

Documentation of changes implemented in ecoinvent database 3.2 (2015.11.30)

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1 Introduction

This report covers the changes to the ecoinvent database between version 3.1, released in 2014 and version 3.2, released in 2015. It describes both the database-wide changes that affect the whole database as well as the specific changes in the different sectors. These changes consist in the addition of new datasets, in the deletion of outdated ones, and in the re-modelling or corrections of others.

All changes described in this report potentially affect or modify impact assessment results, even when they seem as minor as changing an activity link. The description of the changes has been provided to help the users with the interpretation and understanding of the possible changes in results they might encounter.

For a full comparison between the versions of the database, consisting of a listing of all flows affected by changes and the actual amounts changed, the Change Report Annex can be downloaded as an excel file from the ecoinvent website by license holders only.

2 Database-wide changes

For version 3.2, a few aspects have been corrected throughout the whole database. They are covered in this chapter of the report.

2.1 Renamed exchanges and activities

Some activities or products were renamed for version 3.2. Wood drying and planning activities have been renamed and restructured, this is covered in Chapter 10.2.2.

Table 1. Intermediate exchanges renamed for version 3.2. Most of the changes concern correction of spelling mistakes or aim to improve the product name.

Name of exchange in version 3.1	Name of exchange in version 3.2
brick	clay brick
brick shale	shale brick
diesel, burned in diesel-electric generating set	diesel, burned in diesel-electric generating set, 10MW
poor concrete	lean concrete
shaving, hardwood, measured as dry mass	shavings, hardwood, measured as dry mass
shaving, softwood, measured as dry mass	shavings, softwood, measured as dry mass
transport, freight, lorry >32 metric ton, EURO6	transport, freight, lorry >32 metric ton, EURO6

Table 2. Activities renamed for version 3.2. Most of the changes concern correction of spelling mistakes or aim to improve the activity name. * Activities wrongly renamed, it was detected during the writing of this report, and is already being corrected.

Name of activity in version 3.1	Name of activity in version 3.2
brick production	clay brick production
brick shale production	shale brick production
diesel, burned in diesel-electric generating set	diesel, burned in diesel-electric generating set, 10MW
diesel-electric generating set production 10MW	diesel-electric generating set production 10MW production*
electricity production, natural gas, at conventional power plant	electricity production, natural gas, conventional power plant
electricity, from municipal waste incineration to generic market for electricity, medium voltage	electricity, from municipal waste incineration to generic market for electricity, medium voltage
market for brick	market for clay brick
market for brick shale	market for shale brick
market for diesel, burned in diesel-electric generating set	market for diesel, burned in diesel-electric generating set, 10MW
market for diesel-electric generating set production 10MW	market for diesel-electric generating set production 10MW*
market for poor concrete	market for lean concrete
market for shaving, hardwood, measured as dry mass	market for shavings, hardwood, measured as dry mass
market for shaving, softwood, measured as dry mass	market for shavings, softwood, measured as dry mass
market for transport, freight, lorry >32 metric ton, EURO6	market for transport, freight, lorry >32 metric ton, EURO6
market for wood preservation, dipping/immersion method, organic solvent-based, indoor use, occasionally wet, as a(...)_1	market for wood preservation, dipping/immersion method, organic solvent-based, indoor use, occasionally wet
market for wood preservation, dipping/immersion method, organic solvent-based, outdoor use, no ground contact, as(...)_2	market for wood preservation, dipping/immersion method, organic solvent-based, outdoor use, no ground contact
market for wood preservation, oscillating pressure method, organic salt, Cr-free, outdoor use, ground contact, as(...)_5	market for wood preservation, oscillating pressure method, organic salt, Cr-free, outdoor use, ground contact
market for wood preservation, spray tunnel/deluging, organic solvent-based, indoor use, occasionally wet, as amou(...)_6	market for wood preservation, spray tunnel/deluging, organic solvent-based, indoor use, occasionally wet
market for wood preservation, spray tunnel/deluging, organic solvent-based, outdoor use, no ground contact, as am(...)_7	market for wood preservation, spray tunnel/deluging, organic solvent-based, outdoor use, no ground contact
market for wood preservation, vaccum pressure method, inorganic salt, containing Cr, outdoor use, ground contact, (...)_4	market for wood preservation, vaccum pressure method, inorganic salt, containing Cr, outdoor use, ground contact
market for wood preservation, vacuum pressure method, organic salts, Cr-free, outdoor use, ground contact, as amo(...)_3	market for wood preservation, vacuum pressure method, organic salts, Cr-free, outdoor use, ground contact
poor concrete production	lean concrete production
rutile production, synthetic, 95% titanium dioxide	rutile production, synthetic, 95% titanium dioxide, Benelite process.
shaving, hardwood, measured as dry mass to generic market for residual wood, dry	shavings, hardwood, measured as dry mass to generic market for residual wood, dry
shaving, softwood, measured as dry mass to generic market for residual wood, dry	shavings, softwood, measured as dry mass to generic market for residual wood, dry

2.2 Energy exchanges

Energy exchanges were reintroduced in ecoinvent v3.1 in order to allow users to calculate CED values. A few activities were nevertheless needing still correction for this v3.2. The following table lists the activities where the Energy flows have been added or corrected for this version.

Table 3. Activities modified by the introduction of Energy exchanges. In column "v3.2": "U" stands for updated exchange amount, "A" stands for added of a missing exchange.

Activity name	Geography	Time period	Elementary flow	V3.2
clear-cutting, primary forest to arable land	IN	1990 - 2009	Energy, gross calorific value, in biomass, primary forest	U
clear-cutting, primary forest to arable land	MY	1990 - 2009	Energy, gross calorific value, in biomass, primary forest	U
electricity production, wind, 2.3MW turbine, precast concrete tower, onshore	CA-QC	2010 - 2015	Energy, kinetic (in wind), converted	A
electricity production, wind, 2.3MW turbine, precast concrete tower, onshore	GLO	2010 - 2015	Energy, kinetic (in wind), converted	A
palm fruit bunch production, on land recently transformed	GLO	2002 - 2006	Energy, gross calorific value, in biomass	A
palm fruit bunch production, on land recently transformed	MY	2002 - 2006	Energy, gross calorific value, in biomass	A
softwood forestry, mixed species, boreal forest	CA-QC	2006 - 2012	Energy, gross calorific value, in biomass	U
softwood forestry, mixed species, boreal forest	GLO	2006 - 2012	Energy, gross calorific value, in biomass	U

2.3 Changes in the GLO datasets

As explained in the Documentation of changes implemented in ecoinvent Data 3.0, some GLO activities were not created for v3.0. Most of the missing GLO were introduced in v3.1; v3.2 includes a few GLO which were still missing.

Table 4. GLO activities that were missing, and have been added in the version 3.2.

Activity name	Time period
collection of polystyrene scrap, post-consumer	2009 - 2009
cooling energy, from natural gas, at cogen unit with absorption chiller 100kW	2000 - 2005
copper production, from imported concentrates	1994 - 2003
diammonium phosphate production	1999 - 1999
energy use and operation emissions, electric bicycle	2009 - 2009
energy use and operation emissions, electric bicycle	2009 - 2009
energy use and operation emissions, electric bicycle, label-certified electricity	2009 - 2009
energy use and operation emissions, electric bicycle, label-certified electricity	2009 - 2009
heat production, at hot water tank, solar+electric, flat plate, multiple dwelling	2002 - 2002
heat production, at hot water tank, solar+electric, flat plate, multiple dwelling	2002 - 2002
heat production, at hot water tank, solar+gas, flat plate, multiple dwelling	2002 - 2002

In version 3.2, the way the RoW datasets are generated has been modified. RoW processes are now generated as a direct equivalent of the GLO dataset. The concept of RoW datasets being calculated to represent the difference between local activities present in the database and the GLO dataset proved difficult to communicate and reproduce by users, and did not add a significant amount of value to the database. It also introduced a potential error source during data entry if it was misunderstood. The new approach of approximating RoW activities with the data entered in the GLO is more reliable. Testing confirmed that the change has no significant effect on results except in a few datasets that were faulty due to misunderstood use of the concept.

2.4 Product classification

Every new product present in the ecoinvent database has to have two types of classification for the two allocation system models:

- Allocation, cut-off by classification
- Allocation, allocation at the point of substitution (APOS)

The classification of the product is essential to determine how allocation will happen in those two system models, so changes in this regard can strongly affect the impact results.

Table 5. Products which had their classification changed from v3.1 to v3.2.

Product name	APOS classification		cut-off classification	
	V3.1	V3.2	V3.1	V3.2
burnt shale	MFT	non-MFT	Waste	Allocatable product
rape meal	MFT	non-MFT	Allocatable product	Allocatable product

2.5 Prices

The prices for products are needed if economic allocation is to be used in at least one system model; they also can provide additional information on balances (economic balance of inputs and outputs), or can be used for monetary purposes by the users. Currently, approximately half of the products in the database have prices. New prices are being added with every version of the database and some old prices are being updated while additional database quality checks are performed.

The price change is an important factor to consider. If a product has had its price modified, this will affect the allocation results (if price was used as allocation factor), and consequently, the impact assessment results.

Table 6. Products with changed prices. Compared to v3.1, the listed products have new prices (N), decreased prices (-), or increased prices (+). The users of the database which have valid ecoinvent licences can access all the prices directly in the database, or check the concrete changes in the Change report annex.

Product name	Price change
acetic acid, without water, in 98% solution state	+
apple	N
aubergine	N
avocado	N
banana	N
bark chips, wet, measured as dry mass	-
barley grain	N
battery, NiMH, rechargeable, prismatic	N
bitumen adhesive compound, cold	N
broccoli	N
bundle, energy wood, measured as dry mass	N
burnt shale	N
cabbage red	N
cabbage white	N
carrot	N
cauliflower	N
celery	N
citrus	N
clinker	-
copper	+
cotton seed, for sowing	-
cucumber	N
deep well, for geothermal power, onshore, 6000m	N
deinked pulp, wet lap	N
diesel, burned in building machine	-
diethanolamine	-
electricity, medium voltage, label-certified	N
fennel	N
grape	N
green asparagus	N
green bell pepper	N
heavy water	N
hydrogen, liquid	+
iceberg lettuce	N
kiwi	N
lettuce	N
maize grain	N
manganese dioxide	+
manganese sulfate	-

Product name	Price change
melon	N
molybdenite	+
monochloropentafluoroethane	+
nitrogen, liquid	-
offshore well, oil/gas	N
onion	N
onshore well, oil/gas	N
papaya	N
paris market carrot	N
pear	N
pineapple	N
potato	N
radish	N
rape seed	N
refrigerant R134a	N
saw dust, wet, measured as dry mass	+
sawlog and veneer log, hardwood, measured as solid wood under bark	+
sawlog and veneer log, softwood, debarked, measured as solid wood	+
sawlog and veneer log, softwood, measured as solid wood under bark	+
sawnwood, paran pine from sustainable forest management, kiln dried	+
silicon tetrahydride	+
slab and siding, hardwood, wet, measured as dry mass	-
slab and siding, softwood, wet, measured as dry mass	-
soda ash, dense	+
soda ash, light, crystalline, heptahydrate	+
soybean	N
spent nuclear fuel	-
spinach	N
steel, unalloyed	-
strawberry	N
sugar, from sugar beet	+
sugar, from sugarcane	+
tomato	N
vine tomato	N
wheat grain	N
whey	-
white asparagus	N
wood chips, dry, measured as dry mass	+
wood chips, from post-consumer wood, measured as dry mass	+
wood chips, wet, measured as dry mass	+
wood preservative, inorganic salt, containing Cr	N
wood preservative, organic, indoor use, dry	N

Product name	Price change
wood preservative, organic, indoor use, occasionally wet	N
wood preservative, organic, outdoor use, no ground contact	N
wood preservative, water-based, indoor use, dry	N
wood preservative, water-based, indoor use, occasionally wet	N
wood preservative, water-based, outdoor use, no ground contact	N
zucchini	N

2.6 Production volumes

We have made some changes in the production volumes throughout the database. Changes in production volumes will not directly affect the resulting impacts of the product in the given activity, but they will change market compositions, and so affect the resulting impacts of the market mix of the product.

Some changes have corrected remaining placeholder production volumes, replacing them with realistic production volumes, or harmonized the way up- or downscaling was done in some regional activities regarding the GLO or vice versa.

Some datasets have been modified to have a production volume of 0. This means that the reported production volume for the given region is indeed 0, and the activity does not take place within that region. Such datasets may eventually be removed from the database, since they describe activities that no longer happen. However, sometimes they remain in the database, for example for legacy purposes (some user projects may depend on them as inputs). Other examples might be datasets for future technologies. Without a production volume, these datasets will not be included in any market datasets, and they will not be used within other parts of the ecoinvent database unless explicitly selected by the dataset creator, for reasons specified in the documentation.

Check the Change report annex for full coverage on production volume changes. When this change was done together with other larger modifications in the sector, it will be reported in the corresponding chapter.

Table 7. Activities with updated production volumes not mentioned elsewhere in this report. If an activity is present in several geographies (with the same time period) all of them are listed under "Geography".

Activity name	Geography	Time period
energy use and operation emissions, electric bicycle	CH	2009 - 2009
energy use and operation emissions, electric bicycle, label-certified electricity	CH	2009 - 2009
operation, computer, laptop, 68% active work with internet access 0.2 Mbit/s, label-certified electricity	CH, GLO	2005 - 2009
transport, passenger, electric bicycle, label-certified electricity	CH	2005 - 2009

2.7 Corrections in the markets

Some markets were edited to correct the way losses were modelled; either the amount was wrong or the Activity Link was not self-referencing as it should. When those corrections were done together with other corrections in a given sector, they are listed in the chapter for the concerned sector.

Table 8. Markets where solely the modelling of the losses was corrected for v3.2.

Activity name	Geography	Time period
market for floor heating from borehole heat pump	GLO	1998 - 2000
market for liquefied petroleum gas	GLO	1980 - 2010
market for natural gas, low pressure	GLO	2000 - 2010

Each generated market is normally screened to adjust the default transport model to the reality of the concerned product. In v3.2 we have removed remaining aircraft transport that was introduced by default in v3.0 or v3.1, and has afterwards been considered an error. When default transport was extensively edited, this market is reported as corrected in the concerned sector.

Table 9. Markets where “transport, freight, aircraft” was deleted.

Activity name
market for acetone cyanohydrin
market for cable yarder with sled winch
market for chicken for slaughtering, live weight
market for energy wood harvester
market for forwarder
market for mobile cable yarder, trailer-mounted
market for mobile cable yarder, truck-mounted, incl. processor
market for red meat, live weight
market for sheep fleece in the grease
market for sheep for slaughtering, live weight
market for skidder
market for terrain chipper on forwarder
market for wood preservative, organic, indoor use, dry
market for wood preservative, organic, indoor use, occasionally wet
market for wood preservative, organic, outdoor use, no ground contact
market for wood preservative, water-based, indoor use, dry
market for wood preservative, water-based, indoor use, occasionally wet
market for wood preservative, water-based, outdoor use, no ground contact

2.8 New feature: market groups

Market datasets include all the different producers for the same product in a given region in one dataset. They also contain information about e.g. transport from producer to consumer, losses, wastes or emissions produced during transport, etc. In this way, they provide a useful way to access a mix of producers. By adding markets for many different regions, the database can provide useful, region-specific information on the sources of different products. Therefore, it is generally useful to have a good coverage with region-specific markets.

However, as markets cannot overlap by definition, this can complicate dataset creation and modification when creating a dataset for a large region. For example, if a user of the database wants to create a foreground process of an average of European production for e.g. frozen pizza, they will want to add electricity as an input. There are hundreds of datasets that produce electricity in Europe due to the extensive coverage of the sector. The markets, or consumption mixes, for each European country are also available, but the user would naturally prefer one input for all of Europe. The Market Group datasets serve this function. In Market Groups, all markets contained within their region are combined and scaled based on their relative production volumes. Therefore, they are a consumption mix for their region.

Market Groups are very simple datasets. They always contain only markets that supply the specified product and which are completely contained within their region. There are no uncertainties, losses or transport contained in market groups, since these are already reflected in the markets that are contained within.

Market Groups can be layered. For example, the Market Group for electricity, high voltage in North America contains, among other inputs, the Market Group for the United States, which in turn contains the various markets for electricity in the US. A Market Group for a large region will in this way contain each Market dataset fully within its region exactly once.

Table 10. Market groups present in v3.2 of the ecoinvent database. Time period is 2015 – 2015. Market Groups have been created for selected products and geographies based on user feedback and internal analysis.

Activity name	Geography
market group for diesel	GLO, RER
market group for diesel, low-sulfur	GLO, RER
market group for electricity, high voltage	CA, CN, Canada without Quebec, ENTSO-E, Europe without Switzerland, GLO, RAF, RAS, RER, RLA, RME, RNA, UCTE, US
market group for electricity, low voltage	CA, CN, Canada without Quebec, ENTSO-E, Europe without Switzerland, GLO, RAF, RAS, RER, RLA, RME, RNA, UCTE, US
market group for electricity, medium voltage	CA, CN, Canada without Quebec, ENTSO-E, Europe without Switzerland, GLO, RAF, RAS, RER, RLA, RME, RNA, UCTE, US
market group for heat, central or small-scale, natural gas	GLO, RER
market group for heat, central or small-scale, other than natural gas	GLO, RER
market group for heat, district or industrial, natural gas	GLO, RER
market group for heat, district or industrial, other than natural gas	GLO, RER
market group for heavy fuel oil	RER
market group for irrigation	GLO
market group for light fuel oil	RER
market group for natural gas, high pressure	CA, Europe without Switzerland, GLO
market group for tap water	GLO, RER
market group for transport, freight train	GLO

2.9 Impact assessment changes

Two impact assessment methods have been revisited between v3.1 and v3.2, in order to correct mistakes and methodological choices: IPCC 2007 and IPCC 2013. The list of changes in characterisation factors (CF) is found in the Change report annex; there a short note of justification is included for each change.

2.9.1 Changes in IPCC 2007

Dimethyl ether, HCFC-140, Fluorine and Perfluoropentane had missing CF in 3.1 due to a mapping error.

The 3.1 implementation didn't use the errata correction table published by IPCC (https://www.ipcc.ch/publications_and_data/ar4/wg1/en/errataserrata-errata.html#table214). This led to mistakes in Chloroform and HCFC-21 CFs.

Finally, the methane, non-fossil exchanges accidentally received the fossil CF. The difference between fossil and non-fossil methane CF is 2.75.

2.9.2 Changes in IPCC 2013

Implementation of IPCC 2013 for 3.1 included negative CFs for near-term climate forcers (SO₂, NO_x). Also, CFs including carbon-climate feedback effects were chosen. After consultation with specialists, ecoinvent has decided to exclude near-term climate forcers and to opt for CFs without the carbon-climate feedback effects. Please refer to the impact assessment implementation report for a thorough discussion of these choices.

Other CFs also accidentally received their value from the wrong time horizon.

Due to these significant mistake corrections and change in methodological choices, we recommend not to use the impact assessment scores calculated for 3.1 for IPCC2013.

3 Agriculture

Some new transforming and market activities have been added in this sector, both to improve the geographical coverage of the database, and to model the production and supply of products new to the database.

3.1 New data on agriculture

A few new activities and products made its way to the v3.2. In the following tables you can see them listed.

Table 11. New activities on the agriculture sector in v3.2. *If an activity is present in several geographies (with the same time period) all of them are listed under "Geography". In the column 3.2, "NP" stands for New Product delivered to the database (look Table 12).*

Activity name	Geography	Time period	3.2
alfalfa/grass silage production	CA-QC, GLO	2010 - 2012	NP
barley grain, feed production	CA-QC, GLO	1996 - 1999	NP
barley production	CA-QC	2010 - 2012	
hay production	CA-QC, GLO	2010 - 2012	NP
irrigation	TN	1997 - 2006	
lime to generic market for soil pH raising agent	GLO	2015 - 2015	NP
maize grain production	CA-QC	2010 - 2012	
maize grain, feed production	CA-QC, GLO	1996 - 1999	NP
maize silage production	CA-QC, GLO	2010 - 2012	NP
market for irrigation	CA-QC	2012 - 2012	
market for irrigation	TN	2011 - 2011	
oat production	CA-QC, GLO	2010 - 2012	NP
potato production	CA-QC	2010 - 2012	NP
rape seed production	CA-QC	2010 - 2012	NP
soybean production	CA-QC	2010 - 2012	NP
soybean, feed production	CA-QC, GLO	1996 - 1999	NP
swine production	CA-QC, GLO	2009 - 2011	NP
wheat grain, feed production	CA-QC, GLO	1996 - 1999	NP
wheat production	CA-QC	2010 - 2012	NP

Table 12. New products and their corresponding new markets generated for the v3.2 in the agriculture sector. Markets are also new activities included in the database.

