



GreenDelta

sustainability consulting + software

Addressing data quality challenges for Open Source LCA software developers

77th LCA Discussion Forum

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GreenDelta GmbH

Content

- “open source LCA” = openLCA
- Data quality: some notes
- How data quality is addressed in openLCA
- Outlook



“open source LCA” = openLCA

“open source LCA” = openLCA

(for this presentation)



- openLCA: powerful, versatile, free and open source LCA and sustainability assessment software, developed by GreenDelta since 2007
- www.openLCA.org
- Most users worldwide of all LCA software systems (we think..), growing
- But of course:
 - “SimaPro is the leading LCA software solution” (<https://simapro.com/about/>)
 - “GaBi ist die meist verwendete Nachhaltigkeitssoftware für die Ökobilanzierung von Produkten“ (<http://www.gabi-software.com/deutsch/software/gabi-software/>)

A photograph of a mountain landscape with a purple semi-transparent overlay. The overlay contains the text "Data quality" in white. The background shows a valley with a river, surrounded by steep, forested mountains under a cloudy sky. In the foreground, there is a rocky, scree-covered slope.

Data quality

Data quality

(some notes)

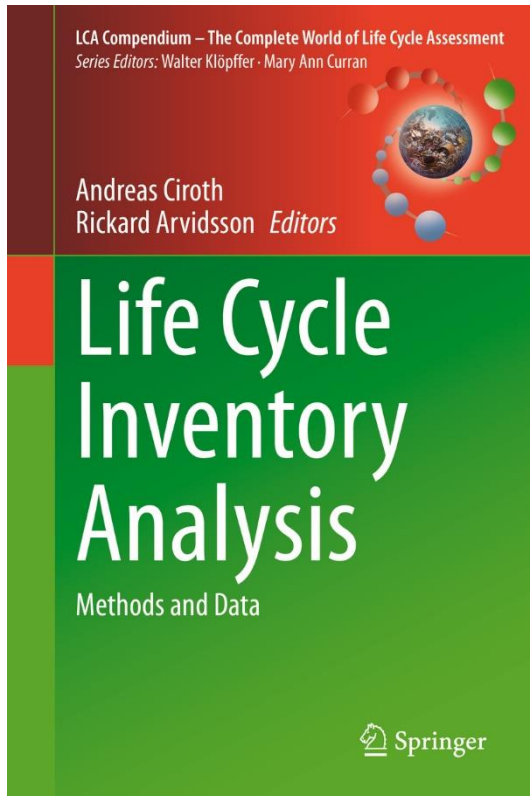
- ISO 14040: fit for purpose
- For datasets, two faces:
 - When creating the dataset
 - When using the dataset



(→ Janus face)

Ciroth, A.: Data Quality, ch. 5 in Life Cycle Inventory Analysis, Ciroth / Arvidsson (eds.), Springer, 2021

(data quality, some more details)



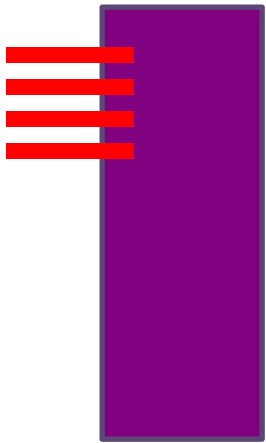
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Data quality indicators from the database are not the full picture

- Different application cases (different location, reference year, carbon accounting method, ...)
- Inter-dataset inconsistency cannot be documented per dataset
- E.g., ecoinvent: tyre wear emissions not provided for some street transport processes

Where is data quality measured and documented?

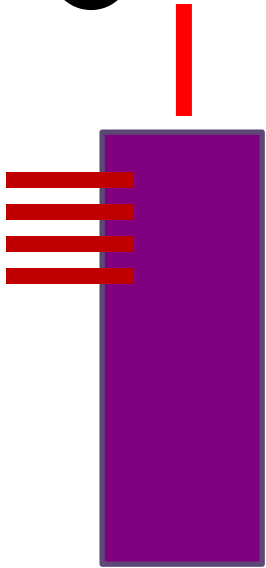
- 1 All the exchanges of a unit process → ecoinvent



a unit process dataset

Where is data quality measured and documented?

