treatment

12.1 Update of the waste incineration activities

The incineration activities have been fully updated, with new emission data. They have also been remodelled to produce heat and electricity to be consumed internally within the incineration processes. Those heat and electricity products are called heat or electricity "for reuse in municipal waste incineration only". They are meant to be consumed exclusively by other incineration activities.

The "heat for reuse in municipal waste incineration only" and the "electricity for reuse in municipal waste incineration only" have **constrained markets**, as they are always produced as by-products but have a significant demand. The marginal consumer are the linking activities that feed the surplus to the generic markets for heat and electricity:

"heat, from municipal waste incineration to generic market for heat district or industrial, other than natural gas", 2008 – 2012, AT, BE, BG, CA-AB, CA-NB, CA-NS, CA-ON, CA-PE, CA-QC, CH, CZ, DE, DK, ES, FI, FR, GB, GLO, HU, IT, JP, KR, LU, NL, NO, PL, PT, RU, SE, SK, TR, TW

"electricity, from municipal waste incineration to generic market for electricty, medium voltage", 2008 – 2012, AT, BE, BG, CA-AB, CA-NB, CA-NS, CA-ON, CA-PE, CA-QC, CH, CZ, DE, DK, ES, FI, FR, GB, GLO, HU, IT, JP, KR, LU, NL, NO, PL, PT, RU, SE, SK, TR, TW

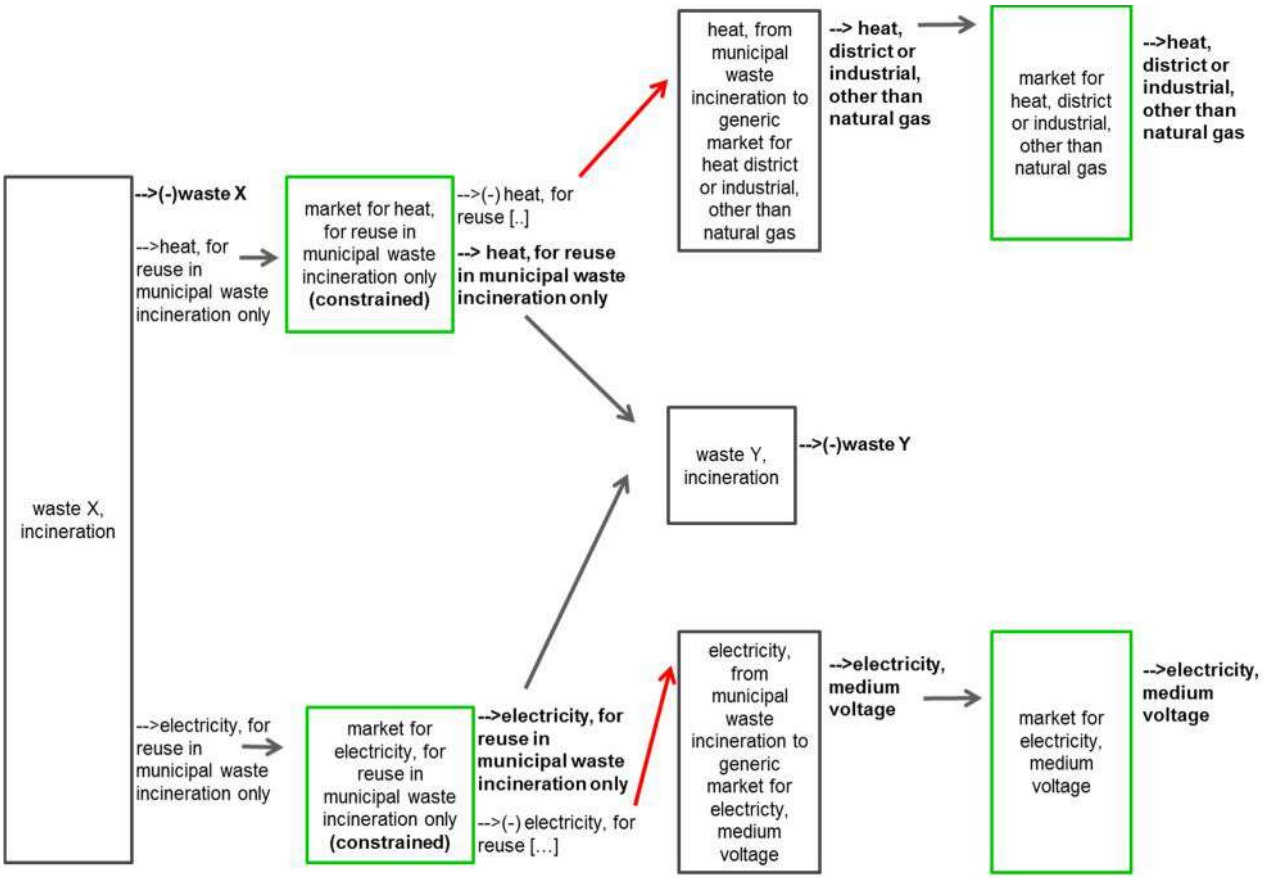

Figure 3. This figure represents the markets for heat and electricity from waste incineration in the **allocation System Models.**

Table 39. New and updated activities concerning municipal waste incineration. The incineration activities have been fully updated at a global level only, except the municipal solid waste incineration activities, which have been all updated (all geographies). If an activity is present in several geographies all of them are listed under "Geographies". The column 3.1 labels the activities as: **R**: Recontextualization. **U**: Update.