Activity name	Geography	Time period	New product
market for alfalfa-grass silage	GLO	2010 - 2012	alfalfa-grass silage
market for barley grain, feed	GLO	1996 - 1999	barley grain, feed
market for hay	GLO	2010 - 2012	hay
market for maize grain, feed	GLO	1996 - 1999	maize grain, feed
market for maize silage	GLO	2010 - 2012	maize silage
market for oat grain	GLO	2010 - 2012	oat grain
market for soil pH raising agent, as CaCO ₃	GLO	2015 - 2015	soil pH raising agent, as CaCO ₃
market for soybean, feed	GLO	1996 - 1999	soybean, feed
market for swine for slaughtering, live weight	GLO	2009 - 2011	swine for slaughtering, live weight
market for wheat grain, feed	GLO	1996 - 1999	wheat grain, feed

3.2 Updates and corrections

Some diverse corrections were made in other datasets, they concern amendments of some flow amounts, addition or removal of direct links, and correction of production volumes. In some cases, this corrected placeholder production volumes still present in the database; in other cases, the value was recalculated in a more accurate way. Finally, some similar products were present each of them with their joint production volume (varieties of asparagus, tomato, carrot and cabbage). This has been corrected by splitting up the production volume between the two products.

The “market for rape meal” was made constrained for the consequential model, the marginal consumer is “rape meal to generic market for protein feed”.

Table 13. Datasets corrected for v3.2, in the agriculture sector. *If an activity is present in several geographies (with the same time period) all of them are listed under "Geography".*

Activity name	Geography	Time period
barley grain, feed production, organic	GLO	1996 - 1999
cabbage red production	GLO	2010 - 2010
cabbage white production	GLO	2010 - 2010
carrot335 production	GLO	2010 - 2010
fodder yeast to generic market for protein feed	GLO	2012 - 2012
green asparagus production	GLO	2010 - 2010
market for rape meal	GLO	2012 - 2012
milk production, from cow	CA-QC, GLO	2009 - 2011
operation, housing system, pig, fully-slatted floor	CA-QC	1994 - 2002
palm fruit bunch production	MY	2002 - 2006
palm fruit bunch production, on land recently transformed	MY	2002 - 2006
paris market carrot production	GLO	2010 - 2010
pipeline construction, liquid manure	CH, GLO	2009 - 2009
rape meal to generic market for protein feed	GLO	2012 - 2012
soybean meal and crude oil production	BR	1998 - 2006
soybean production	US	2004 - 2007
tofu production	CA-QC, GLO	2010 - 2013
tomato production	GLO	2010 - 2010
vine tomato production	GLO	2010 - 2010
white asparagus production	GLO	2010 - 2010

Input amounts of some organic fertilizers (manures) have been set to 0 in the v3.2. Version 3.3 will include a remodelling of those type of fertilizers, and the original amount will be restored. This affects the datasets listed in the following table.

Table 14. Datasets with input flows temporarily set to 0. This concerns the flows of organic fertilizers. If an activity is present in several geographies (with the same time period) all of them are listed under "Geography". If the dataset was integrated newly in v3.2, they will be labelled "yes" in the column "New to v3.2".

Activity name	Geography	Time period	New to v3.2
alfalfa/grass silage production	CA-QC, GLO	2010 - 2012	yes
barley production	CA-QC	2010 - 2012	yes
hay production	CA-QC, GLO	2010 - 2012	yes
maize grain production	CA-QC	2010 - 2012	no
maize silage production	CA-QC, GLO	2010 - 2012	yes
oat production	CA-QC, GLO	2010 - 2012	yes
potato production	CA-QC	2010 - 2012	yes
rape seed production	CA-QC	2010 - 2012	yes
soybean production	CA-QC	2010 - 2012	yes
tree seedling production, in heated greenhouse	GLO; RER	2002 - 2002	no
tree seedling production, in heated greenhouse	GLO, RER	2002 - 2002	no
tree seedling production, in unheated greenhouse	GLO; RER	2002 - 2002	no
tree seedling production, in unheated greenhouse	GLO, RER	2002 - 2002	no
wheat production	CA-QC	2010 - 2012	yes

4 Building materials

4.1 Clinker, cement and concrete

The cement and concrete production have been updated using the most recent production data. More detail is introduced for different types of concrete. Some of the new datasets replace older datasets present in v3.1. In several cases local Swiss markets for certain products are added.

As mentioned in chapter 2.1, “poor concrete” is renamed to “lean concrete” throughout the whole database. Finally, two new products have been introduced in this sector, “**pyrite ash**” and “**sewage sludge, dried**”, in the context of waste utilisation for clinker production.

Table 15. New and updated activities in the building sector. If several geographies of the same activity exists, all of them are listed in the “Geography” column. In the column v3.2, “U” stands for “Updated”, “N” for “New”, “N*” indicates that the product supply by this market is also new.

Activity name	Geography	Time period	v3.2
cement production, alternative constituents 21-35%	CH	2009 - 2010	U
cement production, alternative constituents 21-35%	Europe without Switzerland, GLO	2005 - 2009	U
cement production, alternative constituents 6-20%	CH	2009 - 2010	U
cement production, alternative constituents 6-20%	CA-QC, Europe without Switzerland, GLO	2005 - 2009	U
cement production, blast furnace slag 18-30% and 18-30% other alternative constituents	CH, Europe without Switzerland, GLO	2005 - 2009	U
cement production, blast furnace slag 31-50% and 31-50% other alternative constituents	CH, Europe without Switzerland, GLO	2005 - 2009	U
cement production, Portland	CH	2009 - 2010	U
clinker production	CA-QC	2008 - 2012	U
clinker production	CH	2009 - 2013	U
clinker production	Europe without Switzerland, GLO, US	1998 - 2003	U
concrete production, for building construction, with cement CEM II/A	CH, GLO	2013 - 2013	N
concrete production, for building construction, with cement CEM II/B	CH, GLO	2013 - 2013	N
concrete production, for civil engineering, with cement CEM I	CH, GLO	2013 - 2013	N
concrete production, for civil engineering, with cement CEM II/A	CH, GLO	2013 - 2013	N
concrete production, for civil engineering, with cement CEM II/B	CH, GLO	2013 - 2013	N
concrete production, for drilled piles, with cement CEM I	CH, GLO	2013 - 2013	N
concrete production, for drilled piles, with cement CEM II/A	CH, GLO	2013 - 2013	N
concrete production, for drilled piles, with cement CEM II/B	CH, GLO	2013 - 2013	N

Activity name	Geography	Time period	v3.2
drying, sewage sludge	CH, GLO	2013 - 2013	N
lean concrete production, with cement CEM II/A	CH, GLO	2013 - 2013	N
lean concrete production, with cement CEM II/B	CH, GLO	2013 - 2013	N
market for concrete, for de-icing salt contact	CH	2011 - 2011	N
market for concrete, high exacting requirements	CH	2011 - 2011	N
market for concrete, normal	CH	2011 - 2011	N
market for concrete, sole plate and foundation	CH	2011 - 2011	N
market for lean concrete	CH	2011 - 2011	N
market for pyrite ash	GLO	2009 - 2013	N*
market for sewage sludge, dried	GLO	2009 - 2013	N*
unreinforced concrete production, with cement CEM II/A	CH, GLO	2013 - 2013	N
unreinforced concrete production, with cement CEM II/B	CH, GLO	2013 - 2013	N

The new activities sometimes replace activities in v3.1 that have now been deleted. Usually, one activity from v3.1 has been replaced by two or more activities, describing more specific technologies.

Table 16. *The activities listed in this table have been deleted, as replaced now by more specific technologies. In all cases, the product name has stayed the same.*

Deleted activity		Replacement	
Activity name	Geography	Activity name	Geography
concrete production, high exacting requirements	GLO, RER	concrete production, for building construction, with cement CEM II/A	GLO, RER
		concrete production, for building construction, with cement CEM II/B	GLO, RER
concrete production, normal	GLO, RER	unreinforced concrete production, with CEM II/A	GLO, RER
		unreinforced concrete production, with CEM II/B	GLO, RER
concrete production, sole plate and foundation	GLO, RER	concrete production, for civil engineering, with cement CEM I	GLO, RER
		concrete production, for civil engineering, with cement CEM II/A	GLO, RER
		concrete production, for civil engineering, with cement CEM II/B	GLO, RER
concrete production, for de-icing salt contact	GLO, RER	concrete production, for drilled piles, with CEM I	GLO, RER
		concrete production, for drilled piles, with CEM II/A	GLO, RER
		concrete production, for drilled piles, with CEM II/B	GLO, RER
poor concrete production	GLO, RER	lean concrete production, with cement CEM II/A	GLO, RER
		lean concrete production, with cement CEM II/B	GLO, RER

4.2 Corrections

Some datasets have been corrected for version 3.2. This includes the correction of some exchange amounts and update of production volumes.

Table 17. Corrected datasets in the sector of building materials. *If an activity is present in several geographies (with the same time period) all of them are listed under "Geography".*

Activity name	Geography	Time period
gravel production, crushed	CH	2013 - 2013
quicklime production, in pieces, loose	CH, GLO	2000 - 2002

5 Chemicals

Some new data have been added to this sector, mainly in the resin production and plastic forming. Otherwise, corrected or amended data is also detailed.

5.1 Resins

A more detailed way of modelling resins have been implemented in v3.2. The new data are listed below.

Table 18. New data for resins. The new activities and their new products are listed here. As reflected in the table, for each new product a new GLO market also exist. The unit for all product is kg. Time periods are 2013 – 2019.

Activity name (new)	Geography	Product name (new)
bisphenol A epoxy based vinyl ester resin production	GLO, RER	bisphenol A epoxy based vinyl ester resin
market for bisphenol A epoxy based vinyl ester resin	GLO	bisphenol A epoxy based vinyl ester resin
dicyclopentadiene based unsaturated polyester resin production	GLO, RER	dicyclopentadiene based unsaturated polyester resin
market for dicyclopentadiene based unsaturated polyester resin	GLO	dicyclopentadiene based unsaturated polyester resin
isophthalic acid based unsaturated polyester resin production	GLO, RER	isophthalic acid based unsaturated polyester resin
market for isophthalic acid based unsaturated polyester resin	GLO	isophthalic acid based unsaturated polyester resin
maleic unsaturated polyester resin production	GLO, RER	maleic unsaturated polyester resin
market for maleic unsaturated polyester resin	GLO	maleic unsaturated polyester resin
orthophthalic acid based unsaturated polyester resin production	GLO, RER	orthophthalic acid based unsaturated polyester resin
market for orthophthalic acid based unsaturated polyester resin	GLO	orthophthalic acid based unsaturated polyester resin

5.2 Forming activities

Three new forming activities for plastics have been introduced. They are modelled as services, similarly to other already existing modelling activities in the database (ie. hot-rolling).

Table 19. New data for plastic forming. The new activities and their new products are listed here. As reflected in the table, for each new product a new GLO market also exist. The unit for all product is kg. Time periods are 2012 – 2014.

Activity name (new)	Geography	Product name (new)
extrusion of plastic sheets and thermoforming, inline	FR, GLO	extrusion of plastic sheets and thermoforming, inline
market for extrusion of plastic sheets and thermoforming, inline	GLO	extrusion of plastic sheets and thermoforming, inline
extrusion, co-extrusion of plastic sheets	FR, GLO	extrusion, co-extrusion
market for extrusion, co-extrusion	GLO	extrusion, co-extrusion
thermoforming of plastic sheets	FR, GLO	thermoforming of plastic sheets
market for thermoforming of plastic sheets	GLO	thermoforming of plastic sheets

5.3 Other new chemicals

Some diverse chemicals, sometimes created in the context of other specific sectors (ie. concrete production) have been added to the v3.2 of the database.

Table 20. Other new data for chemical products. The new activities and their new products are listed here. As reflected in the table, for each new product a new market also exist (“uranium, in yellowcake” is then the only product not new to the database). The unit for all product is kg. All activities are GLO.

Activity name(new)	Time period	Product name
foaming agent production	2012 - 2012	foaming agent
market for foaming agent	2012 - 2012	foaming agent
plasticiser production, for concrete, based on sulfonated melamine formaldehyde	2014 - 2014	plasticiser, for concrete, based on sulfonated melamine formaldehyde
market for plasticiser, for concrete, based on sulfonated melamine formaldehyde	2014 - 2014	plasticiser, for concrete, based on sulfonated melamine formaldehyde
sodium sulfide production	2013 - 2013	sodium sulfide
market for sodium sulfide	2013 - 2013	sodium sulfide
strontium carbonate production	2012 - 2012	strontium carbonate
market for strontium carbonate	2012 - 2012	strontium carbonate
uranium production, in yellowcake, in-situ leaching	2005 - 2009	uranium, in yellowcake

5.4 Corrections

Minor corrections were made in some datasets, concerning the update or deletion of some exchanges, or the adjustment of production volumes.

Table 21. Activities where minor corrections have happened between v3.1 and v3.2. If an activity is present in several geographies (with the same time period) all of them are listed under "Geography".

Activity name	Geography	Time period
activated silica production	GLO	2012 - 2012
allyl chloride production, reaction of propylene and chlorine	GLO, RER	1998 - 2004
butene production, mixed	RER	1997 - 2001
compressed air production, 1000 kPa gauge, <30kW, optimised generation	GLO	2003 - 2015
compressed air production, 1200 kPa gauge, <30kW, average generation	GLO	1990 - 2010
compressed air production, 1200 kPa gauge, <30kW, optimized generation	GLO	2003 - 2015
compressed air production, 600 kPa gauge, >30kW, average generation	GLO	1990 - 2010
compressed air production, 600 kPa gauge, >30kW, best generation	GLO	2005 - 2015
compressed air production, 600 kPa gauge, >30kW, optimized generation	GLO	2003 - 2015
compressed air production, 700 kPa gauge, >30kW, average generation	GLO	1990 - 2010
compressed air production, 700 kPa gauge, >30kW, best generation	GLO	2005 - 2015
compressed air production, 700 kPa gauge, >30kW, optimized generation	GLO	2003 - 2015
compressed air production, 800 kPa gauge, <30kW, average generation	GLO	1990 - 2010
compressed air production, 800 kPa gauge, <30kW, optimized generation	GLO	2003 - 2015
compressed air production, 800 kPa gauge, >30kW, average generation	GLO	1990 - 2010
compressed air production, 800 kPa gauge, >30kW, best generation	GLO	2005 - 2015
compressed air production, 800 kPa gauge, >30kW, optimized generation	GLO	2003 - 2015
electrolysis of lithium chloride	GLO	2000 - 2006
ethylene production, average	RER	1999 - 2001
ethylene production, pipeline system	RER	1999 - 2001
fluorescent whitening agent production, DAS1, triazinylaminostilben type	RER	1997 - 1997
fluorescent whitening agent production, distyrylbiphenyl type	RER	1999 - 1999
heavy water production	CA-QC, GLO	2000 - 2000
oxidation of manganese dioxide	RER	1990 - 2009
polyethylene production, high density, granulate	RER	1999 - 2001
polyethylene production, high density, granulate	RER	1999 - 2001
polyethylene production, linear low density, granulate	RER	1999 - 2001
polyethylene production, low density, granulate	RER	1999 - 2001
polypropylene production, granulate	RER	1999 - 2001
potassium chloride production	CA-SK	2000 - 2000
propylene production, pipeline system	RER	1999 - 2001

6 Energy

6.1 Electricity production

The electricity production sector in the ecoinvent database has been revised completely. All data from the year 2008 are replaced with data from the year 2012, the latest reliably available data in early 2015. This update concerns around 2500 activities. Most of the time the same activity is submitted with a newer time period, updated production volume and other improvements and corrections such as efficiency of energy production or emission data. In some cases, the production volume update has been set to 0. As explained in chapter 2.6 this gives full access to all technologies to the user, while avoiding the contribution of those activities to the market.

So far energy production in the ecoinvent database was present for the whole of China. In ecoinvent version 3.2 China is divided into its provinces, providing bigger differentiation of the environmental impacts of energy production in the specific regions of China. Each province has specific electricity-generating datasets for each relevant technology. Markets have been added for the 2 Chinese grid regions, not on a province-specific level.



Figure 1. The different provinces of China now included in the database.

Some small changes have been done to the technology level. This will affect the market composition in the consequential system model.

Table 22. Changes in technology level. *If an activity is present in several geographies (with the same time period) all of them are listed under "Geography".*

Activity name	Geography	Technology level	
		v3.1	v3.2
electricity production, high voltage, for Swiss Federal Railways	CH, GLO	Modern	Current
electricity production, nuclear, aluminium industry	CA-QC	Current	Outdated
electricity production, nuclear, boiling water reactor	JP	Current	Modern
electricity production, nuclear, pressure water reactor	JP	Current	Modern
electricity production, nuclear, pressure water reactor, heavy water moderated	CA-NB, CA-ON, GLO	Current	Modern
electricity production, nuclear, pressure water reactor, heavy water moderated	CA-QC	Old	Outdated
electricity production, photovoltaic, 3kWp slanted-roof installation, multi-Si, panel, mounted, label-certified	CH, GLO	Modern	Current
electricity production, photovoltaic, 3kWp slanted-roof installation, single-Si, panel, mounted, label-certified	CH, GLO	Modern	Current

Table 23. New or updated activities on electricity production. If an activity is present in several geographies (with the same time period) all of them are listed under "Geography". In column "v3.2", "N" stands for activities New to the database, while "U" stands for updated activities.

Activity name	Geography	Time period	v3.2
electricity production, deep geothermal	AT; CH; DE; GLO; HICC; ID; IS; IT; JP; MX; PT; RU; TH; TR; WECC, US only	2015 - 2015	N
electricity production, hard coal	ASCC; AT; AU; BE; BG; BR; CA-AB; CA-NB; CA-NS; CA-ON; CL; CZ; DE; ES; FI; FR; FRCC; GB; GLO; HICC; HR; IE; IN; IT; JP; KR; MRO, US only; MY; NL; NPCC, US only; PE; PT; RFC; SERC; SPP; TH; TR; TRE; TW; TZ; UA; WECC, US only; ZA	1980 - 2015	U
electricity production, hard coal	CA-PE; CA-QC; CN-AH; CN-BJ; CN-CQ; CN-FJ; CN-GD; CN-GS; CN-GX; CN-GZ; CN-HA; CN-HB; CN-HE; CN-HL; CN-HN; CN-HU; CN-JL; CN-JS; CN-JX; CN-LN; CN-NM; CN-NX; CN-QH; CN-SA; CN-SC; CN-SD; CN-SH; CN-SX; CN-TJ; CN-XJ; CN-XZ; CN-YN; CN-ZJ	1980 - 2015	N
electricity production, hard coal, at coal mine power plant	CN; GLO	1999 - 2015	U
electricity production, hydro, pumped storage	ASCC; AT; AU; BE; CA-AB; CA-BC; CA-MB; CA-NB; CA-NS; CA-NT; CA-ON; CA-SK; CA-YK; CH; CZ; DE; ES; FR; FRCC; GB; GLO; GR; HICC; HR; IE; IN; IT; JP; KR; LU; MRO, US only; NO; NPCC, US only; PL; PT; RFC; RS; SE; SERC; SK; SPP; TRE; WECC, US only; ZA	1945 - 2015	U
electricity production, hydro, pumped storage	BA; BG; CN-AH; CN-FJ; CN-GD; CN-HB; CN-HE; CN-HN; CN-HU; CN-JS; CN-LN; CN-SD; CN-SX; CN-ZJ; LT; RO; RU; SI; TW; UA	1945 - 2015	N
electricity production, hydro, reservoir, alpine region	ASCC; AT; BA; CA-AB; CA-BC; CA-NT; CA-YK; CH; FR; GLO; HR; IN; IT; JP; MK; MRO, US only; NO; NPCC, US only; PE; RFC; RS; SERC; WECC, US only	1945 - 2015	U
electricity production, hydro, reservoir, alpine region, label-certified	CH; GLO	1945 - 2015	U
electricity production, hydro, reservoir, non-alpine region	CA-MB; CA-NB; CA-NF; CA-NS; CA-ON; CA-QC; CA-SK; CZ; DE; ES; FI; FRCC; GLO; HICC; KR; PT; RU; SE; SK; SPP; TR; TRE; TZ; ZA	1945 - 2015	U
electricity production, hydro, reservoir, non-alpine region	CA-NT; IS	1945 - 2015	N
electricity production, hydro, reservoir, tropical region	BR; GLO; ID; MY; TH	1970 - 2015	U