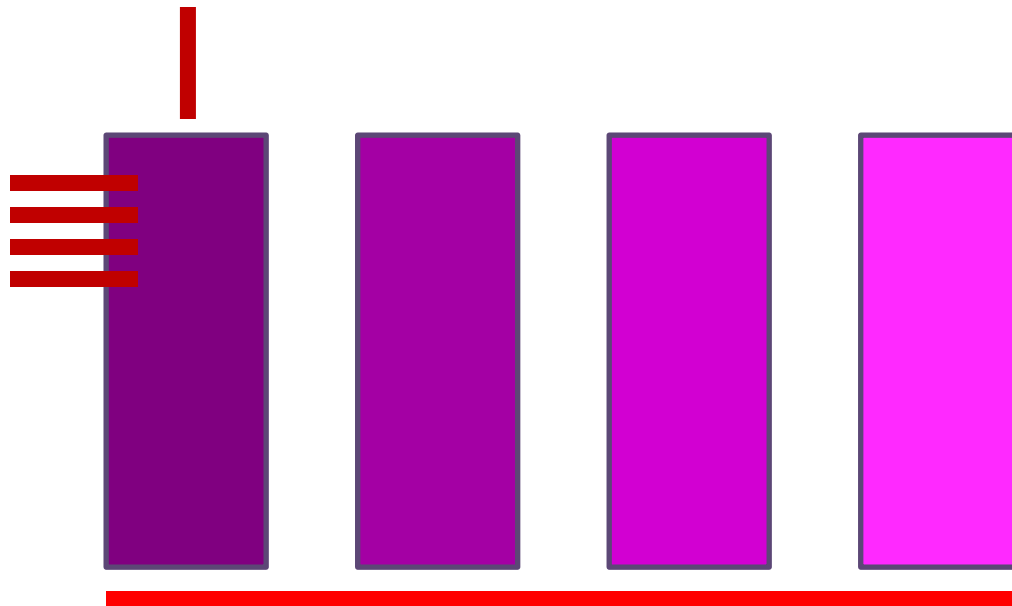
2 A process dataset, meta data → US EPA



a unit process dataset

Where is data quality measured and documented?

- 3 A process dataset against other process datasets
(→ UN GLAD; underdeveloped)



unit process datasets

E.g., ecoinvent: tyre wear emissions not provided for some street transport processes