Activity name	Time period	Geographies	3.1
treatment of aluminium in car shredder residue, municipal incineration	2006 - 2012	GLO	U
treatment of biowaste, municipal incineration	2006 - 2012	GLO	U
treatment of coating from waste cathode ray tube display, municipal waste incineration	2006 - 2012	GLO	U
treatment of copper in car shredder residue, municipal incineration	2006 - 2012	GLO	U
treatment of digester sludge, municipal incineration	2006 - 2012	GLO	U
treatment of hard coal ash, municipal incineration	2006 - 2012	GLO	U
treatment of lead in car shredder residue, municipal incineration	2006 - 2012	GLO	U
treatment of lignite ash, municipal incineration	2006 - 2012	GLO	U
treatment of liquid crystal display, municipal waste incineration	2006 - 2012	GLO	U
treatment of municipal solid waste, incineration	2006 - 2012	AT, BE, BG, CA-AB, CA-NB, CA-NS, CA-ON, CA-PE, CA-QC, CH, CZ, DE, DK, ES, FI, FR, GB, GLO, HU, IT, JP, KR, LU, NL, NO, PL, PT, RU, SE, SK, TR, TW	U
treatment of municipal solid waste, incineration	2006 - 2012	CA-QC,	R
treatment of raw sewage sludge, municipal incineration	2006 - 2012	GLO	U
treatment of residue from mechanical treatment, IT accessory, municipal waste incineration	2006 - 2012	GLO	U
treatment of residue from mechanical treatment, cathode ray tube display, municipal waste incineration	2006 - 2012	GLO	U
treatment of residue from mechanical treatment, desktop computer, municipal waste incineration	2006 - 2012	GLO	U
treatment of residue from mechanical treatment, industrial device, municipal waste incineration	2006 - 2012	GLO	U
treatment of residue from mechanical treatment, laptop computer, municipal waste incineration	2006 - 2012	GLO	U
treatment of residue from mechanical treatment, laser printer, municipal waste incineration	2006 - 2012	GLO	U

treatment of residue from mechanical treatment, liquid crystal display, municipal waste incineration	2006 - 2012	GLO	U
treatment of residue from shredder fraction from manual dismantling, municipal waste incineration	2006 - 2012	GLO	U
treatment of scrap aluminium, municipal incineration	2006 - 2012	GLO	U
treatment of scrap copper, municipal incineration	2006 - 2012	GLO	U
treatment of scrap steel, municipal incineration	2006 - 2012	GLO	U
treatment of scrap tin sheet, municipal incineration	2006 - 2012	GLO	U
treatment of spent anion exchange resin from potable water production, municipal incineration	2006 - 2012	GLO	U
treatment of spent cation exchange resin from potable water production, municipal incineration	2006 - 2012	GLO	U
treatment of steel in car shredder residue, municipal incineration	2006 - 2012	GLO	U
treatment of waste bitumen sheet, municipal incineration	2006 - 2012	GLO	U
treatment of waste building wood, chrome preserved, municipal incineration	2006 - 2012	GLO	U
treatment of waste cement-fibre slab, municipal incineration	2006 - 2012	GLO	U
treatment of waste emulsion paint, municipal incineration	2006 - 2012	GLO	U
treatment of waste expanded polystyrene, municipal incineration	2006 - 2012	GLO	U
treatment of waste glass, municipal incineration	2006 - 2012	GLO	U
treatment of waste graphical paper, municipal incineration	2006 - 2012	GLO	U
treatment of waste newspaper, municipal incineration	2006 - 2012	GLO	U
treatment of waste packaging paper, municipal incineration	2006 - 2012	GLO	U
treatment of waste paint, municipal incineration	2006 - 2012	GLO	U
treatment of waste paperboard, municipal incineration	2006 - 2012	GLO	U
treatment of waste plastic, consumer electronics, municipal incineration	2006 - 2012	GLO	U
treatment of waste plastic, industrial electronics, municipal incineration	2006 - 2012	GLO	U
treatment of waste plastic, mixture, municipal incineration	2006 - 2012	GLO	U
treatment of waste polyethylene terephtalate, municipal incineration	2006 - 2012	GLO	U
treatment of waste polyethylene, municipal incineration	2006 - 2012	GLO	U
treatment of waste polypropylene, municipal incineration	2006 - 2012	GLO	U
treatment of waste polystyrene, municipal incineration	2006 - 2012	GLO	U
treatment of waste polyurethane, municipal incineration	2006 - 2012	GLO	U
treatment of waste polyvinylchloride, municipal incineration	2006 - 2012	GLO	U
treatment of waste polyvinylfluoride, municipal incineration	2006 - 2012	GLO	U
treatment of waste rubber, unspecified, municipal incineration	2006 - 2012	GLO	U
treatment of waste sealing sheet, polyethylene, municipal incineration	2006 - 2012	GLO	U

treatment of waste sealing sheet, polyvinylchloride, municipal incineration	2006 - 2012	GLO	U
treatment of waste textile, soiled, municipal incineration	2006 - 2012	GLO	U
treatment of waste vapour barrier, flame-retarded, municipal incineration	2006 - 2012	GLO	U
treatment of waste wire plastic, municipal incineration	2006 - 2012	GLO	U
treatment of waste wood pole, chrome preserved, municipal incineration	2006 - 2012	GLO	U
treatment of waste wood, untreated, municipal incineration	2006 - 2012	GLO	U
treatment of wood ash mixture, pure, municipal incineration	2006 - 2012	GLO	U
treatment of zinc in car shredder residue, municipal incineration	2006 - 2012	GLO	U

12.2 Other new data

Version 3.1 contains new data on other waste treatments, as well as in wastewater treatment. They are detailed in the following tables.

Table 40. New activities on waste treatment. If an activity is present in several geographies all of them are listed under "Geographies". The column 3.1 labels the activities as: **R**: Recontextualization. **N**: New.

Activity name	Time period	Geographies	3.1
treatment of waste x-ray film	2011 - 2015	GLO	N
treatment of scrap printed wiring boards, shredding and separation	2005 - 2005	CA-QC	R
treatment of municipal solid waste, sanitary landfill	1994 - 2000	CA-QC	R
operation, liquid manure storage and processing facility	1994 - 2002	CA-QC	R
treatment of used vegetable cooking oil, purification	2012 - 2012	CA-QC	N
treatment of waste cooking oil, purified, esterification	2012 - 2012	CA-QC	N

Table 41. New activities on wastewater treatment. If an activity is present in several geographies all of them are listed under "Geographies". The column 3.1 labels the activities as: **N**: New.