Activity name	Geography	Time period	v3.2
electricity production, hydro, run-of-river	ASCC; AT; AU; BA; BE; BG; CA-AB; CA-BC; CA-MB; CA-NB; CA-NS; CA-NT; CA-ON; CA-QC; CA-SK; CA-YK; CH; CL; CZ; DE; DK; ES; FI; FR; FRCC; GB; GLO; GR; HICC; HR; HU; IE; IN; IR; IT; JP; KR; LU; MK; MRO, US only; MX; NL; NPCC, US only; PL; PT; RFC; RO; RS; RU; SE; SERC; SI; SK; SPP; TR; TRE; TW; UA; WECC, US only	1945 - 2015	U
electricity production, hydro, run-of-river	CA-NF; CN-AH; CN-BJ; CN-CQ; CN-FJ; CN-GD; CN-GS; CN-GX; CN-GZ; CN-HA; CN-HB; CN-HE; CN-HL; CN-HN; CN-HU; CN-JL; CN-JS; CN-JX; CN-LN; CN-NM; CN-NX; CN-QH; CN-SA; CN-SC; CN-SX; CN-TJ; CN-XJ; CN-XZ; CN-YN; CN-ZJ; EE; LT; LV	1945 - 2015	N
electricity production, hydro, run-of-river, label-certified	CH; GLO	1945 - 2015	U
electricity production, lignite	ASCC; CA-NS; ES; FRCC; HICC; IT; KR; MRO, US only; MX; NPCC, US only; RFC; SERC; SPP; TRE; WECC, US only	1980 - 2015	N
electricity production, lignite	AU; BA; BG; BR; CA-AB; CA-MB; CA-ON; CA-SK; CZ; DE; GLO; GR; HR; HU; ID; IN; MK; RO; RS; SI; TH; TR; TW	1980 - 2015	U
electricity production, natural gas, combined cycle power plant	ASCC; AT; BE; BR; CN-AH; CN-BJ; CN-CQ; CN-FJ; CN-GD; CN-GS; CN-GX; CN-GZ; CN-HA; CN-HB; CN-HE; CN-HL; CN-HN; CN-HU; CN-JL; CN-JS; CN-JX; CN-LN; CN-NM; CN-NX; CN-QH; CN-SA; CN-SC; CN-SD; CN-SH; CN-SX; CN-TJ; CN-XJ; CN-XZ; CN-YN; CN-ZJ; CZ; DE; ES; FI; FR; FRCC; GB; GR; HR; HU; IE; IT; JP; MRO, US only; NL; NO; NPCC, US only; PT; RFC; RU; SERC; SK; SPP; TRE; UA; WECC, US only	2000 - 2015	N
electricity production, natural gas, combined cycle power plant	AU; CA-AB; CA-BC; CA-MB; CA-NB; CA-NS; CA-NT; CA-ON; CA-SK; CL; GLO; ID; IN; IR; KR; MX; MY; PE; SA; TH; TR; TW	2000 - 2015	U
electricity production, natural gas, conventional power plant	ASCC; AT; AU; BE; BG; BR; CA-AB; CA-BC; CA-MB; CA-NB; CA-NF; CA-NS; CA-NT; CA-ON; CA-SK; CL; CN-AH; CN-BJ; CN-CQ; CN-FJ; CN-GD; CN-GS; CN-GX; CN-GZ; CN-HA; CN-HB; CN-HE;	1990 - 2015	N

Activity name	Geography	Time period	v3.2
	CN-HL; CN-HN; CN-HU; CN-JL; CN-JS; CN-JX; CN-LN; CN-NM; CN-NX; CN-QH; CN-SA; CN-SC; CN-SD; CN-SH; CN-SX; CN-TJ; CN-XJ; CN-XZ; CN-YN; CN-ZJ; CZ; DE; ES; FI; FR; FRCC; GB; GLO; GR; HR; HU; ID; IE; IN; IR; IT; JP; KR; MRO, US only; MX; MY; NL; NO; NPCC, US only; PE; PT; RFC; RO; RU; SA; SERC; SI; SK; SPP; TH; TR; TRE; TW; TZ; UA; WECC, US only		
electricity production, nuclear, boiling water reactor	CH; DE; ES; FI; FRCC; GLO; IN; JP; MRO, US only; MX; NPCC, US only; RFC; RU; SE; SERC; SPP; TRE; TW; WECC, US only	1990 - 2015	U
electricity production, nuclear, boiling water reactor	GB	1990 - 2015	N
electricity production, nuclear, pressure water reactor	BE; BG; BR; CH; CZ; DE; ES; FI; FR; FRCC; GB; GLO; HU; JP; KR; MRO, US only; NL; NPCC, US only; RFC; RU; SE; SERC; SI; SK; SPP; TRE; TW; UA; WECC, US only; ZA	1990 - 2015	U
electricity production, nuclear, pressure water reactor	CN-GD; CN-JS; CN-ZJ; IR	1990 - 2015	N
electricity production, nuclear, pressure water reactor	RO	2008 - 2008	U
electricity production, nuclear, pressure water reactor, heavy water moderated	CA-NB; CA-ON; CA-QC; GLO	2010 - 2015	U
electricity production, nuclear, pressure water reactor, heavy water moderated	CN-ZJ; IN; JP; KR; RO; RU	2010 - 2015	N
electricity production, oil	ASCC; AT; AU; BA; BE; BG; BR; CA-AB; CA-BC; CA-MB; CA-NB; CA-NF; CA-NS; CA-NT; CA-NU; CA-ON; CA-PE; CA-SK; CA-YK; CL; CZ; DE; DK; ES; FI; FR; FRCC; GB; GLO; GR; HICC; HR; HU; ID; IE; IN; IR; IT; JP; KR; MK; MRO, US only; MX; MY; NL; NO; NPCC, US only; PE; PT; RFC; RO; RU; SA; SE; SERC; SI; SK; SPP; TH; TR; TRE; TW; TZ; UA; WECC, US only; ZA	1980 - 2015	U
electricity production, oil	CA-QC; CN-AH; CN-BJ; CN-CQ; CN-FJ; CN-GD; CN-GS; CN-GX; CN-GZ; CN-HA; CN-HB; CN-HE; CN-HL; CN-HN; CN-HU; CN-JL; CN-JS; CN-JX; CN-LN; CN-NM; CN-NX; CN-QH; CN-SA; CN-SC; CN-SD; CN-SH; CN-SX; CN-TJ; CN-XJ; CN-XZ; CN-YN; CN-ZJ; CY; EE; IS; LT; LV; MT	1980 - 2015	N
electricity production, peat	EE	1980 - 2015	N

Activity name	Geography	Time period	v3.2
electricity production, peat	FI; GLO; IE; RU; SE	1980 - 2015	U
electricity production, photovoltaic, 3kWp facade installation, multi-Si, laminated, integrated	GLO	2008 - 2015	U
electricity production, photovoltaic, 3kWp facade installation, multi-Si, laminated, integrated	CH	2005 - 2005	U
electricity production, photovoltaic, 3kWp facade installation, multi-Si, panel, mounted	GLO	2008 - 2015	U
electricity production, photovoltaic, 3kWp facade installation, multi-Si, panel, mounted	CH	2005 - 2005	U
electricity production, photovoltaic, 3kWp facade installation, single-Si, laminated, integrated	GLO	2008 - 2015	U
electricity production, photovoltaic, 3kWp facade installation, single-Si, laminated, integrated	CH	2005 - 2005	U
electricity production, photovoltaic, 3kWp facade installation, single-Si, panel, mounted	GLO	2008 - 2015	U
electricity production, photovoltaic, 3kWp facade installation, single-Si, panel, mounted	CH	2005 - 2005	U
electricity production, photovoltaic, 3kWp flat-roof installation, multi-Si	GLO	2008 - 2015	U
electricity production, photovoltaic, 3kWp flat-roof installation, multi-Si	CH	2005 - 2005	U
electricity production, photovoltaic, 3kWp flat-roof installation, single-Si	GLO	2008 - 2015	U
electricity production, photovoltaic, 3kWp flat-roof installation, single-Si	CH	2005 - 2005	U
electricity production, photovoltaic, 3kWp slanted-roof installation, a-Si, laminated, integrated	GLO	2008 - 2015	U
electricity production, photovoltaic, 3kWp slanted-roof installation, a-Si, laminated, integrated	CH	2005 - 2005	U
electricity production, photovoltaic, 3kWp slanted-roof installation, a-Si, panel, mounted	GLO	2008 - 2015	U
electricity production, photovoltaic, 3kWp slanted-roof installation, a-Si, panel, mounted	CH	2005 - 2005	U
electricity production, photovoltaic, 3kWp slanted-roof installation, CdTe, laminated, integrated	GLO	2008 - 2015	U
electricity production, photovoltaic, 3kWp slanted-roof installation, CdTe, laminated, integrated	CH	2005 - 2005	U
electricity production, photovoltaic, 3kWp slanted-roof installation, CIS, panel, mounted	GLO	2008 - 2015	U
electricity production, photovoltaic, 3kWp slanted-roof installation, CIS, panel, mounted	CH	2005 - 2005	U
electricity production, photovoltaic, 3kWp slanted-roof installation, multi-Si, laminated, integrated	GLO	2008 - 2015	U
electricity production, photovoltaic, 3kWp slanted-roof installation, multi-Si, laminated, integrated	CH	2005 - 2005	U
electricity production, photovoltaic, 3kWp slanted-roof installation, multi-Si, panel, mounted	AT; AU; BE; CA-AB; CA-BC; CA-MB; CA-NB; CA-NS; CA-NT; CA-NU; CA-ON; CA-PE; CA-QC; CA-SK; CA-YK; CH; CZ; DE; DK; ES; FI; FR; FRCC; GB; GLO; GR; HICC; HU; IN; IT; JP; KR; LU; MX; MY; NL; NPCC, US only; PT; RFC; SE; SERC; SI; TH; TW; WECC, US only; ZA	2005 - 2015	U
electricity production, photovoltaic, 3kWp slanted-roof installation, multi-Si, panel, mounted	BG; CN-AH; CN-GD; CN-GS; CN-HA; CN-HU; CN-JS; CN-JX; CN-NM; CN-NX; CN-QH; CN-SA; CN-SD; CN-SH; CN-SX; CN-XJ; CN-XZ; CN-YN; CN-ZJ; CY; ID; LT; MT; PL; RO; SA; SK; TRE; TZ; UA	2005 - 2015	U
electricity production, photovoltaic, 3kWp slanted-roof installation, multi-Si, panel, mounted, label-certified	CH; GLO	2010 - 2015	U

Activity name	Geography	Time period	v3.2
electricity production, photovoltaic, 3kWp slanted-roof installation, ribbon-Si, laminated, integrated	GLO	2008 - 2015	U
electricity production, photovoltaic, 3kWp slanted-roof installation, ribbon-Si, laminated, integrated	CH	2005 - 2005	U
electricity production, photovoltaic, 3kWp slanted-roof installation, ribbon-Si, panel, mounted	GLO	2008 - 2015	U
electricity production, photovoltaic, 3kWp slanted-roof installation, ribbon-Si, panel, mounted	CH	2005 - 2005	U
electricity production, photovoltaic, 3kWp slanted-roof installation, single-Si, laminated, integrated	GLO	2008 - 2015	U
electricity production, photovoltaic, 3kWp slanted-roof installation, single-Si, laminated, integrated	CH	2005 - 2005	U
electricity production, photovoltaic, 3kWp slanted-roof installation, single-Si, panel, mounted	AT; AU; BE; CA-AB; CA-BC; CA-MB; CA-NB; CA-NS; CA-NT; CA-NU; CA-ON; CA-PE; CA-QC; CA-SK; CA-YK; CH; CZ; DE; DK; ES; FI; FR; FRCC; GB; GLO; GR; HICC; HU; IN; IT; JP; KR; LU; MX; MY; NL; NPCC, US only; PT; RFC; SE; SERC; SI; TH; TW; WECC, US only; ZA	2005 - 2015	U
electricity production, photovoltaic, 3kWp slanted-roof installation, single-Si, panel, mounted	BG; CN-AH; CN-FJ; CN-GD; CN-GS; CN-HA; CN-HU; CN-JS; CN-JX; CN-LN; CN-NM; CN-NX; CN-QH; CN-SA; CN-SD; CN-SH; CN-SX; CN-XJ; CN-XZ; CN-YN; CN-ZJ; CY; ID; LT; MT; PL; RO; SA; SK; TRE; TZ; UA	2005 - 2015	N
electricity production, photovoltaic, 3kWp slanted-roof installation, single-Si, panel, mounted, label-certified	CH; GLO	2010 - 2015	U
electricity production, photovoltaic, 570kWp open ground installation, multi-Si	AT; AU; CA-AB; CA-BC; CA-MB; CA-NB; CA-NS; CA-NT; CA-NU; CA-ON; CA-PE; CA-QC; CA-SK; CA-YK; DE; ES; FR; FRCC; GLO; HICC; IT; JP; KR; NL; NPCC, US only; PT; RFC; SERC; WECC, US only	2008 - 2015	U
electricity production, photovoltaic, 570kWp open ground installation, multi-Si	CN-GD; CN-GS; CN-HA; CN-JS; CN-NM; CN-NX; CN-QH; CN-SA; CN-SD; CN-XJ; CN-XZ; CN-YN; GB; MX	2008 - 2015	N
electricity production, wind, <1MW turbine, onshore	ASCC; AT; AU; BE; BG; BR; CA-AB; CA-MB; CA-NS; CA-ON; CA-PE; CA-SK; CA-YK; CH; CL; CZ; DE; DK; ES; FI; FR; GB; GLO; GR; HICC; HR; HU; IE; IN; IR; IT; JP; KR; LU; MRO, US only; MX; NL; NO; NPCC, US only; PE; PL; PT; RFC; RO; RU; SE; SERC; SK; SPP; TR; TRE; TW; UA; WECC, US only; ZA	2000 - 2015	U
electricity production, wind, <1MW turbine, onshore	CA-BC; CA-NB; CA-NF; CA-NT; CN-AH; CN-BJ; CN-CQ; CN-FJ; CN-GD; CN-GS; CN-GX; CN-GZ; CN-HA; CN-HB; CN-HE; CN-HL; CN-HN; CN-HU;	2000 - 2015	N

Activity name	Geography	Time period	v3.2
	CN-JL; CN-JS; CN-JX; CN-LN; CN-NM; CN-NX; CN-QH; CN-SA; CN-SC; CN-SD; CN-SH; CN-SX; CN-TJ; CN-XJ; CN-YN; CN-ZJ; CY; EE; ID; LT; LV		
electricity production, wind, <1MW turbine, onshore, label-certified	CH; GLO	2010 - 2015	U
electricity production, wind, >3MW turbine, onshore	ASCC; AT; AU; BE; BG; BR; CA-AB; CA-MB; CA- NS; CA-ON; CA-PE; CA- SK; CA-YK; CL; CZ; DE; DK; ES; FI; FR; GB; GLO; GR; HICC; HR; HU; IE; IN; IR; IT; JP; KR; LU; MRO, US only; MX; NL; NO; NPCC, US only; PE; PL; PT; RFC; RO; RU; SE; SERC; SK; SPP; TR; TRE; TW; UA; WECC, US only; ZA	2012 - 2012	U
electricity production, wind, >3MW turbine, onshore	CA-NB; CA-QC; CN-AH; CN-BJ; CN-CQ; CN-FJ; CN-GD; CN-GS; CN-GX; CN-GZ; CN-HA; CN-HB; CN-HE; CN-HL; CN-HN; CN-HU; CN-JL; CN-JS; CN-JX; CN-LN; CN-NM; CN-NX; CN-QH; CN-SA; CN-SC; CN-SD; CN-SH; CN-SX; CN-TJ; CN-XJ; CN-YN; CN-ZJ; EE; LT	2012 - 2012	N
electricity production, wind, 1-3MW turbine, offshore	BE; DE; DK; FI; GB; GLO; IE; JP; NL; NO; SE	2000 - 2015	U
electricity production, wind, 1-3MW turbine, offshore	CN-GD; CN-JS; CN-LN; CN-SD; CN-SH; ES; FR; KR; PT	2000 - 2015	N
electricity production, wind, 1-3MW turbine, onshore	ASCC; AT; AU; BE; BG; BR; CA-AB; CA-MB; CA- NS; CA-ON; CA-PE; CA- SK; CA-YK; CH; CL; CZ; DE; DK; ES; FI; FR; GB; GLO; GR; HICC; HR; HU; IE; IN; IR; IT; JP; KR; LU; MRO, US only; MX; NL; NO; NPCC, US only; PE; PL; PT; RFC; RO; RU; SE; SERC; SK; SPP; TR; TRE; TW; UA; WECC, US only; ZA	2005 - 2015	U
electricity production, wind, 1-3MW turbine, onshore	CA-BC; CA-NB; CA-NF; CA-NT; CN-AH; CN-BJ; CN-CQ; CN-FJ; CN-GD; CN-GS; CN-GX; CN-GZ; CN-HA; CN-HB; CN-HE; CN-HL; CN-HN; CN-HU; CN-JL; CN-JS; CN-JX; CN-LN; CN-NM; CN-NX; CN-QH; CN-SA; CN-SC; CN-SD; CN-SH; CN-SX; CN-TJ; CN-XJ; CN-YN; CN-ZJ; CY; EE; LT; LV	2005 - 2015	N
electricity production, wind, 1-3MW turbine, onshore, label-certified	CH; GLO	2010 - 2015	U
electricity production, wind, 2.3MW turbine, precast concrete tower, onshore	CA-QC; GLO	2010 - 2015	U
electricity voltage transformation from high to medium voltage	ASCC; AT; AU; BA; BE; BG; BR; CA-AB; CA-BC;	2012 - 2012	U

Activity name	Geography	Time period	v3.2
	CA-MB; CA-NB; CA-NF; CA-NS; CA-NT; CA-NU; CA-ON; CA-PE; CA-QC; CA-SK; CA-YK; CH; CL; CZ; DE; DK; ES; FI; FR; FRCC; GB; GLO; GR; HICC; HR; HU; ID; IE; IN; IR; IT; JP; KR; LU; MK; MRO, US only; MX; MY; NL; NO; NPCC, US only; PE; PL; PT; RFC; RO; RS; RU; SA; SE; SERC; SI; SK; SPP; TH; TR; TRE; TW; TZ; UA; WECC, US only; ZA		
electricity voltage transformation from high to medium voltage	CSG; CY; EE; IS; LT; LV; MT; SGCC	2012 - 2012	N
electricity voltage transformation from high to medium voltage, label-certified	CH; GLO	2011 - 2015	U
electricity voltage transformation from medium to low voltage	ASCC; AT; AU; BA; BE; BG; BR; CA-AB; CA-BC; CA-MB; CA-NB; CA-NF; CA-NS; CA-NT; CA-NU; CA-ON; CA-PE; CA-QC; CA-SK; CA-YK; CH; CL; CZ; DE; DK; ES; FI; FR; FRCC; GB; GLO; GR; HICC; HR; HU; ID; IE; IN; IR; IT; JP; KR; LU; MK; MRO, US only; MX; MY; NL; NO; NPCC, US only; PE; PL; PT; RFC; RO; RS; RU; SA; SE; SERC; SI; SK; SPP; TH; TR; TRE; TW; TZ; UA; WECC, US only; ZA	2012 - 2012	U
electricity voltage transformation from medium to low voltage	CSG; CY; EE; IS; LT; LV; MT; SGCC	2012 - 2012	N
electricity voltage transformation from medium to low voltage, label-certified	CH; GLO	2011 - 2015	U
electricity, from municipal waste incineration to generic market for electricity, medium voltage	GR; ID; IE; IN; IS; MY; RS; SI	2012 - 2015	N
electricity, from municipal waste incineration to generic market for electricity, medium voltage	AT; BE; BG; CA-AB; CA- NB; CA-NS; CA-ON; CA- PE; CH; CZ; DE; DK; ES; FI; FR; GB; GLO; HU; IT; JP; KR; LU; NL; NO; PL; PT; RU; SE; SK; TR; TW	2012 - 2015	U
electricity, high voltage, hydro, reservoir, import from France	CH	2010 - 2010	U
electricity, high voltage, hydro, run-of-river, import from France	CH	2010 - 2010	U
electricity, high voltage, import from AR	BR	2012 - 2012	U
electricity, high voltage, import from AT	CH; DE; HU; IT; SI	2012 - 2012	U
electricity, high voltage, import from AT	CZ	2012 - 2012	N
electricity, high voltage, import from AZ	TR	2012 - 2012	U
electricity, high voltage, import from BE	FR; LU; NL	2012 - 2012	U
electricity, high voltage, import from BG	GR; RO; RS	2012 - 2012	U
electricity, high voltage, import from BT	IN	2012 - 2012	U
electricity, high voltage, import from CA-AB	CA-BC; CA-SK; WECC, US only	2013 - 2013	U
electricity, high voltage, import from CA-BC	CA-AB; WECC, US only	2013 - 2013	U
electricity, high voltage, import from CA-MB	CA-ON; CA-SK; MRO, US only	2013 - 2013	U