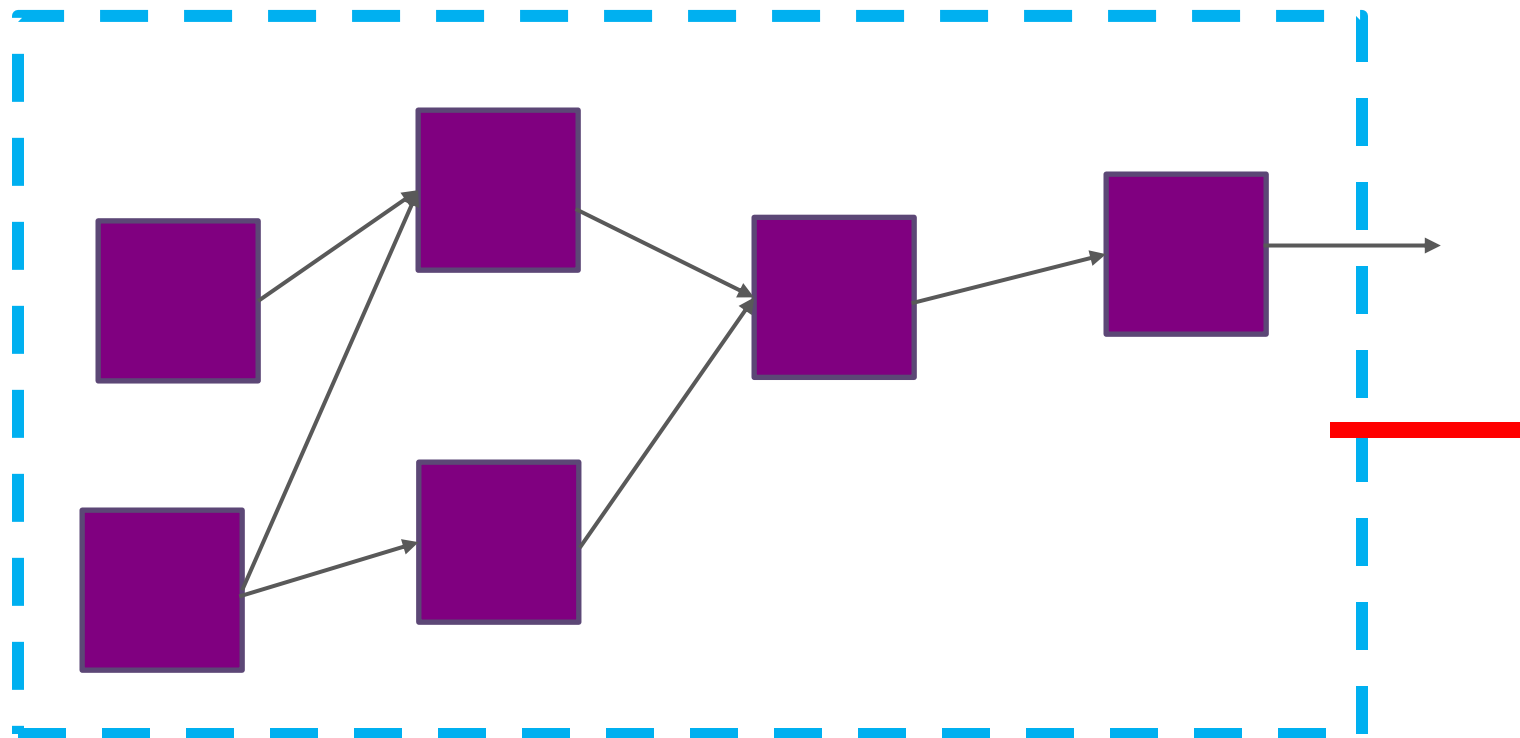
- Provided

not provided

REF_ID	PNAME	FNAME	IS_INPUT	RESULTING	NAME	PREF	PNAME
787cc269-d2	transport, freight, light commercial vehicle, EURO1	transport, freight, light commercial vehicle, EURO1	tyre wear emissions, lorry	0.0.00012	kg	b37c148e-02	transport, freight, light commercial vehicle transport, freight, light commercial vehicle A
05610e24-bd	transport, freight, light commercial vehicle, EURO2	transport, freight, light commercial vehicle, EURO2	tyre wear emissions, lorry	0.0.00012	kg	d57266c2-1a	transport, freight, light commercial vehicle transport, freight, light commercial vehicle A
5f2a6b26-e6	transport, freight, lorry >32 metric ton, EURO1	transport, freight, lorry >32 metric ton, EURO1	tyre wear emissions, lorry	0.0.00015	kg	10138d21-da	transport, freight, light commercial vehicle transport, freight, light commercial vehicle A
701e35e4-cf	transport, freight, lorry >32 metric ton, EURO2	transport, freight, lorry >32 metric ton, EURO2	tyre wear emissions, lorry	0.0.00015	kg	ccc7ed67-e5	transport, freight, lorry 28 metric ton, vegetable oil methyl ester 100% transport, freight, l
ce6e018b-7e	transport, freight, lorry >32 metric ton, EURO3	transport, freight, lorry >32 metric ton, EURO3	tyre wear emissions, lorry	0.0.00017	kg	584fc575-b1	transport, freight, lorry 28 metric ton, vegetable oil methyl ester 100% transport, freight, l
e1221084-74	transport, freight, lorry >32 metric ton, EURO3	transport, freight, lorry >32 metric ton, EURO3	tyre wear emissions, lorry	0.0.00017	kg	4335ccbb-b1	transport, passenger coach transport, passenger coach APOS, U
75d202a1-36	transport, freight, lorry >32 metric ton, EURO4	transport, freight, lorry >32 metric ton, EURO4	tyre wear emissions, lorry	0.0.00017	kg	ff5ef059-858	transport, passenger coach transport, passenger coach APOS, U
7da22b9f-1d	transport, freight, lorry >32 metric ton, EURO4	transport, freight, lorry >32 metric ton, EURO4	tyre wear emissions, lorry	0.0.00017	kg	b7c613d6-f1	transport, passenger, bicycle transport, passenger, bicycle APOS, U
3269857a-c4	transport, freight, lorry >32 metric ton, EURO5	transport, freight, lorry >32 metric ton, EURO5	tyre wear emissions, lorry	0.0.00017	kg	6faf8b3e-33c	transport, passenger, bicycle transport, passenger, bicycle APOS, U
c9fd3466-f9d	transport, freight, lorry >32 metric ton, EURO5	transport, freight, lorry >32 metric ton, EURO5	tyre wear emissions, lorry	0.0.00017	kg	ed88c010-f0f	transport, passenger, electric bicycle transport, passenger, electric bicycle APOS, U
6b5a38b3-a2	transport, freight, lorry >32 metric ton, EURO6	transport, freight, lorry >32 metric ton, EURO6	tyre wear emissions, lorry	0.0.00017	kg	b8711445-b5	transport, passenger, electric bicycle transport, passenger, electric bicycle APOS, U
75dc856f-77f	transport, freight, lorry >32 metric ton, EURO6	transport, freight, lorry >32 metric ton, EURO6	tyre wear emissions, lorry	0.0.00017	kg	11f843b9-a6	transport, passenger, electric bicycle, label-certified electricity transport, passenger, elect