Activity name	Time period	Geographies	3.1
treatment of wastewater, average, capacity 1.1E10l/year	1994 - 2000	CA-QC	N
treatment of wastewater, average, capacity 1.6E8l/year	1994 - 2000	CA-QC	N
treatment of wastewater, average, capacity 1E9l/year	1994 - 2000	CA-QC	N
treatment of wastewater, average, capacity 4.7E10l/year	1994 - 2000	CA-QC	N
treatment of wastewater, average, capacity 5E9l/year	1994 - 2000	CA-QC	N
wastewater treatment facility construction, lagoon, capacity 1.0E9l/year	2012 - 2012	CA-QC, GLO	N
wastewater treatment facility construction, lagoon, capacity 1.1E10l/year	2012 - 2012	CA-QC, GLO	N
wastewater treatment facility construction, lagoon, capacity 1.6E8l/year	2012 - 2012	CA-QC, GLO	N
wastewater treatment facility construction, lagoon, capacity 5.0E9l/year	2012 - 2012	CA-QC, GLO	N

12.3 Corrections

The following activities were treatment activities in version 3.0, with the negative reference product “methane, 96% by volume, from biogas, low pressure, at user”. This product was not a material for treatment in version 3.0, nor in version 3.1, so those activities have been corrected to have an input of “methane, 96% by volume, from biogas, low pressure, at user”, and a reference product of “electricity, low voltage”.

treatment of biogas, burned in micro gas turbine 100kWe, CH, 2000 - 2005
treatment of biogas, burned in micro gas turbine 100kWe, GLO, 2000 - 2005
treatment of biogas, burned in polymer electrolyte membrane fuel cell 2kWe, future, CH, 2000 - 2005
treatment of biogas, burned in polymer electrolyte membrane fuel cell 2kWe, future, GLO, 2000 - 2005
treatment of biogas, burned in solid oxide fuel cell 125kWe, future, CH, 2000 - 2005
treatment of biogas, burned in solid oxide fuel cell 125kWe, future, GLO, 2000 - 2005
treatment of biogas, burned in solid oxide fuel cell, with micro gas turbine, 180kWe, future, CH, 2000 - 2005
treatment of biogas, burned in solid oxide fuel cell, with micro gas turbine, 180kWe, future, GLO, 2000 - 2005

13 Wood sector

13.1 Forestry

13.1.1 New activities in the forestry sector

The following datasets are new, and represent the forestry activities now in ecoinvent. The introduction of those new datasets has led to the deletion of the old datasets, as will be specified in 13.1.3 (Deleted activities and products).

Table 42. New activities in the forestry domain of the wood sector. If an activity is present in several geographies all of them are listed under "Geographies". The column 3.1 labels the activities as: U: Updated. N: New.

Activity name	Time Period	Geographies	3.1
tree seedling production, in heated greenhouse	2002 - 2002	GLO, RER	N
tree seedling production, in unheated greenhouse	2002 - 2002	GLO, RER	N
hardwood forestry, beech, sustainable forest management	2010 - 2012	DE, GLO	N
hardwood forestry, birch, sustainable forest management	2010 - 2012	SE, GLO	N
hardwood forestry, mixed species, sustainable forest management	2010 - 2012	CH, GLO	N
hardwood forestry, oak, sustainable forest management	2010 - 2012	DE, GLO	N
softwood forestry, mixed species, boreal forest	2006 - 2012	CA-QC, GLO	N
softwood forestry, mixed species, sustainable forest management	2010 - 2012	CH, GLO	N
softwood forestry, pine, sustainable forest management	2010 - 2012	DE, SE, GLO	N
softwood forestry, spruce, sustainable forest management	2010 - 2012	DE, SE, GLO	N
cork forestry	1996 - 2003	RER, GLO	U

The exotic woods have not been updated with this release. Nevertheless, they have been restructured to follow as much as possible the new modelling rules. The following datasets have therefore been merged (time period and geographies have been kept unchanged):

Table 43. Merging of the exotic woods datasets to fulfill the new modeling rules.

Merged activities	Name of the resulting merged activity
hardwood forestry, azobe, sustainable forest management	hardwood forestry, azobe, sustainable forest management, 2000, CM/GLO
hardwood forestry, azobe, sustainable forestry management, CO2-removal and land use	
hardwood forestry, eucalyptus ssp., sustainable forest management	hardwood forestry, eucalyptus ssp., sustainable forest management, 2000, TH/GLO
hardwood forestry, eucalyptus, CO2-removal and land use	
hardwood forestry, meranti, sustainable forest management	

meranti production, CO2-removal and land use	hardwood forestry, meranti, sustainable forest management, 2000, MY/GLO
softwood forestry, paraná pine, sustainable forest management	softwood forestry, paraná pine, sustainable forest management, 2000, BR/GLO
paraná pine production, CO2-removal and land use	

As a consequence, all "CO2 removal and land use" activities were deleted, as listed in 13.1.3 (Deleted activities and products).

13.1.2 New products in the forestry datasets

The new modelling of the forestry data also concerns the products. For example, the product "tree seedling" is now available in version 3.1.

In the following tables, the resulting products of the forestry activities together with the explanation whether they are new products or not can be found.

Table 44. Full overview of the forestry sector. Only the regional counterparts are listed here.

Activity name/*reference product*	Unit	Comment
cork forestry, RER, 1996 - 2003	-	Updated activity
cork, raw	kg	
cleft timber, measured as dry mass	kg	New product
hardwood forestry, beech, sustainable forest management, DE, 2010, 2012	-	New activity
sawlog and veneer log, hardwood, measured as solid wood under bark	m^3	
pulpwood, hardwood, measured as solid wood under bark	m^3	
wood chips, wet, measured as dry mass	kg	
cleft timber, measured as dry mass	kg	New product
hardwood forestry, birch, sustainable forest management, SE, 2010, 2012	-	New activity
sawlog and veneer log, hardwood, measured as solid wood under bark	m^3	
pulpwood, hardwood, measured as solid wood under bark	m^3	
wood chips, wet, measured as dry mass	kg	
cleft timber, measured as dry mas	kg	New product
bundle, energy wood, measured as dry mass	kg	New product
softwood forestry, mixed species, boreal forest, CA-QC		New activity
sawlog and veneer log, hardtwood, measured as solid wood under bark	m^3	
hardwood forestry, mixed species, sustainable forest management, CH, 2010, 2012	-	New activity
sawlog and veneer log, hardtwood, measured as solid wood under bark	m^3	
pulpwood, hardwood, measured as solid wood under bark	m^3	
wood chips, wet, measured as dry mass	kg	
cleft timber, measured as dry mass	kg	New product
hardwood forestry, oak, sustainable forest management, DE, 2010, 2012	-	New activity
sawlog and veneer log, hardwood, measured as solid wood under bark	m^3	
pulpwood, hardwood, measured as solid wood under bark	m^3	
wood chips, wet, measured as dry mass	kg	
cleft timber, measured as dry mass	kg	New product
softwood forestry, mixed species, sustainable forest management, CH, 2010, 2012	-	New activity
sawlog and veneer log, softwood, measured as solid wood under bark	m^3	
pulpwood, softwood, measured as solid wood under bark	m^3	
wood chips, wet, measured as dry mass	kg	
cleft timber, measured as dry mass	kg	New product
softwood forestry, pine, sustainable forest management, DE, 2010, 2012	-	New activity
sawlog and veneer log, softwood, measured as solid wood under bark	m^3	
pulpwood, softwood, measured as solid wood under bark	m^3	
wood chips, wet, measured as dry mass	kg	
cleft timber, measured as dry mass	kg	New product