Activity name	Geography	Time period	v3.2
electricity, high voltage, import from CA-NB	CA-NS; CA-PE; CA-QC; NPCC, US only	2013 - 2013	U
electricity, high voltage, import from CA-NF	CA-QC	2013 - 2013	N
electricity, high voltage, import from CA-NS	CA-NB; NPCC, US only	2013 - 2013	U
electricity, high voltage, import from CA-ON	CA-MB; CA-QC; NPCC, US only	2013 - 2013	U
electricity, high voltage, import from CA-PE	CA-NB	2013 - 2013	N
electricity, high voltage, import from CA-QC	CA-NB; CA-NF; CA-ON	2013 - 2013	N
electricity, high voltage, import from CA-SK	CA-AB; CA-MB; MRO, US only	2013 - 2013	U
electricity, high voltage, import from CH	AT; FR; IT	2012 - 2012	U
electricity, high voltage, import from CH	DE	2012 - 2012	N
electricity, high voltage, import from CZ	AT; DE; PL; SK	2012 - 2012	U
electricity, high voltage, import from DE	AT; DK; FR; LU; NL; PL; SE	2012 - 2012	U
electricity, high voltage, import from DE	CH	2011 - 2011	U
electricity, high voltage, import from DE	CZ	2012 - 2012	N
electricity, high voltage, import from DK	DE; NO; SE	2012 - 2012	U
electricity, high voltage, import from EE	FI	2012 - 2012	U
electricity, high voltage, import from EE	LT; LV	2012 - 2012	N
electricity, high voltage, import from ES	FR; PT	2012 - 2012	U
electricity, high voltage, import from FI	EE	2012 - 2012	N
electricity, high voltage, import from FI	NO; SE	2012 - 2012	U
electricity, high voltage, import from FR	BE; DE; ES; GB; IT	2012 - 2012	U
electricity, high voltage, import from FR	CH	2011 - 2011	U
electricity, high voltage, import from GB	FR	2012 - 2012	U
electricity, high voltage, import from GB	IE; NL	2012 - 2012	N
electricity, high voltage, import from GE	TR	2012 - 2012	U
electricity, high voltage, import from GR	BG	2012 - 2012	N
electricity, high voltage, import from GR	IT; MK; TR	2012 - 2012	U
electricity, high voltage, import from GT	MX	2012 - 2012	N
electricity, high voltage, import from HR	BA; SI	2012 - 2012	U
electricity, high voltage, import from HU	AT; HR; RS	2012 - 2012	U
electricity, high voltage, import from HU	RO; UA	2012 - 2012	N
electricity, high voltage, import from IE	GB	2012 - 2012	U
electricity, high voltage, import from IT	AT; CH; FR; GR; SI	2012 - 2012	U
electricity, high voltage, import from LA	TH	2012 - 2012	N
electricity, high voltage, import from LU	BE	2012 - 2012	U
electricity, high voltage, import from LU	DE	2012 - 2012	N
electricity, high voltage, import from MK	GR	2012 - 2012	U
electricity, high voltage, import from MRO, US only	CA-MB; CA-SK	2012 - 2012	U
electricity, high voltage, import from MY	ID	2012 - 2012	N
electricity, high voltage, import from MZ	TZ	2012 - 2012	N
electricity, high voltage, import from MZ	ZA	2012 - 2012	U

Activity name	Geography	Time period	v3.2
electricity, high voltage, import from NL	BE; DE; NO	2012 - 2012	U
electricity, high voltage, import from NL	GB	2012 - 2012	N
electricity, high voltage, import from NO	DK, FI; NL; SE	2012 - 2012	U
electricity, high voltage, import from NPCC, US only	CA-NB; CA-NS; CA-ON; CA-QC	2012 - 2012	U
electricity, high voltage, import from PL	CZ; DE; SE; SK	2012 - 2012	U
electricity, high voltage, import from PT	ES	2012 - 2012	U
electricity, high voltage, import from PY	BR	2012 - 2012	U
electricity, high voltage, import from RO	BG; HU; RS	2012 - 2012	U
electricity, high voltage, import from RS	BA; HR; MK	2012 - 2012	U
electricity, high voltage, import from RU	EE; LT; LV	2012 - 2012	N
electricity, high voltage, import from RU	FI; NO	2012 - 2012	U
electricity, high voltage, import from SE	DE	2012 - 2012	N
electricity, high voltage, import from SE	DK; FI; NO; PL	2012 - 2012	U
electricity, high voltage, import from SI	AT; HR; IT	2012 - 2012	U
electricity, high voltage, import from SK	CZ; HU; UA	2012 - 2012	N
electricity, high voltage, import from SK	PL	2012 - 2012	U
electricity, high voltage, import from TM	TR	2012 - 2012	U
electricity, high voltage, import from TR	BG; GR; IR	2012 - 2012	N
electricity, high voltage, import from TRE	MX	2012 - 2012	U
electricity, high voltage, import from UA	HU; PL; RO; RU	2012 - 2012	U
electricity, high voltage, import from UY	BR	2012 - 2012	U
electricity, high voltage, import from VE	BR	2012 - 2012	U
electricity, high voltage, import from WECC, US only	CA-AB; CA-BC	2012 - 2012	U
electricity, high voltage, natural gas, import from Germany	CH	2010 - 2010	U
electricity, high voltage, nuclear, import from France	CH	2010 - 2010	U
electricity, high voltage, wind power, import from Germany	CH	2010 - 2010	U

Auxiliary activities are reported separately. They have also been updated, and new activities added, introducing new products to the database. New products were created in this context, as can be also seen in Table 25: **“geothermal power plant”, “deep well, drilled, for geothermal power”, “stimulation, deep well”**.

Table 24. New or updated auxiliary activities. If an activity is present in several geographies (with the same time period) all of them are listed under “Geography”. In column “v3.2”, “N” stands for activities New to the database, while “U” stands for updated activities, and “N*” means that the product is also new

Activity name	Geography		
deep well drilling, for deep geothermal power	AT; CH; DE; GLO; HICC; ID; IS; IT; JP; MX; PT; RU; TH; TR; WECC	2015 - 2015	N*
drying, natural gas	NO	2000 - 2000	U
geothermal power plant construction	CH; GLO	2015 - 2015	N*
natural gas, high pressure, import from CA-AB	CA-QC	2010 - 2010	U
stimulation of deep well, for geothermal power	CH; GLO	2015 - 2015	N*
treatment of blast furnace gas, in power plant	AT; AU; BA; BE; BG; BR; CA-AB; CA-NB; CA-NS; CA-ON; CA-PE; CZ; DE; ES; FI; FR; GB; GLO; HR; HU; IR; IT; JP; KR; MX; NL; NO; PL; RO; RS; RU; SE; SK; TR; TW; UA	1980 - 2015	U
treatment of blast furnace gas, in power plant	CN-AH; CN-BJ; CN-CQ; CN-FJ; CN-GD; CN-GS; CN-GX; CN-GZ; CN-HA; CN-HB; CN-HE; CN-HL; CN-HN; CN-HU; CN-JL; CN-JS; CN-JX; CN-LN; CN-NM; CN-NX; CN-QH; CN-SA; CN-SC; CN-SD; CN-SH; CN-SX; CN-TJ; CN-XJ; CN-XZ; CN-YN; CN-ZJ; EE; IE	1980 - 2015	N
treatment of coal gas, in power plant	AT; BA; BE; BG; BR; CA-AB; CA-NB; CA-NS; CA-ON; CA-PE; CZ; DE; ES; FI; FR; GB; GLO; HR; HU; IN; IR; IT; JP; KR; MX; NL; PL; RO; RS; RU; SE; SK; TR; TW; UA	1990 - 2015	U

Markets have also been updated with regards to losses. The Chinese market has been subdivided into two more detailed ones: China Southern Power Grid (CSG) and State Grid Corporation of China (SGCC). New markets have been added, as they supply now new products introduced to the database.

Table 25. New or updated markets in the electricity sector. If an activity is present in several geographies (with the same time period) all of them are listed under "Geography". In column "v3.2", "N" stands for activities New to the database, while "U" stands for updated activities, and "N*" means that the product is also new.

Activity name	Geography	Time period	V3.2
market for deep well, drilled, for geothermal power	GLO	2015 - 2015	N*
market for electricity, high voltage	ASCC; AT; AU; BA; BE; BG; BR; CA-AB; CA-BC; CA-MB; CA-NB; CA-NF; CA-NS; CA-NT; CA-NU; CA-ON; CA-PE; CA-QC; CA-SK; CA-YK; CH; CL; CZ; DE; DK; ES; FI; FR; FRCC; GB; GLO; GR; HICC; HR; HU; ID; IE; IN; IR; IT; JP; KR; LU; MK; MRO, US only; MX; MY; NL; NO; NPCC, US only; PE; PL; PT; RFC; RO; RS; RU; SA; SE; SERC; SI; SK; SPP; TH; TR; TRE; TW; TZ; UA; WECC, US only; ZA	2012 - 2015	U
market for electricity, high voltage	CSG; CY; EE; IS; LT; LV; MT; SGCC	2012 - 2015	N
market for electricity, high voltage, for internal use in coal mining	GLO	2012 - 2015	U
market for electricity, high voltage, label-certified	CH; GLO	2011 - 2015	U
market for electricity, low voltage	ASCC; AT; AU; BA; BE; BG; BR; CA-AB; CA-BC; CA-MB; CA-NB; CA-NF; CA-NS; CA-NT; CA-NU; CA-ON; CA-PE; CA-QC; CA-SK; CA-YK; CH; CL; CZ; DE; DK; ES; FI; FR; FRCC; GB; GLO; GR; HICC; HR; HU; ID; IE; IN; IR; IT; JP; KR; LU; MK; MRO, US only; MX; MY; NL; NO; NPCC, US only; PE; PL; PT; RFC; RO; RS; RU; SA; SE; SERC; SI; SK; SPP; TH; TR; TRE; TW; TZ; UA; WECC, US only; ZA	2012 - 2015	U
market for electricity, low voltage	CSG; CY; EE; IS; LT; LV; MT; SGCC	2012 - 2015	N
market for electricity, low voltage, label-certified	CH; GLO	2011 - 2015	U
market for electricity, medium voltage	ASCC; AT; AU; BA; BE; BG; BR; CA-AB; CA-BC; CA-MB; CA-NB; CA-NF; CA-NS; CA-NT; CA-NU; CA-ON; CA-PE; CA-QC; CA-SK; CA-YK; CH; CL; CZ; DE; DK; ES; FI; FR; FRCC; GB; GLO; GR; HICC; HR; HU; ID; IE; IN; IR; IT; JP; KR; LU; MK; MRO, US only; MX; MY; NL; NO; NPCC, US only; PE; PL; PT; RFC; RO; RS; RU; SA; SE; SERC; SI; SK; SPP; TH; TR; TRE; TW; TZ; UA; WECC, US only; ZA	2012 - 2015	U
market for electricity, medium voltage	CSG; CY; EE; IS; LT; LV; MT; SGCC	2012 - 2015	N
market for electricity, medium voltage, label-certified	CH; GLO	2011 - 2015	U
market for geothermal power plant, 5.5MWel	GLO	2015 - 2015	N*
market for heat and power cogeneration unit, organic Rankine cycle, 1MWe, 6.4 MWth	GLO	2015 - 2015	N*
market for natural gas, high pressure	CA-AB; CA-QC; US	2010 - 2010	U
market for stimulation, deep well	GLO	2015 - 2015	N*

6.1.1 Electricity deleted activities

This big update has also resulted in the renaming, disaggregation or deletion of some activities. First, in the case of Chinese activities, each original activity located in China has been split in several copies, each representing one Chinese province.

Table 26. Activities located in CN in v3.1, and split or deleted for v3.2. Activities modeling imports were deleted when the import was not existing anymore in 2012.

Activity name	Change in v3.2
electricity production, hard coal	Split in provinces
electricity production, hydro, reservoir, non-alpine region	Replaced by "electricity production, hydro, run-of-river" on provinces
electricity production, hydro, run-of-river	Split in provinces
electricity production, nuclear, pressure water reactor	Split in provinces
electricity production, oil	Split in provinces
electricity production, photovoltaic, 3kWp slanted-roof installation, multi-Si, panel, mounted	Split in provinces
electricity production, photovoltaic, 3kWp slanted-roof installation, single-Si, panel, mounted	Split in provinces
electricity production, wind, <1MW turbine, onshore	Split in provinces
electricity production, wind, >3MW turbine, onshore	Split in provinces
electricity production, wind, 1-3MW turbine, offshore	Split in provinces
electricity production, wind, 1-3MW turbine, onshore	Split in provinces
electricity voltage transformation from high to medium voltage	Split in provinces
electricity voltage transformation from medium to low voltage	Split in provinces
electricity, high voltage, import from TW	Deleted import
market for electricity, high voltage	Split in provinces
market for electricity, low voltage	Split in provinces
market for electricity, medium voltage	Split in provinces
treatment of blast furnace gas, in power plant	Split in provinces
treatment of coal gas, in power plant	Split in provinces

Other activities are not anymore present in v3.2, they are listed in Table 27. There are several reasons for that, some activities were simply renamed, in other cases it was considered that there was a best fitting technology for the specific geographical area, and the activity was replaced. We have also simplified the electricity production, photovoltaic modelling (except for GLO and CH), this is reflected in the table as well.

Table 27. Activities that cannot be found anymore in the v3.2 of the database. Some activities were simply renamed, in other cases a best fitting technology for the specific geographical area is proposed. Activities modelling imports were deleted when the import was not existing anymore in 2012.

Activity name	Geography	Change in v3.2
electricity production, geothermal	all	Renamed "electricity production, deep geothermal".
electricity production, hard coal	BA; MX; RO	Changed coal classification in the IEA statistics for the categories hard coal and brown coal.
electricity production, hard coal	DK; NO; PL; RU; SE; SK	Introduction of datasets for electricity production in combined heat and power plants with hard coal.
electricity production, hard coal	HU; SI	Very low production volume with hard coal which is allocated to lignite.
electricity production, lignite	PL; RU; SK; UA	Changed coal classification in the IEA statistics for the categories hard coal and brown coal.
electricity production, natural gas, at conventional power plant	all	Renamed "electricity production, natural gas, conventional power plant"
electricity production, nuclear, pressure water reactor	IN	Better technology "electricity production, nuclear, boiling water reactor"
electricity production, oil	PL; RS	Introduction of datasets for electricity production in combined heat and power plants with oil heat and power co-generation, oil.
electricity production, photovoltaic, 3kWp facade installation, multi-Si, laminated, integrated	AU; IN; KR; MX; MY; TW; ZA	Simplification of the electricity production, photovoltaic modelling. Deleted activity
electricity production, photovoltaic, 3kWp facade installation, multi-Si, panel, mounted	AU; IN; KR; MX; MY; TW; ZA	Simplification of the electricity production, photovoltaic modelling. Deleted activity
electricity production, photovoltaic, 3kWp facade installation, single-Si, laminated, integrated	AU; IN; KR; MX; MY; TW; ZA	Simplification of the electricity production, photovoltaic modelling. Deleted activity
electricity production, photovoltaic, 3kWp facade installation, single-Si, panel, mounted	AU; IN; KR; MX; MY; TW; ZA	Simplification of the electricity production, photovoltaic modelling. Deleted activity
electricity production, photovoltaic, 3kWp flat-roof installation, multi-Si	AU; IN; KR; MX; MY; TW; ZA	Simplification of the electricity production, photovoltaic modelling. Deleted activity
electricity production, photovoltaic, 3kWp flat-roof installation, single-Si	AU; IN; KR; MX; MY; TW; ZA	Simplification of the electricity production, photovoltaic modelling. Deleted activity
electricity production, photovoltaic, 3kWp slanted-roof installation, a-Si, laminated, integrated	AU; IN; KR; MX; MY; TW; ZA	Simplification of the electricity production, photovoltaic modelling. Deleted activity
electricity production, photovoltaic, 3kWp slanted-roof installation, a-Si, panel, mounted	AU; IN; KR; MX; MY; TW; ZA	Simplification of the electricity production, photovoltaic modelling. Deleted activity
electricity production, photovoltaic, 3kWp slanted-roof installation, CdTe, laminated, integrated	AU; IN; KR; MX; MY; TW; ZA	Simplification of the electricity production, photovoltaic modelling. Deleted activity
electricity production, photovoltaic, 3kWp slanted-roof installation, CIS, panel, mounted	AU; IN; KR; MX; MY; TW; ZA	Simplification of the electricity production, photovoltaic modelling. Deleted activity
electricity production, photovoltaic, 3kWp slanted-roof installation, multi-Si, laminated, integrated	AU; IN; KR; MX; MY; TW; ZA	Simplification of the electricity production, photovoltaic modelling. Deleted activity
electricity production, photovoltaic, 3kWp slanted-roof installation, ribbon-Si, laminated, integrated	AU; IN; KR; MX; MY; TW; ZA	Simplification of the electricity production, photovoltaic modelling. Deleted activity
electricity production, photovoltaic, 3kWp slanted-roof installation, ribbon-Si, panel, mounted	AU; IN; KR; MX; MY; TW; ZA	Simplification of the electricity production, photovoltaic modelling. Deleted activity
electricity production, photovoltaic, 3kWp slanted-roof installation, single-Si, laminated, integrated	AU; IN; KR; MX; MY; TW; ZA	Simplification of the electricity production, photovoltaic modelling. Deleted activity
electricity production, wind, <1MW turbine, onshore	CA-QC	Better technology "electricity production, wind, 2.3MW turbine, precast concrete tower, onshore"
electricity production, wind, 1-3MW turbine, onshore	CA-QC	Better technology "electricity production, wind, 2.3MW turbine, precast concrete tower, onshore"
electricity, high voltage, hydro, reservoir, import from CA-NF	CA-QC	Deleted import
electricity, high voltage, import from AR	CL	Deleted import
electricity, high voltage, import from HR	HU	Deleted import
electricity, high voltage, import from HU	FI	Deleted import

Activity name	Geography	Change in v3.2
electricity, high voltage, import from MX	TRE	Deleted import
electricity, high voltage, import from Quebec	all	Deleted import
electricity, high voltage, import from RU	UA	Deleted import
electricity, high voltage, import from UA	SK	Deleted import
electricity, high voltage, import from unspecified	CZ	Deleted import

6.2 Heat production

Heat production has been reported separately from electricity production to facilitate the reading of the document divided by heat and electricity, but some of the activities actually describe co-generation of heat and electricity.

Table 28. New and updated activities on heat production. If an activity is present in several geographies (with the same time period) all of them are listed under "Geography". In column "v3.2", "N" stands for activities New to the database, while "U" stands for updated activities.

Activity name	Geography	Time period	V3.2
heat and power co-generation unit construction, 1MWel	CH; GLO	2015 - 2015	N
heat and power co-generation, biogas, gas engine	AT; AU; BE; CA-AB; CA-NB; CA-NS; CA-ON; CA-PE; CA-QC; CH; CZ; DE; DK; ES; FI; FR; GB; GLO; GR; HU; IE; IT; KR; LU; MX; NL; NO; PL; PT; SE; SI; SK; TH; TR	2007 - 2015	U
heat and power co-generation, biogas, gas engine	BR; EE; FRCC; HICC; HR; IN; IR; LT; LV; MRO, US only; MY; NPCC, US only; PE; RFC; RO; RS; SERC; SPP; TRE; TW; WECC, US only	2007 - 2015	N
heat and power co-generation, biogas, gas engine, label-certified	CH; GLO	2010 - 2015	U
heat and power co-generation, diesel, 200kW electrical, SCR-NOx reduction	CH	2000 - 2000	U
heat and power co-generation, hard coal	AT; CZ; DE; DK; FI; GLO; KR; NL; NO; PL; RU; SE; SK	1980 - 2015	N
heat and power co-generation, lignite	CZ; DE; GLO; GR; PL; RU; SI; SK	1980 - 2015	N
heat and power co-generation, natural gas, 200kW electrical, lean burn	CH	2000 - 2000	U
heat and power co-generation, natural gas, combined cycle power plant, 400MW electrical	ASCC; AT; BE; BG; BR; DE; DK; ES; FI; FRCC; GB; GR; HR; HU; IR; IT; LT; LU; LV; MK; MRO, US only; NL; NPCC, US only; PL; PT; RFC; RO; SA; SERC; SK; SPP; TRE; WECC, US only	2000 - 2015	N
heat and power co-generation, natural gas, combined cycle power plant, 400MW electrical	AU; GLO; KR; RU; TR	2000 - 2015	U
heat and power co-generation, natural gas, conventional power plant, 100MW electrical	ASCC; AT; BA; BE; BG; BR; CZ; DE; DK; EE; ES; FI; FR; FRCC; GB; GR; HR; HU; IE; IR; IT; LT; LU; LV; MK; MRO, US only; NL; NPCC, US only; PE; PL; PT; RFC; RO; RS; SA; SE; SERC; SI; SK; SPP; TRE; TW; WECC, US only	1990 - 2015	N
heat and power co-generation, natural gas, conventional power plant, 100MW electrical	AU; CA-AB; CA-BC; CA-MB; CA-NB; CA-NS; CA-NT; CA-ON; CA-QC; CA-SK; GLO; KR; RU; TR; UA	1990 - 2015	U
heat and power co-generation, oil	ASCC; AT; AU; BE; BG; BR; CZ; DE; DK; ES; FI; FR; FRCC; GB; GLO; GR; HICC; HR; IE; IT; KR; LT; LU; LV; MRO, US only;	1980 - 2015	N

Activity name	Geography	Time period	V3.2
	NL; NPCC, US only; PL; PT; RFC; RO; RS; RU; SE; SERC; SK; SPP; TR; TRE; TW; UA; WECC, US only		
heat and power co-generation, wood chips, 2000 kW	CH; GLO	2000 - 2015	U
heat and power co-generation, wood chips, 2000 kW, state-of-the-art 2014	CH; GLO	2012 - 2015	U
heat and power co-generation, wood chips, 6667 kW	BG; EE; HR; ID; LT; LV; MY; TZ; UA	2010 - 2015	N
heat and power co-generation, wood chips, 6667 kW	CH; CL; GLO; IN; MX; PE; RU; TH; TR; TW; ZA	2010 - 2015	U
heat and power co-generation, wood chips, 6667 kW, state-of-the-art 2014	ASCC; AT; AU; BE; BR; CA-AB; CA-BC; CA-NS; CA-ON; CA-PE; CA-QC; 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; RFC; RO; SE; SERC; SI; SK; SPP; TRE; WECC, US only	2010 - 2015	U
heat and power co-generation, wood chips, 6667 kW, state-of-the-art 2014	CY; MT	2010 - 2015	N
heat and power co-generation, wood chips, 6667 kW, state-of-the-art 2014, label-certified	CH; GLO	2010 - 2015	U
heat production, anthracite, at stove 5-15kW	Europe without Switzerland	1988 - 1992	U
heat production, at coal coke industrial furnace 1-10MW	GLO	1995 - 2015	U
heat production, at hard coal industrial furnace 1-10MW	Europe without Switzerland; GLO	1988 - 1992	U
heat production, hard coal briquette, stove 5-15kW	Europe without Switzerland	1988 - 1992	U
heat production, hard coal coke, stove 5-15kW	Europe without Switzerland	1988 - 1992	U
heat production, hardwood chips from forest, at furnace 1000kW	CH; GLO	2000 - 2014	U
heat production, hardwood chips from forest, at furnace 1000kW, state-of-the-art 2014	CH; GLO	2014 - 2014	U
heat production, hardwood chips from forest, at furnace 300kW	CH; GLO	2000 - 2014	U
heat production, hardwood chips from forest, at furnace 300kW, state-of-the-art 2014	CH; GLO	2014 - 2014	U
heat production, hardwood chips from forest, at furnace 5000kW	CH; GLO	2000 - 2014	U
heat production, hardwood chips from forest, at furnace 5000kW, state-of-the-art 2014	CH; GLO	2014 - 2014	U
heat production, hardwood chips from forest, at furnace 50kW	CH; GLO	2000 - 2014	U
heat production, hardwood chips from forest, at furnace 50kW, state-of-the-art 2014	CH	2014 - 2014	U
heat production, heavy fuel oil, at industrial furnace 1MW	Europe without Switzerland	2001 - 2001	U
heat production, heavy fuel oil, at industrial furnace 1MW	GLO	2000 - 2000	U
heat production, light fuel oil, at boiler 100kW condensing, non-modulating	CH; Europe without Switzerland	1991 - 2000	U
heat production, light fuel oil, at boiler 100kW, non-modulating	CH; Europe without Switzerland	1991 - 2000	U
heat production, light fuel oil, at boiler 10kW condensing, non-modulating	CH; Europe without Switzerland	1991 - 2000	U
heat production, light fuel oil, at boiler 10kW, non-modulating	CH; Europe without Switzerland	1991 - 2000	U
heat production, light fuel oil, at industrial furnace 1MW	Europe without Switzerland; GLO	1991 - 2000	U
heat production, softwood chips from forest, at furnace 1000kW	CH; GLO	2000 - 2014	U

Activity name	Geography	Time period	V3.2
heat production, softwood chips from forest, at furnace 1000kW, state-of-the-art 2014	CH; GLO	2014 - 2014	U
heat production, softwood chips from forest, at furnace 300kW	CH; GLO	2000 - 2014	U
heat production, softwood chips from forest, at furnace 300kW, state-of-the-art 2014	CH; GLO	2014 - 2014	U
heat production, softwood chips from forest, at furnace 5000kW	CH; GLO	2000 - 2014	U
heat production, softwood chips from forest, at furnace 5000kW, state-of-the-art 2014	CH; GLO	2014 - 2014	U
heat production, untreated waste wood, at furnace 1000-5000 kW	CH; GLO	2000 - 2014	U
heat production, untreated waste wood, at furnace 1000-5000 kW, state-of-the-art 2014	CH; GLO	2014 - 2014	U
heat production, wood chips from industry, at furnace 1000kW	CH; GLO	2000 - 2014	U
heat production, wood chips from industry, at furnace 1000kW, state-of-the-art 2014	CH; GLO	2014 - 2014	U
heat production, wood chips from industry, at furnace 300kW	CH; GLO	2000 - 2014	U
heat production, wood chips from industry, at furnace 300kW, state-of-the-art 2014	CH; GLO	2014 - 2014	U
heat production, wood chips from industry, at furnace 5000kW	CH; GLO	2000 - 2014	U
heat production, wood chips from industry, at furnace 5000kW, state-of-the-art 2014	CH; GLO	2014 - 2014	U
heat production, wood chips from post-consumer wood, at furnace 300kW	GLO	2000 - 2001	U
heat production, wood pellet, at furnace 300kW	GLO	2000 - 2014	U
heat production, wood pellet, at furnace 300kW, state-of-the-art 2014	CH	2014 - 2014	U
heat production, wood pellet, at furnace 9kW	Europe without Switzerland	2000 - 2001	U
heat production, wood pellet, at furnace 9kW, state-of-the-art 2014	Europe without Switzerland	2014 - 2014	U
heat, from municipal waste incineration to generic market for heat district or industrial, other than natural gas	BG	2008 - 2012	U
treatment of bagasse, from sweet sorghum, in heat and power co-generation unit, 6400kW thermal	GLO	2000 - 2001	U

7 Metals

7.1 Aluminium and aluminium products

The supply chain of aluminium has been enriched in data for this release of the ecoinvent database. A more detailed geographical scope in the electricity production part, new activities to cover European production, and some updates and corrections in existing activities are the main differences with v3.1. Also, some new activities and products concerning aluminium alloys and cables have been added to the database.

The geographical area **“UN-Europe”** has now been split into "IAI Area, EU27 & EFTA" and "IAI Area, Europe outside EU27 & EFTA", and is not present anymore in the database.

7.1.1 Electricity production

The electricity production for the aluminium industry has been updated together with the electricity production data (chapter 6.1).

Table 29. New or updated activities. If an activity is present in several geographies (with the same time period) all of them are listed under "Geography". In column "v3.2", "N" stands for activities new to the database, "U" stands for updated activities, and "D" for deleted activities.

Activity name	Geography	Time period	V3.2
electricity production, coal, aluminium industry	IAI Area, EU27 & EFTA; IAI Area, Europe outside EU & EFTA	2012 - 2012	N
electricity production, coal, aluminium industry	CN; GLO; IAI Area 1; IAI Area 2, without Quebec; IAI Area 4&5 without China; UN-OCEANIA	2012 - 2012	U
electricity production, hydro, aluminium industry	IAI Area, EU27 & EFTA; IAI Area, Europe outside EU & EFTA	2012 - 2012	N
electricity production, hydro, aluminium industry	CA-QC; CN; GLO; IAI Area 1; IAI Area 2, without Quebec; IAI Area 3; IAI Area 4&5 without China; UN-OCEANIA	2012 - 2012	U
electricity production, natural gas, aluminium industry	IAI Area, EU27 & EFTA	2012 - 2012	N
electricity production, natural gas, aluminium industry	GLO; IAI Area 2, without Quebec; IAI Area 3; IAI Area 8	2012 - 2012	U
electricity production, nuclear, aluminium industry	IAI Area, EU27 & EFTA	2012 - 2012	N
electricity production, nuclear, aluminium industry	CA-QC; GLO; IAI Area 2, without Quebec	2012 - 2012	U
electricity production, oil, aluminium industry	IAI Area, EU27 & EFTA	2012 - 2012	N
electricity production, oil, aluminium industry	GLO; IAI Area 8; UN-OCEANIA	2012 - 2012	U
electricity production, oil, aluminium industry	IAI Area 2, without Quebec	2012 - 2012	D
electricity voltage transformation from high to medium voltage, aluminium industry	IAI Area, EU27 & EFTA; IAI Area, Europe outside EU & EFTA	2012 - 2012	N
electricity voltage transformation from high to medium voltage, aluminium industry	CA-QC; CN; GLO; IAI Area 1; IAI Area 2, without Quebec; IAI Area 3; IAI Area 4&5 without China; IAI Area 8; UN-OCEANIA	2012 - 2012	U
market for electricity, high voltage, aluminium industry	CA-QC; CN; GLO; IAI Area 1; IAI Area 2, without Quebec; IAI Area 3; IAI Area 4&5 without China; IAI Area 8; UN-OCEANIA	2012 - 2015	U
market for electricity, high voltage, aluminium industry	IAI Area, EU27 & EFTA; IAI Area, Europe outside EU & EFTA	2012 - 2015	N
market for electricity, medium voltage, aluminium industry	CA-QC; CN; GLO; IAI Area 1; IAI Area 2, without Quebec; IAI Area 3; IAI Area 4&5 without China; IAI Area 8; UN-OCEANIA	2012 - 2015	U
market for electricity, medium voltage, aluminium industry	IAI Area, EU27 & EFTA; IAI Area, Europe outside EU & EFTA	2012 - 2015	N

7.1.2 Aluminium and aluminium products

As mentioned, the European coverage of primary aluminium production has been improved. This includes the addition of new activities, and the update of existing ones. Some other activities have also been updated or corrected. Updates (or corrections) include correction of amount exchanges, amendment of production volumes, redirection of direct links, or deletion of exchanges.

Table 30. New or modified producing activities in the aluminium sector. If several geographies of the same activity exists, all of them are listed in the "Geography" column. In the column v3.2, "U" stands for "Updated", "N" for "New", "U*" the update concerned only the production volumes of the products.

Activity name	Geography	Time period	V3.2
aluminium alloy production, ALi	CA-QC, GLO	2013 - 2013	N
aluminium alloy production, Metallic Matrix Composite	CA-QC, GLO	2013 - 2013	N
aluminium around steel bi-metal stranded cable production, 3x3.67mm external diameter wire	CA-QC, GLO	2012 - 2012	N
aluminium around steel bi-metal wire production, 3.67 mm external diameter	CA-QC, GLO	2012 - 2012	N
aluminium hydroxide production	GLO	2012 - 2012	U
aluminium ingot, primary, to aluminium, cast alloy market	GLO	2010 - 2010	U*
aluminium ingot, primary, to aluminium, wrought alloy market	GLO	2010 - 2010	U*
aluminium oxide production	GLO	2012 - 2012	U
aluminium production, primary, cast alloy slab from continuous casting	CA-QC, GLO	2012 - 2012	N
aluminium production, primary, ingot	IAI Area, EU27 & EFTA; IAI Area, Europe outside EU & EFTA	2012 - 2012	N
aluminium production, primary, ingot	CA-QC; CN; IAI Area 1; IAI Area 2, without Quebec; IAI Area 3; IAI Area 4&5 without China; IAI Area 8; UN-OCEANIA	2012 - 2012	U
aluminium production, primary, liquid, prebake	IAI Area, EU27 & EFTA; IAI Area, Europe outside EU & EFTA	2012 - 2012	N
aluminium production, primary, liquid, prebake	CA-QC; CN; IAI Area 1; IAI Area 2, without Quebec; IAI Area 3; IAI Area 4&5 without China; IAI Area 8; UN-OCEANIA	2012 - 2012	U
aluminium production, primary, liquid, Söderberg	IAI Area, EU27 & EFTA; IAI Area, Europe outside EU & EFTA	2012 - 2012	N
aluminium production, primary, liquid, Söderberg	CA-QC; GLO; IAI Area 2, without Quebec; IAI Area 3; IAI Area 4&5 without China	2012 - 2012	U
aluminium, ingot, primary, import from Africa	IAI Area, EU27 & EFTA	2012 - 2012	N
aluminium, ingot, primary, import from Asia (excluding China)	IAI Area, EU27 & EFTA	2012 - 2012	N
aluminium, ingot, primary, import from Middle East (Gulf cooperation Council)	IAI Area, EU27 & EFTA	2012 - 2012	N
aluminium, ingot, primary, import from North America_Canada	IAI Area, EU27 & EFTA	2012 - 2012	N
aluminium, ingot, primary, import from Oceania	IAI Area, EU27 & EFTA	2012 - 2012	N
aluminium, ingot, primary, import from Rest of Europe	IAI Area, EU27 & EFTA	2012 - 2012	N
aluminium, ingot, primary, import from South America	IAI Area, EU27 & EFTA	2012 - 2012	N
anode production, paste, for aluminium electrolysis	CA-QC	2012 - 2012	U
anode production, prebake, for aluminium electrolysis	CA-QC	2012 - 2012	U
bauxite mine operation	GLO	2010 - 2010	U
market for aluminium oxide	GLO	2011 - 2011	U
market for aluminium, primary, ingot	IAI Area, EU27 & EFTA	2010 - 2010	N
market for bauxite, without water	GLO	2011 - 2011	U
treatment of aluminium scrap, new, at refiner	GLO	2005 - 2005	U*
treatment of aluminium scrap, new, at remelter	GLO	2005 - 2005	U*

Activity name	Geography	Time period	V3.2
treatment of aluminium scrap, post-consumer, by collecting, sorting, cleaning, pressing	GLO, RER	2005 - 2005	U
treatment of aluminium scrap, post-consumer, prepared for recycling, at refiner	GLO, RER	2005 - 2005	U*
treatment of aluminium scrap, post-consumer, prepared for recycling, at remelter	GLO	2005 - 2005	U*

The restructuring of the European production has improved the geographical scope of the activities. That means that some existing activities in v3.1 have been replaced and deleted.

Table 31. Deleted activities from v3.1 and their replacement in v3.2.

Activity name	Geography	
	V3.1	V3.2
aluminium production, primary, ingot	UN-EUROPE	IAI Area, EU27 & EFTA
		IAI Area, Europe outside EU & EFTA
aluminium production, primary, liquid, Söderberg	UN-EUROPE	IAI Area, EU27 & EFTA
		IAI Area, Europe outside EU & EFTA
aluminium production, primary, liquid, prebake	UN-EUROPE	IAI Area, EU27 & EFTA
		IAI Area, Europe outside EU & EFTA

Finally, the inclusion of new activities has also generated new products. These products and their corresponding new markets are now included in the database.

Table 32. New products and their corresponding new markets added for v3.2. The geography of all markets is GLO.

Product name	Activity name	Time Period
aluminium alloy, ALi	market for aluminium alloy, ALi	2013 - 2013
aluminium alloy, metal matrix composite	market for aluminium alloy, metal matrix composite	2013 - 2013
aluminium around steel bi-metal stranded cable, 3x3.67mm external diameter wire	market for aluminium around steel bi-metal stranded cable, 3x3.67mm external diameter wire	2012 - 2012
aluminium around steel bi-metal wire, 3.67mm external diameter	market for aluminium around steel bi-metal wire, 3.67mm external diameter	2012 - 2012
aluminium, primary, cast alloy slab from continuous casting	market for aluminium, primary, cast alloy slab from continuous casting	2012 - 2012

7.2 Other metals and metal products

Some new activities concerning metal production are published with the v3.2 release of the ecoinvent database.

As mentioned in Table 5, “burnt shale” is now a non-MFT and allocatable product. For that, its market, and the activities where it is produced present in v3.1 have had to be modified. Otherwise, updates or corrections in this sector included correction of activity links, addition of flows, and update of production volumes.

Table 33. Other new or modified producing activities in the metal sector. If several geographies of the same activity exists, all of them are listed in the “Geography” column. In the column v3.2, “U” stands for “Updated”, “N” for “New”, “U*” the update concerned only the production volumes of the products. In the case of “iron pellet production” only an activity link was modified.

Activity name	Geography	Time period	V3.2
burnt shale production	DE, GLO	2010 - 2010	N
ground granulated blast furnace slag production	GLO, US	2001 - 2002	U
hard chromium coating, electroplating, steel substrate, 0.14 mm thickness	GLO	2014 - 2014	N
indium rich leaching residues, from zinc production stockpiling	US	2012 - 2012	U*
iron pellet production	CA-QC, GLO	2011 - 2011	U
market for burnt shale	GLO	2005 - 2009	U
market for ground granulated blast furnace slag	GLO	2012 - 2012	U
mining and beneficiation of nickel ore	CA-QC, GLO	2010 - 2010	N
primary zinc production from concentrate	CA-QC	2011 - 2012	N
primary zinc production from concentrate	GLO	1994 - 2003	U
rutile production, synthetic, 95% titanium dioxide, Becher process	GLO	2004 - 2004	N
smelting and refining of nickel ore	GLO	2010 - 2010	N
steel production, converter, chromium steel 18/8	GLO, RER	2001 - 2001	U*
steel production, converter, low-alloyed	GLO, RER	2001 - 2001	U*
steel production, converter, unalloyed	GLO, RER	2001 - 2001	U*
steel production, electric, chromium steel 18/8	GLO, RER	2001 - 2001	U*
steel production, electric, low-alloyed	GLO, RER	2001 - 2001	U*
strontium sulfate quarry operation	GLO	2012 - 2012	N
titanium production, primary	GLO	2004 - 2004	N
titanium production, primary, triple melt	GLO	2004 - 2004	N
titanium tetrachloride production	GLO	2004 - 2004	N
treatment of copper cake	GLO	2012 - 2012	N
treatment of electronics scrap, metals recovery in copper smelter	GLO, SE	2000 - 2005	U*
treatment of metal part of electronics scrap, in blister-copper, by electrolytic refining	GLO, SE	2000 - 2005	U*
treatment of precious metal from electronics scrap, in anode slime, precious metal extraction	GLO, SE	2000 - 2005	U*
treatment of scrap lead acid battery, remelting	GLO, RER	2000 - 2005	U*

Some of those activities produce products that are actually new to the database. They are detailed in the following table.

Table 34. New products and their new generated markets. All markets are GLO.

Product name	Activity name	Time Period
copper cake	market for copper cake	2012 - 2012
nickel ore, beneficiated, 16%	market for nickel ore, beneficiated, 16%	2010 - 2010
strontium sulfate, unprocessed	market for strontium sulfate, unprocessed	2012 - 2012
titanium primary, triple-melt	market for titanium primary, triple-melt	2004 - 2004
titanium tetrachloride	market for titanium tetrachloride	2004 - 2004
titanium, primary	market for titanium, primary	2004 - 2004
hard chromium coat, electroplating, steel substrate, 0.14 mm thickness	market for hard chromium coat, electroplating, steel substrate, 0.14 mm thickness	2014 - 2014

8 Transport

The update of transport between ecoinvent version 3.1 and version 3.2 includes error corrections and modelling changes in both passenger and freight transport. In addition to the traditional modes of transport, the transport of goods in need of atmosphere control (refrigeration) model has been created and submitted in the form of more than a hundred datasets. It is now possible to accurately model the transport of goods in need of cooling throughout the whole supply chain.

8.1 New datasets: transport of goods in need of atmosphere control (refrigeration)

The transport of good in need of atmosphere control (refrigeration) has been missing so far in the ecoinvent database. A new model has been developed and its result is presented to the users of the database through more than a hundred datasets.

Within this update four main groups of datasets have been created;

- 1) Intermodal shipping containers and their operation
- 2) Infrastructure for transport of cargo in need of atmosphere control and their operation
- 3) Transport of goods (mainly food) including the new infrastructure and its operation
- 4) Update markets of goods in need of atmosphere control

The datasets are created using the new features offered by the ecoSpold2 format, such as mathematical formulas, variable names and parameters. While all the parameters have default values which are used during the linking the users of the database can easily change the parameters and thus adjust the dataset to fit the needs of their foreground modelling.

Figure 2 represents simplified scheme of the relationships between the individual activities related.