softwood forestry, pine, sustainable forest management, SE, 2010, 2012	-	New activity
sawlog and veneer log, softwood, measured as solid wood under bark	m^3	
pulpwood, softwood, measured as solid wood under bark	m^3	
wood chips, wet, measured as dry mass	kg	
cleft timber, measured as dry mass	kg	New product
bundle, energy wood, measured as dry mass	kg	New product
softwood forestry, spruce, sustainable forest management, DE, 2010, 2012	-	New activity
sawlog and veneer log, softwood, measured as solid wood under bark	m^3	
pulpwood, softwood, measured as solid wood under bark	m^3	
wood chips, wet, measured as dry mass	kg	
cleft timber, measured as dry mass	kg	New product
softwood forestry, spruce, sustainable forest management, SE, 2010, 2012	-	New activity
sawlog and veneer log, softwood, measured as solid wood under bark	m^3	
pulpwood, softwood, measured as solid wood under bark	m^3	
wood chips, wet, measured as dry mass	kg	
cleft timber, measured as dry mas	kg	New product
bundle, energy wood, measured as dry mass	kg	New product

13.1.3 Deleted activities and products

As a consequence of the update, the following activities and products have been deleted, as they have been replaced with more current data.

Table 45. Deleted activities. . If an activity is present in several geographies, all of them are listed under "Geographies".

Activity name	Geographies	Time Period
hardwood forestry	RER, GLO	1996 - 2002
hardwood forestry, CO2-removal and land use	Europe without NORDEL (NCPA), NORDEL	2000 - 2000
hardwood forestry, CO2-removal and land use	GLO	2001 - 2002
hardwood forestry, azobe, sustainable forestry management, CO2-removal and land use	CM, GLO	2000 - 2005
hardwood forestry, eucalyptus, CO2-removal and land use	GLO, TH	2000 - 2005
hardwood forestry, for pulp	NORDEL, GLO	2000 - 2000
hardwood forestry, operation, except harvesting	RER, GLO	1996 - 2002
log production, energy wood, split, at forest	RER, GLO	1996 - 1996
meranti production, CO2-removal and land use	MY, GLO	2000 - 2005

paraná pine production, CO2-removal and land use	BR, GLo	2000 - 2005
pulpwood, hardwood, under bark, air drying	GLO	1996 - 2002
softwood forestry	RER, GLO	1996 - 2002
softwood forestry, CO2-removal and land use	Europe without NORDEL (NCPA), NORDEL	2000 - 2000
softwood forestry, CO2-removal and land use	GLO	2001 - 2002
softwood forestry, for pulp	NORDEL, GLO	2000 - 2000
softwood forestry, for sawlog and veneer log, Nordic countries (out-dated)	NORDEL, GLO	2000 - 2000
softwood forestry, operation, except harvesting	RER, GLO	1996 - 2002
treatment of wood fuel, hardwood, wet, air drying	RER, GLO	1996 - 2002
treatment of wood fuel, softwood, wet, air drying	RER, GLO	1996 - 2002

Table 46. Deleted products.

Product name	Unit
azobe from sustainable forestry management, CO2-removal and land use	m3
eucalyptus ssp., CO2-removal and land use	m3
hardwood forestry operation, except harvesting	m3
hardwood, CO2-removal and land use	m3
log, energy wood, split, measured as solid wood under bark	m3
log, hardwood, piled in forest, air-dried	m3
log, softwood, piled in forest, air-dried	m3
meranti, CO2-removal and land use	m3
paraná pine, CO2-removal and land use	m3
softwood forestry operation, except harvesting	m3
softwood, CO2-removal and land use	m3
wood fuel, hardwood, wet, measured as solid wood under bark	m3
wood fuel, softwood, wet, measured as solid wood under bark	m3

13.2 Machinery and machinery operation in the forestry sector

13.2.1 New activities concerning machinery or machinery operation

Table 47. New activities regarding forestry machinery and forestry machinery operation. If an activity is present in several geographies all of them are listed under "Geographies". The column 3.1 labels the activities as: U: Updated. N: New. U/C: the activity was Updated and its name was Changed..

Activity name	Time Period	Geographies	3.1
Forestry machinery			
cable yarder production, trailer-mounted	2012	GLO	N
cable yarder production, truck-mounted	2012	GLO	N
cable yarder with sled winch production	2012	GLO	N
chipper production, mobile, diesel	2012	GLO	U
energy wood harvester production	2012	GLO	N
forestry harvester production	2012	GLO	N
forwarder production	2012	GLO	N
forwarder production, with terrain chipper	2012	GLO	N
skidder production	2012	GLO	N
Forestry machinery operation			
clefting/splitting of energy wood	2010 - 2012	RER, GLO	N
delimbing, with excavator-based processor	2012 - 2012	RER, GLO	N
forwarding, forwarder	2012 - 2012	RER, GLO	N
harvesting, forestry harvester	2012 - 2012	RER, GLO	N
harvesting/bundling, energy wood harvester	2012 - 2012	RER, GLO	N
power sawing, without catalytic converter	2011 - 2012	RER, GLO	U
skidding, skidder	2012 - 2012	RER, GLO	N
wood chipping, mobile chipper, at forest road	2012 - 2012	RER, GLO	U/R*
wood chipping, terrain chipper, diesel	2012 - 2012	RER, GLO	N
yarding and processing, mobile cable yarder on truck	2012 - 2012	RER, GLO	N
yarding, mobile cable yarder on trailer	2012 - 2012	RER, GLO	N
yarding, sled yarder	2012 - 2012	RER, GLO	N

* Was: wood chipping, mobile chipper, in forest, GLO/RER, 1996 – 2002.