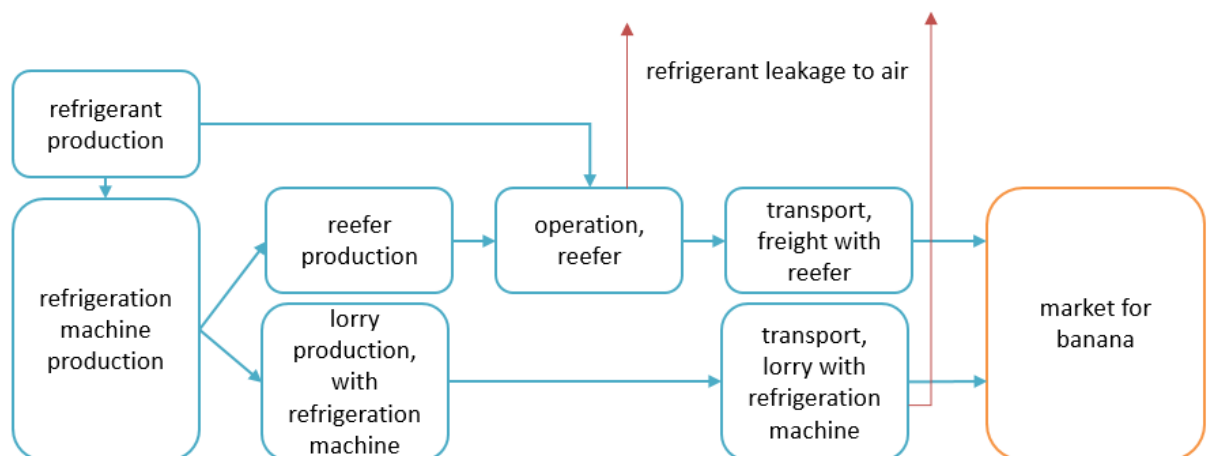


Figure 2. Scheme representing the relationship of the newly created datasets; transport of goods in need of atmosphere control

8.1.1 Transport with reefer with refrigeration machine

The datasets related to intermodal shipping container are usually at least four. One represents the production of the container, one the maintenance, one the treatment of the used container and one the operation (see Figure 3). Each product has its own market.

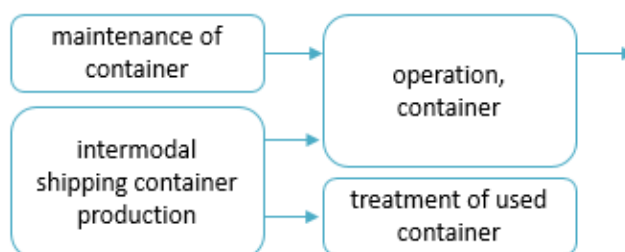


Figure 3 Scheme of datasets related to intermodal shipping container production

Table 35. Transport, intermodal shipping containers - new datasets created. All the datasets have been created as global (GLO) and unless stated otherwise have current technology level and time period of 2010 - 2015.

Activity name	size	3.2
intermodal shipping container production, <i>size</i>	20-, 40-, 40 HC-, 45 HC-foot	N
maintenance, intermodal shipping container, <i>size</i>	20-, 40-, 40 HC-, 45 HC-foot	N
treatment of used intermodal shipping container, <i>size</i>	20-, 40-, 40 HC-, 45 HC-foot	N
operation, intermodal shipping container, <i>size</i>	20-, 40-, 40 HC-, 45 HC-foot	N
market for intermodal shipping container, <i>size</i>	20-, 40-, 40 HC-, 45 HC-foot	N
market for maintenance, intermodal shipping container, <i>size</i>	20-, 40-, 40 HC-, 45 HC-foot	N
market for used intermodal shipping container, <i>size</i>	20-, 40-, 40 HC-, 45 HC-foot	N
market for operation, intermodal shipping container		N

Table 36. Transport of goods in need of atmosphere control, infrastructure, reefer - new datasets created. All the datasets have been created as global (GLO) and unless stated otherwise and have time period of 2010 – 2015.

Activity name	Technology level	refrigerant	mode	3.2
refrigeration machine production, carbon dioxide, liquid as refrigerant	modern			N
refrigeration machine production, R134a as refrigerant	current			N
maintenance, refrigeration machine	current			N
treatment of used refrigeration machine, carbon dioxide, liquid as refrigerant	modern			N
treatment of used refrigeration machine, R134a as refrigerant	current			N
market for refrigeration machine, <i>refrigerant</i> as refrigerant	-	carbon dioxide, liquid, R134a		N
market for used refrigeration machine, <i>refrigerant</i> as refrigerant	-			N
market for maintenance, refrigeration machine	-			N
diesel-electric generating set production 18.5kW	current			N
diesel, burned in diesel-electric generating set, 18.5kW	current			N
treatment of used diesel-electric generating set, 18.5kW	current			N
market for diesel-electric generating set, 18.5kW	-			N
market for diesel, burned in diesel-electric generating set, 18.5kW	-			N
market for used diesel-electric generating set, 18.5kW	-			N
reefer production, intermodal shipping container, 40-foot, high-cube, carbon dioxide, liquid as refrigerant	modern			N
reefer production, intermodal shipping container, 40-foot, high-cube, R134a as refrigerant	current			N
maintenance, reefer, intermodal shipping container, 40-foot, high-cube	current			N
treatment of used reefer, intermodal shipping container, 40-foot, high-cube	current			N
operation, reefer, <i>mode</i> , 40-foot, high-cube, carbon dioxide, liquid as refrigerant	modern		cooling, freezing	N
operation, reefer, <i>mode</i> , 40-foot, high-cube, R134a as refrigerant	current		cooling, freezing	N
market for reefer, intermodal shipping container, 40-foot, high-cube, carbon dioxide, liquid as refrigerant				N
market for reefer, intermodal shipping container, 40-foot, high-cube, R134a as refrigerant				N
market for maintenance, reefer, intermodal shipping container, 40-foot, high-cube				N
market for operation, reefer, <i>mode</i>			cooling, freezing	N
market for used reefer, intermodal shipping container, 40-foot, high-cube				N
treatment of used refrigerant R134a, venting	current			N
treatment of used refrigerant R134a, final disposal	current			N
treatment of used refrigerant R134a, reclamation	modern			N
market for used refrigerant R134a	-			N

Table 37. Transport of goods in need of atmosphere control, transport with reefer - new datasets created. All the datasets have been created as global (GLO) and unless stated otherwise and have time period of 2010 – 2015.

Activity name	type	mode	3.2
transport, freight, <i>type</i> with reefer, <i>mode</i>	aircraft, inland waterways, barge, lorry, sea, transoceanic ship, train	cooling, freezing	N
market for transport, freight, <i>type</i> with reefer, <i>mode</i>	aircraft, inland waterways, barge, lorry, sea, transoceanic ship, train	cooling, freezing	N

8.1.2 Transport with lorry with refrigeration machine

The transport of goods in need of atmosphere control in the lorries is modelled using four different EURO types of lorries, two different refrigerants, two lorry sizes and two modes of operation. See Table 38 for more details. The combination of all these types result in 32 datasets.

Table 38. Type of transport, freight, lorry with refrigeration machine. The combination of the different factors listed in the table generates 32 different datasets.

Lorry type - emissions	Lorry size	Refrigerant used	Mode of operation
EURO3	3.5-7.5	CO2, liquid	cooling
EURO4	7.5-16	R134a	freezing
EURO5			
EURO6			

Table 39. Technology level of the transport with lorries of different EURO classes and using different refrigerant

Activity name	Refrigerant	
	R134a	carbon dioxide, liquid
transport, freight, lorry with refrigeration machine, EURO3	old	current
transport, freight, lorry with refrigeration machine, EURO4	current	modern
transport, freight, lorry with refrigeration machine, EURO5	modern	new
transport, freight, lorry with refrigeration machine, EURO6	new	new

Table 40. Transport of goods in need of atmosphere control, infrastructure, lorry - new datasets created. All the datasets have been created as global (GLO) and unless stated otherwise and have time period of 2010 – 2015.

Activity name	Technology level	refrigerant	mode	3.2
lorry production, with refrigeration machine, carbon dioxide, liquid as refrigerant, 16 metric ton	Modern			N
lorry production, with refrigeration machine, R134a as refrigerant, 16 metric ton	Current			N
market for transport, freight, lorry with refrigeration machine, <i>mode</i>	-		cooling, freezing	N
market for lorry with refrigeration machine, <i>refrigerant</i> as refrigerant, 16 metric ton	-	R134a, carbon dioxide, liquid		N

Table 41. Transport of goods in need of atmosphere control, transport with the infrastructure, lorry - new datasets created.
All the datasets have been created as global (GLO) and unless stated otherwise and have time period of 2010 – 2015.

Activity name	Technology level	size	mode	3.2
transport, freight, lorry with refrigeration machine, <i>size</i> ton, EURO3, carbon dioxide, liquid refrigerant, <i>mode</i>	Current	3.5-7.5, 7.5-16	cooling, freezing	N
transport, freight, lorry with refrigeration machine, <i>size</i> ton, EURO3, R134a refrigerant, <i>mode</i>	Old	3.5-7.5, 7.5-16	cooling, freezing	N
transport, freight, lorry with refrigeration machine, <i>size</i> ton, EURO4, carbon dioxide, liquid refrigerant, cooling	Modern	3.5-7.5, 7.5-16	cooling, freezing	N
transport, freight, lorry with refrigeration machine, <i>size</i> ton, EURO4, R134a refrigerant, <i>mode</i>	Current	3.5-7.5, 7.5-16	cooling, freezing	N
transport, freight, lorry with refrigeration machine, <i>size</i> ton, EURO5, carbon dioxide, liquid refrigerant, <i>mode</i>	New	3.5-7.5, 7.5-16	cooling, freezing	N
transport, freight, lorry with refrigeration machine, <i>size</i> ton, EURO5, R134a refrigerant, <i>mode</i>	Modern	3.5-7.5, 7.5-16	cooling, freezing	N
transport, freight, lorry with refrigeration machine, <i>size</i> ton, EURO6, carbon dioxide, liquid refrigerant, <i>mode</i>	New	3.5-7.5, 7.5-16	cooling, freezing	N
transport, freight, lorry with refrigeration machine, <i>size</i> ton, EURO6, R134a refrigerant, <i>mode</i>	New	3.5-7.5, 7.5-16	cooling, freezing	N
market for transport, freight, lorry with refrigeration machine, <i>size</i> ton, EURO3, carbon dioxide, liquid refrigerant, <i>mode</i>	-	3.5-7.5, 7.5-16	cooling, freezing	N
market for transport, freight, lorry with refrigeration machine, <i>size</i> ton, EURO3, R134a refrigerant, <i>mode</i>	-	3.5-7.5, 7.5-16	cooling, freezing	N
market for transport, freight, lorry with refrigeration machine, <i>size</i> ton, EURO4, carbon dioxide, liquid refrigerant, cooling	-	3.5-7.5, 7.5-16	cooling, freezing	N
market for transport, freight, lorry with refrigeration machine, <i>size</i> ton, EURO4, R134a refrigerant, <i>mode</i>	-	3.5-7.5, 7.5-16	cooling, freezing	N
market for transport, freight, lorry with refrigeration machine, <i>size</i> ton, EURO5, carbon dioxide, liquid refrigerant, <i>mode</i>	-	3.5-7.5, 7.5-16	cooling, freezing	N
market for transport, freight, lorry with refrigeration machine, <i>size</i> ton, EURO5, R134a refrigerant, <i>mode</i>	-	3.5-7.5, 7.5-16	cooling, freezing	N
market for transport, freight, lorry with refrigeration machine, <i>size</i> ton, EURO6, carbon dioxide, liquid refrigerant, <i>mode</i>	-	3.5-7.5, 7.5-16	cooling, freezing	N
market for transport, freight, lorry with refrigeration machine, <i>size</i> ton, EURO6, R134a refrigerant, <i>mode</i>	-	3.5-7.5, 7.5-16	cooling, freezing	N

8.1.3 Generic market

The product names of the transport are very specific. While some users and data providers know exactly what type of transport should be used in their activities (which EURO class, size of the vehicle and type of refrigerant use), some need only the generic transport, freight, lorry with refrigeration machine, cooling or freezing. For this reason several linking activities which transfer part of the production volume of the very specific types of transport into the generic market for transport, freight, lorry with refrigeration machine.

The scheme below outlines an example of a linking activity.

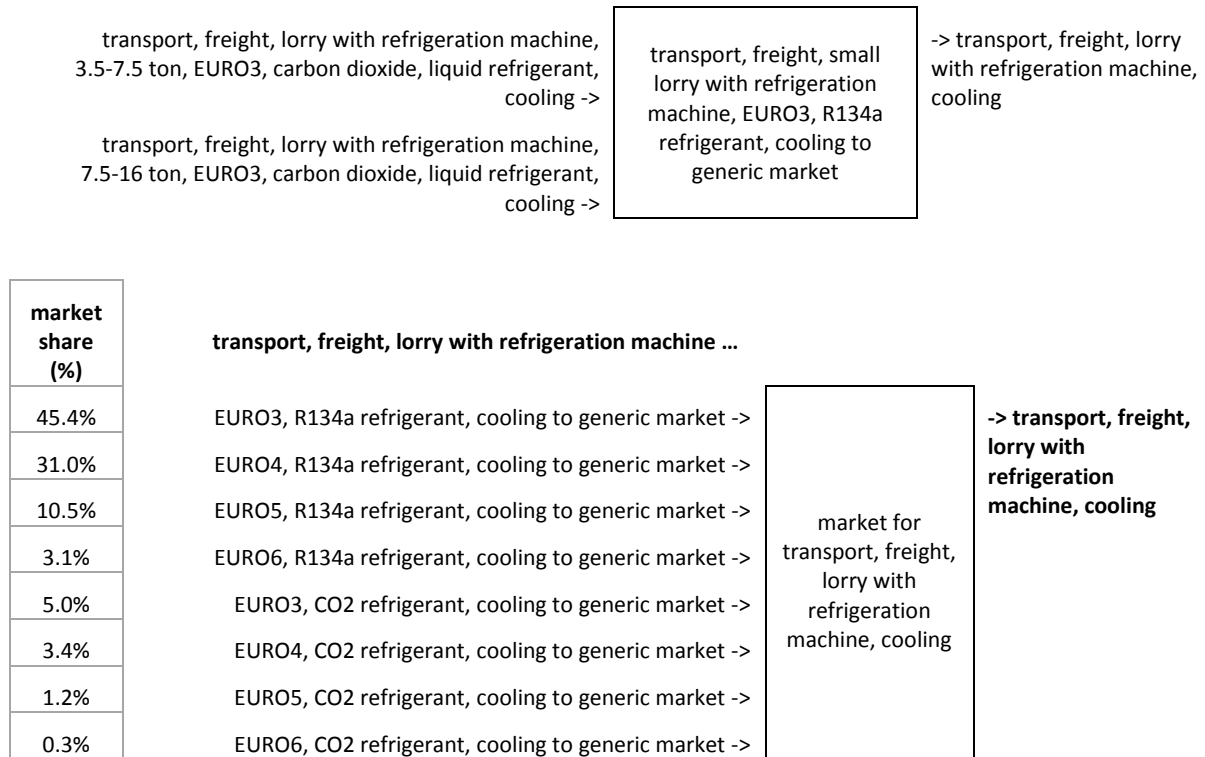


Figure 4. Scheme of market for transport, freight, lorry with refrigeration machine, cooling. System model: ecoinvent, default

Table 42. Transport of goods in need of atmosphere control, transport with the infrastructure, generic market - new datasets created. All the datasets have been created as global (GLO) and unless stated otherwise and have time period of 2010 – 2015.

Activity name	Technology level	<i>mode</i>	3.2
transport, freight, small lorry with refrigeration machine, EURO3, CO2 refrigerant, <i>mode</i> to generic market	Current	cooling, freezing	N
transport, freight, small lorry with refrigeration machine, EURO3, R134a refrigerant, <i>mode</i> to generic market	Old	cooling, freezing	N
transport, freight, small lorry with refrigeration machine, EURO4, CO2 refrigerant, <i>mode</i> to generic market	Modern	cooling, freezing	N
transport, freight, small lorry with refrigeration machine, EURO4, R134a refrigerant, <i>mode</i> to generic market	Current	cooling, freezing	N
transport, freight, small lorry with refrigeration machine, EURO5, CO2 refrigerant, <i>mode</i> to generic market	New	cooling, freezing	N
transport, freight, small lorry with refrigeration machine, EURO5, R134a refrigerant, <i>mode</i> to generic market	Modern	cooling, freezing	N
transport, freight, small lorry with refrigeration machine, EURO6, CO2 refrigerant, <i>mode</i> to generic market	New	cooling, freezing	N
transport, freight, small lorry with refrigeration machine, EURO6, R134a refrigerant, <i>mode</i> to generic market	New	cooling, freezing	N

More documentation can be found directly in the datasets and in the sectorial report (Lévová, T., 2015, Freight transport with intermodal shipping containers and transport of goods in need of atmosphere control, ecoinvent database version 3.2, ecoinvent Centre, Zürich, Switzerland).

The refrigerated transport has already been applied in the fruits and vegetable markets, when appropriated. Table 43 lists markets that have been edited so to contain refrigerated transport. At the same time, losses have been introduced to those markets, to model spoilage and wastage during transport and distribution. This is represented by an additional input of product (self-linked to the market), and by a corresponding output of biowaste.

Refrigerated air transportation was also considered and added to the market activities for select fruit and vegetable products: papaya, pineapple, strawberry, green asparagus and white asparagus. Because of the significant impact of air transportation, it was only included for products for which literature was available¹. Those markets are listed in a distinct column in Table 43.

¹ CBI Product Factsheet: Fresh Papayas in the European Market, CBI, 2015 & "ASPARAGUS FAX REPORT" USDA, 2006

Table 43. Market datasets for products requiring transport, freight with reefer that have been updated for v3.2. All markets were GLO, and all resulting products are expressed in kg. The name of the product is always reflected in the name of the market.

Updated markets	
<i>Refrigerated transport, but no air transport</i>	<i>Refrigerated transport, including air transport</i>
market for banana	market for green asparagus
market for kiwi	market for white asparagus
market for apple	market for pineapple
market for aubergine	market for papaya
market for avocado	market for strawberry
market for broccoli	
market for cauliflower	
market for cabbage red	
market for cabbage white	
market for carrot	
market for celery	
market for citrus	
market for cucumber	
market for fennel	
market for grape	
market for green bell pepper	
market for iceberg lettuce	
market for lettuce	
market for melon	
market for onion	
market for paris market carrot	
market for pear	
market for potato	
market for radish	
market for spinach	
market for tomato	
market for vine tomato	
market for zucchini	

8.2 Corrections: transport, freight

8.2.1 Production volumes

Production volumes have been adjusted for all EURO classes in all road freight transport datasets **“transport, freight, lorry 16-32 metric ton, [...]”**; **“transport, freight, lorry 3.5-7.5 metric ton,[...]”**; **“transport, freight, lorry 7.5-16 metric ton, [...]”**; **“transport, freight, lorry >32 metric ton, [...]”**.

8.2.2 Freight, lorry>32 metric ton

The freight, lorry >32 metric ton represents an average of transport with 24-40 and 40-60 ton lorries. According to the available statistics, the average payload of those two classes are 15.6 tons and 22.8 tons, respectively.

In v3.1, the average payload of the >32 ton class was calculated as the simple average of the two classes, yielding to an average payload of 19.2 tons. However, a closer look to the statistics revealed that 95% of the transportation occurs in the 24-40 ton class. A more representative payload would then be a weighted average of the average payloads, giving 95% of the weight to the 24-40 ton class and 5% to the 40-60 ton class. The new payload, **15.96 ton**, was deemed more representative.

Changing the average payload affects the quantity of fuel and emissions per km of transport of all transport, freight, lorry >32 metric ton activities listed in Table 44.

Table 44. Transport freight >32 metric ton activities affected by the correction in the payload. If an activity is present in several geographies (with the same time period), all of them are listed under “Geography”.

Activity name	Geography	Time period
transport, freight, lorry >32 metric ton, EURO3	GLO, RER	2009 - 2013
transport, freight, lorry >32 metric ton, EURO4	GLO, RER	2009 - 2013
transport, freight, lorry >32 metric ton, EURO5	GLO, RER	2009 - 2013
transport, freight, lorry >32 metric ton, EURO6	GLO, RER	2009 - 2013

8.2.3 Transport, freight, lorry, unspecified

The activities averaging the different transport sizes, in order to construct the market for the unspecified transport by freight lorry have been restructured. Until v3.1, “size-specific lorry transport to generic market for lorry transport” was the only activity supplying the product **“transport, freight, lorry, unspecified”** to the “market for transport, freight, lorry, unspecified”. In that activity, only transport by EURO3 lorry was accounted.