The RER and GLO activities "power sawing, with catalytic converter", 1993 – 2001 had their technology level changed to "outdated" to maintain the consistency of the update.

13.2.2 New products

The update has generated new products that are now accessible in the database.

Table 48. New products concerning forestry machinery or forestry machinery operation in version 3.1.

Product name	Unit
Forestry machinery	
cable yarder with sled winch	unit
energy wood harvester	unit
forestry harvester	unit
forwarder	unit
mobile cable yarder, trailer-mounted	unit
mobile cable yarder, truck-mounted, incl. processor	unit
skidder	unit
terrain chipper on forwarder	unit
Forestry machinery operation	
cable yarding	hour
clefting of energy wood	hour
delimbing/sorting, excavator-based processor	hour
forwarding, forwarder	hour
harvesting, forestry harvester	hour
harvesting/bundling, energy wood harvester	hour
skidding, skidder	hour
wood chipping, chipper, mobile, diesel, at forest road	hour
wood chipping, forwarder with terrain chipper, in forest	hour

13.2.3 Deleted activities and products

As a consequence of the update, the following activity and its resulting product has been deleted:

Activity	Product (unit)
wood chipping, mobile chipper, in forest, GLO/RER, 1996 – 2002.	wood chipping, mobile chipper, in forest (kg)

13.3 Sawmill

The sawmilling modelling has been also heavily changed. The sawmill now delivers different products and the general level of detail has increased.

13.3.1 New activities

Table 49. New activities in the sawmilling. If an activity is present in several geographies all of them are listed under "Geographies". The column 3.1 labels the activities as: U: Updated. N: New.

Activity name	Time Period	Geographies	3.1
Sawmill			
debarking, hardwood	2011 - 2013	CH, GLO	U
debarking, softwood	2011 - 2013	CH, GLO	U
beam, hardwood, raw, air drying	2011 - 2013	CH, GLO	N
beam, hardwood, raw, kiln drying	2011 - 2013	CH, GLO	N
beam, softwood, raw, air drying	2011 - 2013	CH, GLO	N
beam, softwood, raw, kiln drying	2011 - 2013	CH, GLO	N
board, hardwood, raw, air drying	2011 - 2013	CH, GLO	N
board, hardwood, raw, kiln drying	2011 - 2013	CH, GLO	N
board, softwood, raw, air drying	2011 - 2013	CH, GLO	N
board, softwood, raw, kiln drying	2011 - 2013	CH, GLO	N
lath, hardwood, raw, air drying	2011 - 2013	CH, GLO	N
lath, hardwood, raw, kiln drying	2011 - 2013	CH, GLO	N
lath, softwood, raw, air drying	2011 - 2013	CH, GLO	N
lath, softwood, raw, kiln drying	2011 - 2013	CH, GLO	N
planing, beam, hardwood, air dried	2011 - 2013	CH, GLO	N
planing, beam, hardwood, kiln dried	2011 - 2013	CH, GLO	N
planing, beam, softwood, air dried	2011 - 2013	CH, GLO	N
planing, beam, softwood, kiln dried	2011 - 2013	CH, GLO	N
planing, board, hardwood, air dried	2011 - 2013	CH, GLO	N
planing, board, hardwood, kiln dried	2011 - 2013	CH, GLO	N
planing, board, softwood, air dried	2011 - 2013	CH, GLO	N
planing, board, softwood, kiln dried	2011 - 2013	CH, GLO	N
sawing, hardwood	2011 - 2013	CH, GLO	U
sawing, softwood	2011 - 2013	CH, GLO	U
wood chips production, hardwood, at sawmill	2011 - 2013	CH, GLO	N
wood chips production, softwood, at sawmill	2011 - 2013	CH, GLO	N

A few activities have been created in order to allow the linking between specific and generic markets. The residual woods were all given constrained markets, and more about them can be read in 13.3.4 (New constrained markets). All the sawnwood production activities have been kept, but are now averaging activities that get inputs from the more specific products issued from the new sawmill, to deliver the generic sawnwood products that have always been present in the database.

Table 50. New activities serving to link specific to generic markets. If an activity is present in several geographies all of them are listed under "Geographies". The column 3.1 labels the activities as: U: Updated. N: New.

Activity name	Time Period	Geographies	3.1
Residual wood			
bark chips, wet, measured as dry mass to generic market for residual hardwood, wet	2014 - 2014	GLO	N
saw dust, wet, measured as dry mass to generic market for residual softwood, wet	2014 - 2014	GLO	N
shaving, hardwood, measured as dry mass to generic market for residual wood, dry	2014 - 2014	GLO	N
shaving, softwood, measured as dry mass to generic market for residual wood, dry	2014 - 2014	GLO	N
slab and siding, hardwood, wet, measured as dry mass to generic market for residual hardwood, wet	2014 - 2014	GLO	N
slab and siding, softwood, wet, measured as dry mass to generic market for residual softwood, wet	2014 - 2014	GLO	N
Sawnwood products			
sawnwood production, hardwood, air dried, planed	2014 - 2014	RER, GLO	N
sawnwood production, hardwood, kiln dried, planed	2014 - 2014	RER, GLO	N
sawnwood production, hardwood, raw, air dried	2014 - 2014	RER, GLO	N
sawnwood production, hardwood, raw, kiln dried	2014 - 2014	RER, GLO	N
sawnwood production, softwood, air dried, planed	2014 - 2014	RER, GLO	N
sawnwood production, softwood, kiln dried, planed	2014 - 2014	RER, GLO	N
sawnwood production, softwood, raw, air dried	2014 - 2014	RER, GLO	N
sawnwood production, softwood, raw, kiln dried	2014 - 2014	RER, GLO	N

13.3.2 New products

As a consequence of the new activities introduced in the database, new products are now available.

Table 51. New products available in the version 3.1, regarding sawmilling.

Product name	Unit
Sawmill	
saw dust, wet, measured as dry mass	kg
sawlog and veneer log, hardwood, debarked, measured as solid wood	m3
sawnwood, beam, hardwood, air dried, planed	m3
sawnwood, beam, hardwood, kiln dried, planed	m3
sawnwood, beam, hardwood, raw, air dried	m3
sawnwood, beam, hardwood, raw, kiln dried	m3

sawnwood, beam, softwood, air dried, planed	m3
sawnwood, beam, softwood, kiln dried, planed	m3
sawnwood, beam, softwood, raw, air dried	m3
sawnwood, beam, softwood, raw, kiln dried	m3
sawnwood, board, hardwood, air dried, planed	m3
sawnwood, board, hardwood, kiln dried, planed	m3
sawnwood, board, hardwood, raw, air dried	m3
sawnwood, board, hardwood, raw, kiln dried	m3
sawnwood, board, softwood, air dried, planed	m3
sawnwood, board, softwood, kiln dried, planed	m3
sawnwood, board, softwood, raw, air dried	m3
sawnwood, board, softwood, raw, kiln dried	m3
sawnwood, lath, hardwood, raw, air dried	m3
sawnwood, lath, hardwood, raw, kiln dried	m3
sawnwood, lath, softwood, raw, air dried	m3
sawnwood, lath, softwood, raw, kiln dried	m3
shaving, hardwood, measured as dry mass	kg
shaving, softwood, measured as dry mass	kg
slab and siding, hardwood, wet, measured as dry mass	kg
slab and siding, softwood, wet, measured as dry mass	kg
Generic products	
sawnwood, hardwood, air dried, planed	m3
sawnwood, softwood, raw, kiln dried	m3

13.3.3 Deleted activities and products

The following activities have been deleted, as they are considered obsolete after the update. It has to be considered that many of those activities were created for the version 3.0, when most of the residual wood was classified as material for treatment.

Table 52. Deleted activities in the sector. . If an activity is present in several geographies, all of them are listed under "Geographies".

Activity name	Time Period	Geographies
market for residual hardwood, wet	2011 - 2011	RER
mulch production from bark	2012 - 2012	GLO
mulch production from wood chips	2012 - 2012	GLO
planing, hardwood, air / kiln dried	1986 - 2002	RER, GLO
planing, hardwood, kiln dried	1986 - 2002	RER, GLO
planing, softwood, air dried	1986 - 2002	RER, GLO
planing, softwood, kiln dried	1986 - 2002	RER, GLO

pulpwood, softwood, measured as solid wood under bark to generic market for softwood fibre	2005 - 2013	GLO
residual softwood, wet to generic market for softwood fibre	2005 - 2013	GLO
sawing / debarking, Scandinavian softwood	2000 - 2000	NORDEL, GLO
sawing / debarking, hardwood	1986 - 1996	RER, GLO
sawing / debarking, softwood	1986 - 1996	RER, GLO
sawing, softwood, forest-debarked	1986 - 1996	RER, GLO
sawnwood production, hardwood, raw, air / kiln dried	1986 - 2002	RER, GLO
sawnwood production, hardwood, raw, air dried	1996 - 2002	RER, GLO
sawnwood production, hardwood, raw, kiln dried	1986 - 2002	RER, GLO
sawnwood production, softwood, raw, air dried	1996 - 2002	RER, GLO
sawnwood production, softwood, raw, kiln dried, 10% water on dry mass basis	1986 - 2002	RER, GLO
sawnwood production, softwood, raw, kiln dried, 20% water on dry mass basis	1986 - 2002	RER, GLO
treatment of residual hardwood, wet, air drying	1996 - 2002	RER, GLO
treatment of residual softwood, wet, air drying	1996 - 2002	RER, GLO
wood chips production, from industry	1996 - 2002	RER, GLO
wood chips production, hardwood, at forest	1996 - 1998	RER, GLO
wood chips production, pulpwood, at forest	1996 - 1998	GLO
wood chips production, softwood, at forest	1996 - 1998	RER, GLO

Similarly, the products listed below have been removed from the database. In most of the cases, those products have been removed in order to increase the level of detail. A few cases (mulch, softwood fibre) are related to products generated solely for version 3.0, in order to model the treatment chains of residual woods. This is no longer relevant, and both activities and products have been removed.

Table 53. Deleted products in the sawmill.

Product	Unit
mulch	kg
pulpwood, dry	m3
sawnwood, hardwood, air / kiln dried, planed	m3
sawnwood, hardwood, raw, air / kiln dried	m3
sawnwood, softwood, raw, kiln dried, 10% water on dry mass basis	m3
sawnwood, softwood, raw, kiln dried, 20% water on dry mass basis	m3
softwood fibre	m3
wood preservation service, logs, pressure vessel, preservative not included	m3
wood preservation service, sawnwood, pressure vessel, preservative not included	m3
wood preservation facility	unit

13.3.4 New constrained markets

The residual woods have been restructured from version 3.0. While they were considered materials for treatment in v3.0, they have been given constrained markets in version 3.1. This is justified by the fact that many of those residual woods are used as inputs for other activities that would otherwise be considered specialty productions. The existence of many of those specialty production activities point to the necessity of a constrained market (see also the ecoinvent data quality guidelines, chapter 11.4).

Table 54. Constrained markets in the wood sector. The marginal consumer is identified in "Marginal consumer in v3.1". When the market existed in version 3.0, and the marginal consumer as well, changes made to the marginal consumer between the two versions are marked in the column "Marginal consumer in v 3.0". The removal of the word "treatment" from the activity name implies that the activity has been remodeled into an ordinary transforming activity; that is because the concerned product is not a MFT anymore, but has a constrained market.