Because this unspecified transport is used in the default transport model, modelling it correctly is key. We have now for v3.2 constructed activities that average sizes and supply the product “transport, freight, lorry, unspecified” to the “market for transport, freight, lorry, unspecified”, for each EURO class. The activities are named differently, so “size-specific lorry transport to generic market for lorry transport” cannot be found anymore in the database; look Table 45 for proper naming in v3.2.

Table 45. Averaging activities that substitute the v3.1 “size-specific lorry transport to generic market for lorry transport” activity.

Activity name	Geography	Time period	Product name
transport, freight, lorry, all sizes, EURO3 to generic market for transport, freight, lorry, unspecified	GLO, RER	2010 - 2015	transport, freight, lorry, unspecified
transport, freight, lorry, all sizes, EURO4 to generic market for transport, freight, lorry, unspecified	GLO, RER	2010 - 2015	transport, freight, lorry, unspecified
transport, freight, lorry, all sizes, EURO5 to generic market for transport, freight, lorry, unspecified	GLO, RER	2010 - 2015	transport, freight, lorry, unspecified
transport, freight, lorry, all sizes, EURO6 to generic market for transport, freight, lorry, unspecified	GLO, RER	2010 - 2015	transport, freight, lorry, unspecified

8.3 Transport, passenger car

8.3.1 Correction of NOx and PM emissions

The datasets on transport, passenger car, diesel are partially updated. The data on nitrogen oxides and particulates emissions are updated based on the latest literature data (The Handbook of Emission Factors for Road Transport version 3.2 (HEBFA, 2014) (<http://www.hbefa.net/e/index.html>)).

Table 46. The activities listed in this table are affected by the change in the NOx and PM emissions. If an activity is present in several geographies (with the same time period), all of them are listed under “Geography”.

Activity name	Geography	Time period
transport, passenger car, large size, diesel, EURO 3	GLO, RER	2012 - 2012
transport, passenger car, large size, diesel, EURO 4	GLO, RER	2012 - 2012
transport, passenger car, large size, diesel, EURO 5	GLO, RER	2012 - 2012
transport, passenger car, medium size, diesel, EURO 3	GLO, RER	2012 - 2012
transport, passenger car, medium size, diesel, EURO 4	GLO, RER	2012 - 2012
transport, passenger car, medium size, diesel, EURO 5	GLO, RER	2012 - 2012
transport, passenger car, small size, diesel, EURO 3	GLO, RER	2012 - 2012
transport, passenger car, small size, diesel, EURO 4	GLO, RER	2012 - 2012
transport, passenger car, small size, diesel, EURO 5	GLO, RER	2012 - 2012

8.3.2 New activities

A new activity modelling the transport, passenger car, medium size, using liquefied petroleum gas (LPG) has been added to the database for the v3.2, adding as well a new product (and its corresponding market).

Table 47. New activities and new product in the passenger transport for v3.2. Both activities are GLO, and have a time period 2012 – 2012.

Activity name	Product name	Unit
transport, passenger car, medium size, liquefied petroleum gas (LPG), EURO 5	transport, passenger car, medium size, liquefied petroleum gas, EURO 5	km
market for transport, passenger car, medium size, liquefied petroleum gas, EURO 5	transport, passenger car, medium size, liquefied petroleum gas, EURO 5	km

9 Waste treatments

9.1 Municipal incineration

A new technology (municipal incineration with fly ash extraction) has been introduced in the database (Table 48), and coexists with the “conventional” municipal incineration. Data for this new technology is so far present only in Switzerland, so the Global copy has been given the same production volumes that the Swiss one. In practical terms, that means that in all system models a Rest-of-the-World activity will not be available for “fly ash extraction” but only for “conventional” municipal incineration.

Table 48. New activities concerning municipal incineration. This activity has been reported to happen only in CH. GLO activity exists in the Undefined copy of the database. The RoW activity will not be generated in the different system models.

Activity name	Geography	Time period
market for municipal solid waste	CH	2011 - 2011
treatment of aluminium in car shredder residue, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of biowaste, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of coating from waste cathode ray tube display, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of copper in car shredder residue, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of digester sludge, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of hard coal ash, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of lead in car shredder residue, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of lignite ash, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of liquid crystal display, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of municipal solid waste, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of raw sewage sludge, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of residue from mechanical treatment, cathode ray tube display, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of residue from mechanical treatment, desktop computer, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of residue from mechanical treatment, industrial device, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of residue from mechanical treatment, IT accessory, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of residue from mechanical treatment, laptop computer, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of residue from mechanical treatment, laser printer, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of residue from mechanical treatment, liquid crystal display, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of residue from shredder fraction from manual dismantling, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of scrap aluminium, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of scrap copper, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012

Activity name	Geography	Time period
treatment of scrap steel, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of scrap tin sheet, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of spent anion exchange resin from potable water production, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of spent cation exchange resin from potable water production, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of steel in car shredder residue, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of waste bitumen sheet, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of waste building wood, chrome preserved, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of waste cement-fibre slab, dismantled, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of waste emulsion paint, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of waste expanded polystyrene, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of waste glass, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of waste graphical paper, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of waste newspaper, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of waste packaging paper, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of waste paint, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of waste paperboard, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of waste plastic, consumer electronics, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of waste plastic, industrial electronics, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of waste plastic, mixture, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of waste polyethylene terephthalate, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of waste polyethylene, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of waste polypropylene, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of waste polystyrene, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of waste polyurethane, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of waste polyvinylchloride, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of waste polyvinylfluoride, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of waste rubber, unspecified, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of waste sealing sheet, polyethylene, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of waste sealing sheet, polyvinylchloride, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of waste textile, soiled, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of waste vapour barrier, flame-retarded, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of waste wire plastic, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of waste wood pole, chrome preserved, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012

Activity name	Geography	Time period
treatment of waste wood, untreated, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of wood ash mixture, pure, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012
treatment of zinc in car shredder residue, municipal incineration with fly ash extraction	CH, GLO	2006 - 2012

The introduction of this new technology has resulted in some changes to the database. First, the “conventional” municipal incineration activities in Switzerland have been given a production volume of 0, in order to maintain them in the database to maximize user’s flexibility (chapter 2.6). Their level of technology has been set to “Outdated”.

Table 49. Activities with a production volume of 0. In the case of the CH activities, the level of technology has been set to “outdated”

Activity name		
treatment of aluminium in car shredder residue, municipal incineration	CH	1994 - 2000
treatment of coating from waste cathode ray tube display, municipal waste incineration	CH	1994 - 2000
treatment of copper in car shredder residue, municipal incineration	CH	1994 - 2000
treatment of hard coal ash, municipal incineration	CH	1994 - 2000
treatment of lead in car shredder residue, municipal incineration	CH	1994 - 2000
treatment of lignite ash, municipal incineration	CH	1994 - 2000
treatment of liquid crystal display, municipal waste incineration	CH	1994 - 2000
treatment of municipal solid waste, incineration	CA-AB, CA-NB, CA-NS, CA-ON, CA-PE, CA-QC, CH	2006 - 2012
treatment of raw sewage sludge, municipal incineration	CH	1994 - 2000
treatment of residue from mechanical treatment, cathode ray tube display, municipal waste incineration	CH	1994 - 2000
treatment of residue from mechanical treatment, desktop computer, municipal waste incineration	CH	1994 - 2000
treatment of residue from mechanical treatment, industrial device, municipal waste incineration	CH	1994 - 2000
treatment of residue from mechanical treatment, IT accessory, municipal waste incineration	CH	1994 - 2000
treatment of residue from mechanical treatment, laptop computer, municipal waste incineration	CH	1994 - 2000
treatment of residue from mechanical treatment, laser printer, municipal waste incineration	CH	1994 - 2000
treatment of residue from mechanical treatment, liquid crystal display, municipal waste incineration	CH	1994 - 2000
treatment of residue from shredder fraction from manual dismantling, municipal waste incineration	CH	1994 - 2000
treatment of scrap aluminium, municipal incineration	CH	1994 - 2000
treatment of scrap copper, municipal incineration	CH	1994 - 2000

Activity name		
treatment of scrap steel, municipal incineration	CH	1994 - 2000
treatment of scrap tin sheet, municipal incineration	CH	1994 - 2000
treatment of spent anion exchange resin from potable water production, municipal incineration	CH	1994 - 2000
treatment of spent cation exchange resin from potable water production, municipal incineration	CH	1994 - 2000
treatment of steel in car shredder residue, municipal incineration	CH	1994 - 2000
treatment of waste bitumen sheet, municipal incineration	CH	1994 - 2000
treatment of waste building wood, chrome preserved, municipal incineration	CH	1994 - 2000
treatment of waste cement-fibre slab, municipal incineration	CH	1994 - 2000
treatment of waste emulsion paint, municipal incineration	CH	1994 - 2000
treatment of waste expanded polystyrene, municipal incineration	CH	1994 - 2000
treatment of waste glass, municipal incineration	CH	1994 - 2000
treatment of waste graphical paper, municipal incineration	CH	1994 - 2000
treatment of waste newspaper, municipal incineration	CH	1994 - 2000
treatment of waste packaging paper, municipal incineration	CH	1994 - 2000
treatment of waste paint, municipal incineration	CH	1994 - 2000
treatment of waste paint, municipal incineration	CH	1994 - 2000
treatment of waste paperboard, municipal incineration	CH	1994 - 2000
treatment of waste plastic, consumer electronics, municipal incineration	CH	1994 - 2000
treatment of waste plastic, industrial electronics, municipal incineration	CH	1994 - 2000
treatment of waste plastic, mixture, municipal incineration	CH	1994 - 2000
treatment of waste polyethylene terephthalate, municipal incineration	CH	1994 - 2000
treatment of waste polyethylene, municipal incineration	CH	1994 - 2000
treatment of waste polypropylene, municipal incineration	CH	1994 - 2000
treatment of waste polystyrene, municipal incineration	CH	1994 - 2000
treatment of waste polyurethane, municipal incineration	CH	1994 - 2000
treatment of waste polyvinylchloride, municipal incineration	CH	1994 - 2000
treatment of waste polyvinylfluoride, municipal incineration	CH	1994 - 2000
treatment of waste rubber, unspecified, municipal incineration	CH	1994 - 2000
treatment of waste sealing sheet, polyethylene, municipal incineration	CH	1994 - 2000
treatment of waste sealing sheet, polyvinylchloride, municipal incineration	CH	1994 - 2000
treatment of waste textile, soiled, municipal incineration	CH	1994 - 2000
treatment of waste vapour barrier, flame-retarded, municipal incineration	CH	1994 - 2000
treatment of waste wire plastic, municipal incineration	CH	1994 - 2000
treatment of waste wood pole, chrome preserved, municipal incineration	CH	1994 - 2000

Activity name		
treatment of waste wood, untreated, municipal incineration	CH	1994 - 2000
treatment of wood ash mixture, pure, municipal incineration	CH	1994 - 2000
treatment of zinc in car shredder residue, municipal incineration	CH	1994 - 2000

Second, all Swiss activities that had direct links to municipal incineration activities have had those changed to municipal incineration with fly ash extraction, as this has been considered the technology in use in Switzerland.

In the general rearrangement of the waste management sector, many production volumes have been adjusted, either to better reflect the share of different technologies, or to correct placeholder values, or to ensure the correct relationship between by-product and reference product production volumes.

Table 50. Updated datasets affected by the waste treatment reorganization. Wastewater of board has also been corrected (exchange amounts). If an activity is present in several geographies (with the same time period), all of them are listed under "Geography".

Activity name	Geography	Time period
treatment of hard coal ash, residual material landfill	AT, BE, CZ, DE, ES, FR, GLO, HR, IT, NL, PL, PT, SK	1994 - 2000
collection of polystyrene scrap, post-consumer	CH	2009 - 2009
glass wool mat production	CH	1993 - 2000
treatment of hard coal ash, sanitary landfill	CH, GLO	1994 - 2000
treatment of inert waste, inert material landfill	CH, GLO	1995 - 1995
treatment of inert waste, sanitary landfill	CH, GLO	1994 - 2000
treatment of lignite ash, opencast refill	AT, BA, CZ, DE, ES, FR, GLO, GR, HU, MK, PL, SI, SK	1996 - 2000
treatment of lignite ash, sanitary landfill	CH, GLO	1994 - 2000
treatment of municipal solid waste, incineration	BG	2006 - 2012
treatment of scrap steel, inert material landfill	CH, GLO	1995 - 1995
treatment of sludge from pulp and paper production, sanitary landfill	CH, GLO	1994 - 2000
treatment of sludge, pig iron production, residual material landfill	CH, GLO	1994 - 2000
treatment of spent solvent mixture, hazardous waste incineration	CH, GLO	1997 - 2000
treatment of used door, inner, glass-wood, collection for final disposal	CH	2005 - 2005
treatment of used door, inner, wood, collection for final disposal	CH	2005 - 2005

Activity name	Geography	Time period
treatment of used door, outer, wood-aluminium, collection for final disposal	CH	2005 - 2005
treatment of used door, outer, wood-glass, collection for final disposal	CH	2005 - 2005
treatment of used tyre	GLO	2005 - 2012
treatment of used window frame, plastic, collection for final disposal	CH	1996 - 2004
treatment of used window frame, wood, collection for final disposal	CH	1996 - 2004
treatment of used window frame, wood-metal, collection for final disposal	CH	1996 - 2004
treatment of waste asphalt, sanitary landfill	CH	1994 - 2000
treatment of waste emulsion paint on wood, collection for final disposal	CH	1994 - 2002
treatment of waste emulsion paint, hazardous waste incineration	CH, GLO	1997 - 2000
treatment of waste emulsion paint, inert material landfill	GLO	1995 - 1995
treatment of waste emulsion paint, sanitary landfill	GLO	1994 - 2000
treatment of waste fibreboard, collection for final disposal	CH	1994 - 2002
treatment of waste glass pane in burnable frame, collection for final disposal	CH	1994 - 2002
treatment of waste graphical paper, sanitary landfill	CH	1994 - 2000
treatment of waste mineral oil, hazardous waste incineration	CH, GLO	1997 - 2000
treatment of waste paint on wood, collection for final disposal	CH	1994 - 2002
treatment of waste paint, hazardous waste incineration	CH, GLO	1997 - 2000
treatment of waste paint, inert material landfill	GLO	1995 - 1995
treatment of waste paint, municipal incineration	GLO	2006 - 2012
treatment of waste paint, sanitary landfill	GLO	1994 - 2000
treatment of waste paper, unsorted, sorting	CH, Europe without Switzerland, GLO	1993 - 2007
treatment of waste paperboard, inert material landfill	GLO	1995 - 1995
treatment of waste paperboard, sanitary landfill	GLO	1994 - 2000
treatment of waste plastic, mixture, sanitary landfill	CH	1994 - 2000
treatment of waste polyurethane foam, collection for final disposal	CH	1994 - 2002
treatment of waste wood, untreated, sanitary landfill	GLO	1994 - 2000
treatment of wastewater from soft fibreboard production, capacity 5E9l/year	CH	2007 - 2008
treatment of used flexible duct, aluminium/PET, DN of 125	CH	2000 - 2000
treatment of used sealing tape, aluminium/PE, 50 mm wide	CH	2000 - 2000
treatment of waste glass from unsorted public collection, sorting	GLO, RER	1994 - 1998
treatment of waste glass pane in burnable frame, sorting plant	CH	1994 - 2002
treatment of waste paperboard, sorting plant	CH, GLO	1994 - 2002

Activity name	Geography	Time period
treatment of waste plaster-cardboard sandwich, sorting plant	CH	1994 - 2002
treatment of waste x-ray film	GLO	2011 - 2015
market for brake wear emissions, lorry	GLO	2009 - 2013
market for brake wear emissions, passenger car	GLO	2012 - 2012
market for tyre wear emissions, lorry	GLO	2009 - 2013
market for tyre wear emissions, passenger car	GLO	2012 - 2012
treatment of wastewater, average, capacity 1E9l/year	GLO	1994 - 2000
treatment of wastewater from medium density fibreboard production, capacity 5E9l/year	GLO, RER	2012 - 2012
treatment of wastewater from PV cell production, capacity 5E9l/year	CH	1994 - 2000
treatment of wastewater from anaerobic digestion of whey, capacity 1E9l/year	CH	1994 - 2000
treatment of wastewater from black chrome coating, capacity 1.1E10l/year	CH	1994 - 2000
treatment of wastewater from cathode ray tube production, capacity 1.1E10l/year	CH	1994 - 2000
treatment of wastewater from ceramic production, capacity 5E9l/year	CH	1994 - 2000
treatment of wastewater from concrete production, capacity 5E9l/year	CH	1994 - 2000
treatment of wastewater from glass production, capacity 1.1E10l/year	CH	1994 - 2000
treatment of wastewater from grass refinery, capacity 5E9l/year	CH	1994 - 2000
treatment of wastewater from liquid crystal display backlight production, capacity 1.1E10l/year	CH	1994 - 2000
treatment of wastewater from liquid crystal display production, capacity 1.1E10l/year	CH	1994 - 2000
treatment of wastewater from liquid crystal production, capacity 1.1E10l/year	CH	1994 - 2000
treatment of wastewater from lorry production, capacity 4.7E10l/year	CH	1994 - 2000
treatment of wastewater from maize starch production, capacity 1.1E10l/year	CH	1994 - 2000
treatment of wastewater from pig iron production, capacity 5E9l/year	CH	1994 - 2000
treatment of wastewater from plywood production, capacity 5E9l/year	CH	1994 - 2000
treatment of wastewater from potato starch production, capacity 1.1E10l/year	CH	1994 - 2000
treatment of wastewater from tube collector production, capacity 1.1E10l/year	CH	1994 - 2000
treatment of wastewater from wafer fabrication, capacity 1.1E10l/year	CH	1994 - 2000
treatment of wastewater from soft fibreboard production, capacity 5E9l/year	CH	2007 - 2008
treatment of wastewater, average, capacity 1.1E10l/year	CH	1994 - 2000
treatment of wastewater, average, capacity 1.6E8l/year	CH	1994 - 2000
treatment of wastewater, average, capacity 1E9l/year	CH	1994 - 2000
treatment of wastewater, average, capacity 4.7E10l/year	CH	1994 - 2000
treatment of wastewater, average, capacity 5E9l/year	CH	1994 - 2000
treatment of wastewater, from residence, capacity 1.1E10l/year	CH	1994 - 2000

Activity name	Geography	Time period
treatment of wastewater, unpolluted, capacity 5E9l/year	CH	1994 - 2000
treatment of wastewater, unpolluted, from residence, capacity 1.1E10l/year	CH	1994 - 2000

10 Wood and paper

The restructuring of the wood sector is finalised with this release of the database, which also introduced some new data.

10.1 Forestry and logging

Regional European markets have been created for all products issued from the forestry activities. This allows a more regionally accurate supply to the downstream consumers: sawmill activities; board, heat, and paper production activities.

Table 51. New market activities in the forestry domain of the wood sector. If an activity is present in several geographies all of them are listed under "Geography". "*": Geography change, was RER in v3.1. Transport was adjusted in the European copies, when existing in v3.1.

Activity name	Geography
market for cleft timber, measured as dry mass	CH, Europe without Switzerland
market for pulpwood, hardwood, measured as solid wood under bark	CH, Europe without Switzerland
market for pulpwood, softwood, measured as solid wood under bark	CH, Europe without Switzerland
market for sawlog and veneer log, hardwood, measured as solid wood under bark	CH, Europe without Switzerland*
market for sawlog and veneer log, softwood, measured as solid wood under bark	CH, Europe without Switzerland*
market for wood chips, wet, measured as dry mass	CH, Europe without Switzerland*

Found mistakes have been corrected for this versions, this includes the addition of direct links, the update of production volumes, or the correction of some exchange amounts. The geography of the activity "cork forestry, RER" has been corrected to Portugal (PT), in order to better correlate with the origin of the data.

Table 52. Updated data for v3.2 in the forestry sector. If an activity is present in several geographies all of them are listed under "Geography". "*": Geography change, was RER in v3.1.

Activity name	Geography	Time period
cork forestry	GLO, PT*	1996 - 2003
hardwood forestry, beech, sustainable forest management	DE, GLO	2010 - 2012
hardwood forestry, birch, sustainable forest management	GLO, SE	2010 - 2012
hardwood forestry, mixed species, sustainable forest management	CH, GLO	2010 - 2012
hardwood forestry, oak, sustainable forest management	DE, GLO	2010 - 2012
softwood forestry, mixed species, boreal forest	CA-QC, GLO	2006 - 2012
softwood forestry, mixed species, sustainable forest management	CH, GLO	2010 - 2012
softwood forestry, pine, sustainable forest management	DE, GLO, SE	2010 - 2012
softwood forestry, spruce, sustainable forest management	DE, GLO, SE	2010 - 2012

10.2 Sawmilling and planing of wood

10.2.1 Sawmilling

The main changes in the sector have occurred in the modelling of the sawmilling process.