Constrained market	Marginal consumer in v3.1	Marginal consumer in v3.0
market for bark chips, wet, measured as dry mass, GLO	bark chips, wet, measured as dry mass to generic market for residual hardwood, wet, 2004 – 2014, GLO	
market for saw dust, wet, measured as dry mass, GLO	saw dust, wet, measured as dry mass to generic market for residual softwood, wet, 2004 – 2014, GLO	
market for shaving, hardwood, measured as dry mass, GLO	shaving, hardwood, measured as dry mass to generic market for residual wood, dry, 2004 – 2014, GLO	
market for shaving, softwood, measured as dry mass, GLO	shaving, softwood, measured as dry mass to generic market for residual wood, dry, 2004 – 2014, GLO	
market for slab and siding, hardwood, wet, measured as dry mass, GLO	slab and siding, hardwood, wet, measured as dry mass to generic market for residual hardwood, wet, 2004 – 2014, GLO	
market for slab and siding, softwood, wet, measured as dry mass, GLO	slab and siding, softwood, wet, measured as dry mass to generic	

	market for residual softwood, wet, 2004 – 2014, GLO	
market for wood chips, dry, measured as dry mass, GLO, RER	heat production, wood chips from industry, at furnace 5000kW	
market for wood chips, from post-consumer wood, measured as dry mass, GLO	heat production, wood chips from industry, at furnace 5000kW	treatment of wood chips, from post-consumer wood, measured as dry mass, in furnace 300kW

The product "residual softwood, wet" no longer needed a constrained market in this version, as it is produced as reference product in some of the activities that link residual wood from sawmill into the generic market for "residual wood, wet" (see Table 50). For the same reasons, "residual hard/softwood, dry" are not materials for treatment anymore.

13.4 Wood based products

13.4.1 New activities

Table 55. New activites related to wood based products. If an activity is present in several geographies all of them are listed under "Geographies". The column 3.1 labels the activities as: **R**: Recontextualization. **U**: Updated. **N**: New.

Activity name	Time Period	Geographies	3.1
coating service, melamine impregnated paper, double-sided	2012 - 2012	RER, GLO	N
fibreboard production, hard	2012 - 2012	RER, GLO	U
fibreboard production, soft, from wet & dry processes	2012 - 2012	RER w/o CH, GLO	N
fibreboard production, soft, from wet & dry processes	2012 - 2012	CA-QC	R
glued laminated timber production, for indoor use	2009 - 2011	CA-QC	N
medium density fibre board production, uncoated	2012 - 2012	RER, GLO	N
melamine impregnated paper production	2012 - 2012	RER, GLO	N
oriented strand board production	2005 - 2006	CA-QC	N
oriented strand board production	2012 - 2012	RER, GLO	U
particle board production, for indoor use, from virgin wood	2011 - 2012	BR, GLO	N
particle board production, uncoated, average glue mix	2012 - 2012	RER, GLO	N
plywood production, for outdoor use	1996 - 1996	CA-QC	R
window frame production, wood, U=1.5 W/m2K	1996 - 2004	CA-QC	R
wood wool production	2002 - 2002	CA-QC	R
treatment of wastewater from hard fibreboard production, capacity 5E9l/year	2012 - 2012	RER, GLO	U
treatment of wastewater from medium density fibreboard production, capacity 5E9l/year	2012 - 2012	RER, GLO	N
treatment of wastewater from particle board production, capacity 5E9l/year	2012 - 2012	RER, GLO	U

The activity “fibreboard production, soft, 2008 – 2009, CH, GLO” has been renamed into “fibreboard production, soft, from wet processes, 2008 – 2009, CH, GLO” in order to avoid double counting with the new activities “from wet and dry processes”.

13.4.2 New products

The introduction of those new activities has also generated new wood based products or services, available now in version 3.1.

Table 56. New wood based products or services.

Product name	Unit
coating, with melamine impregnated paper	m2
paper, melamine impregnated	Kg
particleboard, uncoated	m3

13.4.3 Deleted activities and products

The update has also included the deletion of activities that became obsolete.

Table 57. Deleted activities in the sector. If an activity is present in several geographies, all of them are listed under “Geographies”.

Activity name	Time Period	Geographies
fibreboard production, hard, from virgin wood	1996 - 2002	GLO
medium density fibreboard production	1996 - 2002	RER, GLO
medium density fibreboard production, from virgin wood	1996 - 2002	GLO
particle board production, cement bonded, from virgin wood	1989 - 2002	GLO
particle board production, for indoor use, from virgin wood	1986 - 2000	GLO
particle board production, for outdoor use, from virgin wood	1986 - 2000	GLO
treatment of wastewater from fibreboard production, capacity 5E9l/year	1994 - 2000	CH, GLO
treatment of wastewater from particle board production, capacity 5E9l/year	1994 - 2000	CH

13.5 Wood preservation

13.5.1 New activities

The wood preservative production and the wood preservation services are now described with a fine level of detail. The following table lists all new activities in this sector.

Table 58. New activites related to wood preservation. If an activity is present in several geographies all of them are listed under "Geographies". The column 3.1 labels the activities as: **U**: Updated. **N**: New. **U/C**: the activity was Updated and its name was Changed.

Activity name	Time Period	Geographies	3.1
Wood preservation			
wood preservation, dipping/immersion, solvent-based preservative, indoor use, dry	2012 - 2012	RER, GLO	N
wood preservation, dipping/immersion, solvent-based preservative, indoor use, occasionally wet	2012 - 2012	RER, GLO	N
wood preservation, dipping/immersion, solvent-based preservative, outdoor use, no ground contact	2012 - 2012	RER, GLO	N
wood preservation, dipping/immersion, water-based preservative, indoor use, dry	2012 - 2012	RER, GLO	N
wood preservation, dipping/immersion, water-based preservative, indoor use, occasionally wet	2012 - 2012	RER, GLO	N
wood preservation, dipping/immersion, water-based preservative, outdoor use, no ground contact	2012 - 2012	RER, GLO	N
wood preservation, hot/cold dipping, creosote, outdoor use, ground contact	2008 - 2008	RER, GLO	N
wood preservation, oscillating pressure method, inorganic salt, containing Cr, outdoor use, ground contact	2012 - 2012	RER, GLO	N
wood preservation, oscillating pressure method, organic salt, Cr-free, outdoor use, ground contact	2012 - 2012	RER, GLO	N
wood preservation, pressure vessel, creosote, outdoor use, ground contact	2008 - 2008	RER, GLO	N
wood preservation, spray tunnel/deluging, solvent-based preservative, indoor use, dry	2012 - 2012	RER, GLO	N
wood preservation, spray tunnel/deluging, solvent-based preservative, indoor use, occasionally wet	2012 - 2012	RER, GLO	N
wood preservation, spray tunnel/deluging, solvent-based preservative, outdoor use, no ground contact	2012 - 2012	RER, GLO	N
wood preservation, spray tunnel/deluging, water-based preservative, indoor use, dry	2012 - 2012	RER, GLO	N
wood preservation, spray tunnel/deluging, water-based preservative, indoor use, occasionally wet	2012 - 2012	RER, GLO	N
wood preservation, spray tunnel/deluging, water-based preservative, outdoor use, no ground contact	2012 - 2012	RER, GLO	N
wood preservation, vacuum pressure method, inorganic salt, containing Cr, outdoor use, ground contact	2012 - 2012	RER, GLO	N
wood preservation, vacuum pressure method, organic salt, Cr-free, outdoor use, ground contact	2012 - 2012	RER, GLO	N
wood preservation facility construction, dipping/immersion tank	2012 - 2012	GLO	N