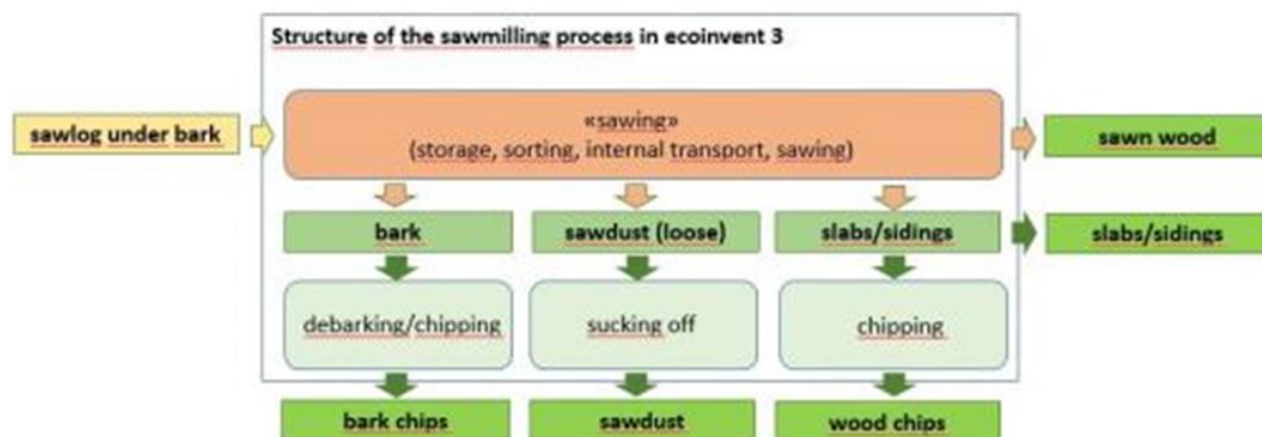


Figure 5. Structure of the sawmilling process in ecoinvent v3.2.

First, it has been considered that the debarking happens together with the sawing, so the debarking activities **“debarking, hardwood”** and **“debarking, softwood”** (CH and GLO) have been deleted, as the stand-alone process they represented is no longer relevant.

Similarly, the reference product of the “sawing” activities has been renamed from “sawnwood, [...]wood, raw, debarked” to “sawnwood, [...]wood, raw”. The concerned markets as well.

Table 53. Renamed sawing activities and products.

Name in v3.1	Name in v3.2
market for sawnwood, (hard or soft)wood, raw, debarked	market for sawnwood, (hard or soft)wood, raw
sawnwood, (hard or soft)wood, raw, debarked	sawnwood, (hard or soft)wood, raw

The sawmill operation is modelled by using several interlinked activities. The main activity is “sawing (hard or soft)wood”, that produces “sawnwood, softwood, raw”, “saw dust, loose, wet, measured as dry mass”, “bark”, “slab and siding, softwood, wet, measured as dry mass”.

The products **“saw dust, loose, wet, measured as dry mass”** and **“bark”** are new intermediate products (MFT or wastes depending on the system model) that have been added to the sawing process, instead of saw dust or bark chips.

They are treated by suction and chipping to generate the existing sawdust and bark chips, so the electricity consumption and machine use in those activities are modelled in distinct processes, and so imputable to distinct products. That means that electricity consumption is now distributed differently between the resulting products, in which affects the impacts of sawnwood.

The sawmill chain is maintained using Activity links, to model that all processes do occur in the same place and there is no transport in between. This generates a Swiss sawmill process and a CA-QC one. The GLO sawmill process is modelled the same way.

Table 54. Activities in the sawmilling domain in v3.2. When several geographies with the same time period are mentioned, all of them are listed in the "Geography" column. In column "v3.2": "R": Recontextualization; "N": New to v3.2; "U": Updated activity from v3.1.

Activity name	Geography	Time period	V3.2
bark chips production, hardwood, at sawmill	CA-QC	2011 - 2012	R
bark chips production, hardwood, at sawmill	CH	2011 - 2013	N
bark chips production, hardwood, at sawmill	GLO	2011 - 2012	N
bark chips production, softwood, at sawmill	CA-QC	2011 - 2012	R
bark chips production, softwood, at sawmill	CH	2011 - 2013	N
bark chips production, softwood, at sawmill	GLO	2011 - 2012	N
market for bark	GLO	2011 - 2012	N
market for saw dust, loose, wet, measured as dry mass	GLO	2012 - 2012	N
sawing, hardwood	CA-QC	2011 - 2013	R
sawing, hardwood	CH, GLO	2011 - 2013	U
sawing, softwood	CA-QC	2011 - 2013	R
sawing, softwood	CH, GLO	2011 - 2013	U
sawmill construction	CH	2012 - 2013	N
sawmill construction	Europe without Switzerland, GLO	2002 - 2002	U*
suction, sawdust	CA-QC	2012 - 2012	R
suction, sawdust	CH, GLO	2012 - 2012	N
wood chips production, hardwood, at sawmill	CA-QC	2011 - 2013	R
wood chips production, hardwood, at sawmill	CH, GLO	2011 - 2013	U
wood chips production, softwood, at sawmill	CA-QC	2011 - 2013	R
wood chips production, softwood, at sawmill	CH, GLO	2011 - 2013	U

10.2.2 Drying and planing

Drying and planing activities were also updated for this release. First, the products and activities were renamed. Then, the existing activities were updated, and a new kiln drying activity was introduced (drying to $u = 20\%$).

The details of the renaming can be looked at in the following tables. The drying and planing activities include now the moisture content of the wood after drying, as with the introduction of the new kiln drying activities, both technologies (air and kiln drying) can supply the wood dried to $u=20\%$.

Table 55. Renamed drying and planing products.

Product name in v3.1	Product name in v3.2
sawnwood, beam, (hard or soft)wood, air dried, planed	sawnwood, beam, (hard or soft)wood, dried ($u=20\%$), planed
sawnwood, beam, (hard or soft)wood, kiln dried, planed	sawnwood, beam, (hard or soft)wood, dried ($u=10\%$), planed
sawnwood, beam, (hard or soft)wood, raw, air dried	sawnwood, beam, (hard or soft)wood, raw, dried ($u=20\%$)
sawnwood, beam, (hard or soft)wood, raw, kiln dried	sawnwood, beam, (hard or soft)wood, raw, dried ($u=10\%$)
sawnwood, board, (hard or soft)wood, air dried, planed	sawnwood, board, (hard or soft)wood, dried ($u=20\%$), planed
sawnwood, board, (hard or soft)wood, kiln dried, planed	sawnwood, board, (hard or soft)wood, dried ($u=10\%$), planed
sawnwood, board, (hard or soft)wood, raw, air dried	sawnwood, board, (hard or soft)wood, raw, dried ($u=20\%$)
sawnwood, board, (hard or soft)wood, raw, kiln dried	sawnwood, board, (hard or soft)wood, raw, dried ($u=10\%$)
sawnwood, (hard or soft)wood, air dried, planed	sawnwood, (hard or soft)wood, dried ($u=20\%$), planed
sawnwood, (hard or soft)wood, kiln dried, planed	sawnwood, (hard or soft)wood, dried ($u=10\%$), planed
sawnwood, (hard or soft)wood, raw, air dried	sawnwood, (hard or soft)wood, raw, dried ($u=20\%$)
sawnwood, (hard or soft)wood, raw, kiln dried	sawnwood, (hard or soft)wood, raw, dried ($u=10\%$)
sawnwood, lath, (hard or soft)wood, raw, air dried	sawnwood, lath, (hard or soft)wood, raw, dried ($u=20\%$)
sawnwood, lath, (hard or soft)wood, raw, kiln dried	sawnwood, lath, (hard or soft)wood, raw, dried ($u=10\%$)

Table 56. Renamed drying and planing activities.

Activity name in v3.1	Activity name in v3.2
beam, (hard or soft)wood, raw, air drying	beam, (hard or soft)wood, raw, air drying to u=20%
beam, (hard or soft)wood, raw, kiln drying	beam, (hard or soft)wood, raw, kiln drying to u=10%
board, (hard or soft)wood, raw, air drying	board, (hard or soft)wood, raw, air drying to u=20%
board, (hard or soft)wood, raw, kiln drying	board, (hard or soft)wood, raw, kiln drying to u=10%
lath, (hard or soft)wood, raw, air drying	lath, (hard or soft)wood, raw, air drying to u=20%
lath, (hard or soft)wood, raw, kiln drying	lath, (hard or soft)wood, raw, kiln drying to u=10%
market for sawnwood, (hard or soft)wood, air dried, planed	market for sawnwood, (hard or soft)wood, dried (u=20%), planed
market for sawnwood, (hard or soft)wood, kiln dried, planed	market for sawnwood, (hard or soft)wood, dried (u=10%), planed
market for sawnwood, (hard or soft)wood, raw, air dried	market for sawnwood, (hard or soft)wood, raw, dried (u=20%)
market for sawnwood, (hard or soft)wood, raw, kiln dried	market for sawnwood, (hard or soft)wood, raw, dried (u=10%)
market for sawnwood, beam, (hard or soft)wood, air dried, planed	market for sawnwood, beam, (hard or soft)wood, dried (u=20%), planed
market for sawnwood, beam, (hard or soft)wood, kiln dried, planed	market for sawnwood, beam, (hard or soft)wood, dried (u=10%), planed
market for sawnwood, beam, (hard or soft)wood, raw, air dried	market for sawnwood, beam, (hard or soft)wood, raw, dried (u=20%)
market for sawnwood, beam, (hard or soft)wood, raw, kiln dried	market for sawnwood, beam, (hard or soft)wood, raw, dried (u=10%)
market for sawnwood, board, (hard or soft)wood, air dried, planed	market for sawnwood, board, (hard or soft)wood, dried (u=20%), planed
market for sawnwood, board, (hard or soft)wood, kiln dried, planed	market for sawnwood, board, (hard or soft)wood, dried (u=10%), planed
market for sawnwood, board, (hard or soft)wood, raw, air dried	market for sawnwood, board, (hard or soft)wood, raw, dried (u=20%)
market for sawnwood, board, (hard or soft)wood, raw, kiln dried	market for sawnwood, board, (hard or soft)wood, raw, dried (u=10%)
market for sawnwood, lath, (hard or soft)wood, raw, air dried	market for sawnwood, lath, (hard or soft)wood, raw, dried (u=20%)
market for sawnwood, lath, (hard or soft)wood, raw, kiln dried	market for sawnwood, lath, (hard or soft)wood, raw, dried (u=10%)
planing, beam, (hard or soft)softwood, air dried	planing, beam, (hard or soft)softwood, u=20%
planing, beam, (hard or soft)wood, kiln dried	planing, beam, (hard or soft)softwood, u=10%
planing, board, (hard or soft)softwood, air dried	planing, board, (hard or soft)softwood, u=20%
planing, board, (hard or soft)wood, kiln dried	planing, board, (hard or soft)softwood, u=10%
planing, lath, (hard or soft)softwood, air dried	planing, lath, (hard or soft)softwood, u=20%
planing, lath, (hard or soft)wood, kiln dried	planing, lath, (hard or soft)softwood, u=10%
sawnwood production, (hard or soft)wood, air dried, planed	sawnwood production, (hard or soft)wood, dried (u=20%), planed
sawnwood production, (hard or soft)wood, kiln dried, planed	sawnwood production, (hard or soft)wood, dried (u=10%), planed
sawnwood production, (hard or soft)wood, raw, air dried	sawnwood production, (hard or soft)wood, raw, dried (u=20%)
sawnwood production, (hard or soft)wood, raw, kiln dried	sawnwood production, (hard or soft)wood, raw, dried (u=10%)

With the introduction of the new kiln drying activities, both technologies (air and kiln drying) can now supply the wood dried to a moisture level of 20% (u=20%). In other words, the same 20% moisture-level product can now be delivered by two different technologies, air and kiln drying, while the 10% moisture level product can (as always) be only produced by kiln drying.

As a consequence of this remodelling, the activities “[...], (hard or soft)wood, raw, air drying” and “[...], (hard or soft)wood, raw, kiln drying”, as well as the resulting products (kiln dried or air dried) and its markets have been deleted.

Table 57 New and updated drying activities. All activities are present in the three geographies CH, CA-QC, GLO, and the time period of all activities is 2011 – 2013, so both fields have been excluded from the table. All CA-QC activities are Recontextualization activities. The column 3.2 labels the activities as: U: Updated. N: New.

Activity name	Product name	3.2
beam, (hard or soft)wood, raw, kiln drying to u=10%	sawnwood, beam, (hard or soft)wood, raw, dried (u=10%)	U
beam, (hard or soft)wood, raw, kiln drying to u=20%	sawnwood, beam, (hard or soft)wood, raw, dried (u=20%)	N
beam, (hard or soft)wood, raw, air drying to u=20%	sawnwood, beam, (hard or soft)wood, raw, dried (u=20%)	U
board, (hard or soft)wood, raw, kiln drying to u=10%	sawnwood, board, (hard or soft)wood, raw, dried (u=10%)	U
board, (hard or soft)wood, raw, kiln drying to u=20%	sawnwood, board, (hard or soft)wood, raw, dried (u=20%)	N
board, (hard or soft)wood, raw, air drying to u=20%	sawnwood, board, (hard or soft)wood, raw, dried (u=20%)	U
lath, (hard or soft)wood, raw, kiln drying to u=10%	sawnwood, lath, (hard or soft)wood, raw, dried (u=10%)	U
lath, (hard or soft)wood, raw, kiln drying to u=20%	sawnwood, lath, (hard or soft)wood, raw, dried (u=20%)	N
lath, (hard or soft)wood, raw, air drying to u=20%	sawnwood, lath, (hard or soft)wood, raw, dried (u=20%)	U

Similarly to sawing activities, planing activities now have the suction of the shavings disaggregated in an independent process, in order to better distribute electricity consumption between resulting products. This has generated the new intermediate products “shavings, hardwood, loose, measured as dry mass” and “shavings, softwood, loose, measured as dry mass”.

Table 58. Updated planing activities. All activities are present in the three geographies CH, CA-QC, GLO (the Canadian being a Recontextualized copy). The column 3.2 labels the activities as: "U": Updated; "N": New; "*N": the product is also new.

Activity name	Product name	Time period	3.2
market for shavings, hardwood, loose, measured as dry mass	shavings, hardwood, loose, measured as dry mass	2012 - 2013	N*
market for shavings, softwood, loose, measured as dry mass	shavings, softwood, loose, measured as dry mas	2011 - 2013	N*
planing, beam, (hard or soft)wood, u=10%	sawnwood, beam, (hard or soft)wood, dried (u=10%), planed	2011 - 2013	U
planing, beam, (hard or soft)wood, u=20%	sawnwood, beam, (hard or soft)wood, dried (u=20%), planed	2011 - 2013	U
planing, board, (hard or soft)wood, u=10%	sawnwood, board, (hard or soft)wood, dried (u=10%), planed	2011 - 2013	U
planing, board, (hard or soft)wood, u=20%	sawnwood, board, (hard or soft)wood, dried (u=20%), planed	2011 - 2013	U
planing, lath, (hard or soft)wood, u=10%	sawnwood, lath, (hard or soft)wood, dried (u=10%), planed	2011 - 2013	U
planing, lath, (hard or soft)wood, u=20%	sawnwood, lath, (hard or soft)wood, dried (u=20%), planed	2011 - 2013	U
suction, shavings, hardwood	shavings, softwood, loose, measured as dry mas	2012 - 2013	N*
suction, shavings, softwood	shavings, softwood, loose, measured as dry mas	2011 - 2013	N*

10.3 Wood products

Some corrections and updates have been done in this sector, concerning amendment of production volumes, or update of exchange amounts. Also, new activities, and is corresponding products have been added. As can be seen in the table below, two new products have been added in this domain: **“wood cladding, softwood”** and **“joist, engineered wood”**.

Table 59. New or updated activities related to wood products. When several geographies with the same time period are mentioned, all of them are listed in the “Geography” column. In column “v3.2”: “N”: New to v3.2; “U”: Updated activity from v3.1; “*N”: the product is also new to the database.

Activity name	Geography	Time period	V3.2
engineered wood joist production	CA-QC, GLO	2011 - 2011	N*
fibreboard production, hard	GLO, RER	2012 - 2012	U
fibreboard production, soft, from wet & dry processes	Europe without Switzerland	2012 - 2012	U
fibreboard production, soft, from wet & dry processes	CA-QC, Europe without Switzerland, GLO	2012 - 2012	U
glued laminated timber production, for indoor use	CA-QC, GLO, RER	2009 - 2011	U
glued laminated timber production, for outdoor use	GLO	1986 - 2002	U
hardwood forestry, azobe, sustainable forest management	CM, GLO	2000 - 2005	U
import of sawnwood, paran pine from sustainable forest management, kiln dried	RER	2000 - 2005	U
market for joist, engineered wood	GLO	2011 - 2011	N*
market for sawnwood, paran pine from sustainable forest management, kiln dried	GLO	2011 - 2011	U
market for wood cladding, softwood	GLO	2012 - 2012	N*
medium density fibre board production, uncoated	RER	2012 - 2012	U
oriented strand board production	GLO, RER	2012 - 2012	U
particle board production, uncoated, average glue mix	GLO, RER	2012 - 2012	U
sawing and planing, azobe, air dried	GLO, RER	2000 - 2005	U
sawing and planing, paran pine, kiln dried	BR, GLO	2000 - 2005	U
softwood forestry, paran pine, sustainable forest management	BR, GLO	2000 - 2005	U
wood cladding production, softwood	CA-QC, GLO	2012 - 2012	N*
wood preservation, dipping/immersion, water-based preservative, indoor use, dry	GLO	2012 - 2012	U
wood preservation, hot/cold dipping, creosote, outdoor use, ground contact	RER	2008 - 2008	U
wood preservation, pressure vessel, creosote, outdoor use, ground contact	GLO	2008 - 2008	U
wood preservation, spray tunnel/deluging, solvent-based preservative, indoor use, dry	GLO, RER	2012 - 2012	U
wood preservation, spray tunnel/deluging, solvent-based preservative, indoor use, occasionally wet	GLO, RER	2012 - 2012	U
wood preservation, spray tunnel/deluging, solvent-based preservative, outdoor use, no ground contact	GLO, RER	2012 - 2012	U
wood preservation, spray tunnel/deluging, water-based preservative, indoor use, dry	GLO, RER	2012 - 2012	U
wood preservation, spray tunnel/deluging, water-based preservative, indoor use, occasionally wet	GLO, RER	2012 - 2012	U
wood preservation, spray tunnel/deluging, water-based preservative, outdoor use, no ground contact	GLO, RER	2012 - 2012	U

10.4 Paper

The paper sector has three new activities, and has otherwise benefited from minor corrections, mainly concerning the redirection of activity links to the right geography, or the update of production volumes. The “market for deinked pulp, wet lap” is constrained in the consequential model, and has been together with the different “paper production, woodfree, uncoated, [...]” activities, amended in order to work properly in the consequential system model.

Table 60. New and updated activities in the paper sector. When several geographies with the same time period are mentioned, all of them are listed in the “Geography” column. In column “v3.2”: “N”: New to v3.2; “U”: Updated activity from v3.1.

Activity name	Geography	Time period	V3.2
corrugated board box production	CA-QC	2008 - 2008	U
fluting medium production, semichemical	RER	2008 - 2008	U
linerboard production, kraftliner	CA-QC, RER	2008 - 2008	U
market for deinked pulp, wet lap	GLO	2014 - 2014	U
paper production, newsprint, virgin	CA-QC	2012 - 2012	U
paper production, woodfree, uncoated, 100% recycled content, at non-integrated mill	CA-QC	2009 - 2009	U
paper production, woodfree, uncoated, 30% recycled content, at integrated mill	CA-QC, GLO	2011 - 2012	U
paper production, woodfree, uncoated, 50% recycled content, at non-integrated mill	CA-QC	2009 - 2009	U
paper production, woodfree, uncoated, at integrated mill	CA-QC	2011 - 2012	U
sulfate pulp production, elementary chlorine free bleached	CA-QC	2011 - 2012	N
sulfate pulp production, elementary chlorine free bleached	GLO	1997 - 2000	U
sulfate pulp production, unbleached	GLO, RER	1993 - 2000	U
treatment of recovered paper to fluting medium, semichemical fluting, 40% recycled content	CA-QC	2009 - 2009	U
treatment of waste paper to pulp, wet lap, totally chlorine free bleached	CA-QC, GLO	2007 - 2007	U
treatment, sludge from pulp and paper production, landfarming	CA-QC, GLO	2011 - 2012	N