wood preservation facility construction, flow coating equipment	2012 - 2012	GLO	N
wood preservation facility construction, hot/cold dipping tank	2012 - 2012	GLO	N
wood preservation facility construction, oscillating pressure vessel	2012 - 2012	GLO	N
wood preservation facility construction, vacuum pressure vessel	2012 - 2012	GLO	N
Wood preservative production			
wood preservative production, creosote	2011 - 2011	RER, GLO	U
wood preservative production, inorganic salt, containing Cr, outdoor use, ground contact	2012 - 2012	GLO	U/C*
wood preservative production, organic salts, Cr-free, outdoor use, ground contact	2012 - 2012	GLO	U/C**
wood preservative production, organic, indoor use, dry	2012 - 2012	GLO	N
wood preservative production, organic, indoor use, occasionally wet	2012 - 2012	GLO	N
wood preservative production, organic, outdoor use, no ground contact	2012 - 2012	GLO	N
wood preservative production, water-based, indoor use, dry	2012 - 2012	GLO	N
wood preservative production, water-based, indoor use, occasionally wet	2012 - 2012	GLO	N
wood preservative production, water-based, outdoor use, no ground contact	2012 - 2012	GLO	N

*Was: “wood preservative production, inorganic salt, containing Cr, 2000 – 2002”, RER, GLO

**Was: “wood preservative production, organic salt, Cr-free, 2000 – 2002”, RER, GLO

13.5.2 New products

Similarly, the new activities have generated new products, now available in version 3.1.

Table 59. New wood products or services on wood preservative production and wood preservation.

Product name	Unit
Wood preservation services	
wood preservation, dipping/immersion method, organic solvent-based, indoor use, dry	Kg
wood preservation, dipping/immersion method, organic solvent-based, indoor use, occasionally wet	Kg
wood preservation, dipping/immersion method, organic solvent-based, outdoor use, no ground contact	Kg
wood preservation, dipping/immersion method, water-based, indoor use, dry	Kg
wood preservation, dipping/immersion method, water-based, indoor use, occasionally wet	Kg
wood preservation, dipping/immersion method, water-based, outdoor use, no ground contact	Kg
wood preservation, hot/cold dipping, creosote, outdoor use, ground contact	Kg
wood preservation, oscillating pressure method, inorganic salt, containing Cr, outdoor use, ground contact	Kg
wood preservation, oscillating pressure method, organic salt, Cr-free, outdoor use, ground contact	Kg

wood preservation, pressure vessel, creosote, outdoor use, ground contact	Kg
wood preservation, spray tunnel/deluging, organic solvent-based, indoor use, dry	Kg
wood preservation, spray tunnel/deluging, organic solvent-based, indoor use, occasionally wet	Kg
wood preservation, spray tunnel/deluging, organic solvent-based, outdoor use, no ground contact	Kg
wood preservation, spray tunnel/deluging, water-based, indoor use, dry	Kg
wood preservation, spray tunnel/deluging, water-based, indoor use, occasionally wet	Kg
wood preservation, spray tunnel/deluging, water-based, outdoor use, no ground contact	Kg
wood preservation, vaccum pressure method, inorganic salt, containing Cr, outdoor use, ground contact	Kg
wood preservation, vacuum pressure method, organic salts, Cr-free, outdoor use, ground contact	Kg
Wood preservative products	
wood preservative, organic, indoor use, dry	kg
wood preservative, organic, indoor use, occasionally wet	kg
wood preservative, organic, outdoor use, no ground contact	kg
wood preservative, water-based, indoor use, dry	kg
wood preservative, water-based, indoor use, occasionally wet	kg
wood preservative, water-based, outdoor use, no ground contact	kg

13.5.3 Deleted activities and products

The obsolete activities and products, replaced by more detailed datasets, are listed below.

Table 60. Deleted activities in the sector. If an activity is present in several geographies, all of them are listed under "Geographies".

Activity name	Time Period	Geographies
wood preservation service, logs, pressure vessel, preservative not included	2000 - 2002	RER, GLO
wood preservation service, sawnwood, pressure vessel, preservative not included	2000 - 2002	RER, GLO
wood preservation facility construction	2002	RER, GLO
wood preservative production, inorganic salt, containing Cr	2000 - 2002	RER, GLO
wood preservative production, organic salt, Cr-free	2000 - 2002	RER, GLO

Table 61. Deleted products in the sector

Product name	Unit
wood preservation service, logs, pressure vessel, preservative not included	m3
wood preservation service, sawnwood, pressure vessel, preservative not included	m3
wood preservation facility	unit

13.6 Corrections in other datasets related to this sector

The activities “charcoal production, 1985 – 1996, GLO” have been corrected to avoid the use of “log, energy wood, split, measured as solid wood under bark” (a product that has been deleted). It uses “cleft timber, measured as dry mass” instead.

The activities “palm fruit bunch production, 2002 - 2006”, and “palm fruit bunch production, on land recently transformed, 2002 – 2006” both MY and GLO were corrected to use the latest chipping activity (in hours): “wood chipping, chipper, mobile, diesel, at forest road”.

The activities “wood pellet production, 2011 – 2012” in RER and GLO have been corrected to use the new residual woods available and better reflect the original data collected.

The RER and GLO activities “glued laminated timber production, for indoor use, 1986 – 2002”; “glued laminated timber production, for outdoor use, 1986 – 2002”; “laminated timber element production, for outdoor use, 1986 – 2002”; as well as “three layered laminated board production, 1997 – 2002” have been updated to use as inputs the new products from the sawmill.