bf5b888b-f3f	transport, freight, lorry >32 metric ton, unregulated	transport, freight, lorry >32 metric ton, unregulated	tyre wear emissions, lorry	0.0.00015	kg	22394adf-44a	transport, passenger, electric bicycle, label-certified electricity transport, passenger, elect
e957817b-07	transport, freight, lorry 16-32 metric ton, EURO1	transport, freight, lorry 16-32 metric ton, EURO1	tyre wear emissions, lorry	0.0.00015	kg	d3429762-c2	transport, passenger, motor scooter transport, passenger, motor scooter APOS, U
f7a1c7c-86a	transport, freight, lorry 16-32 metric ton, EURO2	transport, freight, lorry 16-32 metric ton, EURO2	tyre wear emissions, lorry	0.0.00015	kg	1bda45ac-30	transport, passenger, motor scooter transport, passenger, motor scooter APOS, U
b06941cf-1e1	transport, freight, lorry 16-32 metric ton, EURO3	transport, freight, lorry 16-32 metric ton, EURO3	tyre wear emissions, lorry	0.0.00022	kg	07937a77-09	transport, regular bus transport, regular bus APOS, U
f016da42-5a	transport, freight, lorry 16-32 metric ton, EURO3	transport, freight, lorry 16-32 metric ton, EURO3	tyre wear emissions, lorry	0.0.00022	kg	806c93a2-a9f	transport, regular bus transport, regular bus APOS, U
bf581918-63	transport, freight, lorry 16-32 metric ton, EURO4	transport, freight, lorry 16-32 metric ton, EURO4	tyre wear emissions, lorry	0.0.00022	kg	31554b6e-ae	transport, tractor and trailer, agricultural transport, tractor and trailer, agricultural APOS,
f1216b22-11	transport, freight, lorry 16-32 metric ton, EURO4	transport, freight, lorry 16-32 metric ton, EURO4	tyre wear emissions, lorry	0.0.00022	kg	be69db3f-22	transport, tractor and trailer, agricultural transport, tractor and trailer, agricultural APOS,
38080e54-d0	transport, freight, lorry 16-32 metric ton, EURO5	transport, freight, lorry 16-32 metric ton, EURO5	tyre wear emissions, lorry	0.0.00022	kg	90154a05-58	transport, trolleybus transport, trolleybus APOS, U
f3be48e9-5e	transport, freight, lorry 16-32 metric ton, EURO5	transport, freight, lorry 16-32 metric ton, EURO5	tyre wear emissions, lorry	0.0.00022	kg	690b545e-4e	transport, trolleybus transport, trolleybus APOS, U
521a1975-9d	transport, freight, lorry 16-32 metric ton, EURO6	transport, freight, lorry 16-32 metric ton, EURO6	tyre wear emissions, lorry	0.0.00022	kg		
e637f3b5-ef	transport, freight, lorry 16-32 metric ton, EURO6	transport, freight, lorry 16-32 metric ton, EURO6	tyre wear emissions, lorry	0.0.00022	kg		
534542d3-ef	transport, freight, lorry 16-32 metric ton, unregulated	transport, freight, lorry 16-32 metric ton, unregulated	tyre wear emissions, lorry	0.0.00015	kg		
15dd710-e2	transport, freight, lorry 3.5-7.5 metric ton, EURO1	transport, freight, lorry 3.5-7.5 metric ton, EURO1	tyre wear emissions, lorry	0.0.00015	kg		
7f25c285-2f2	transport, freight, lorry 3.5-7.5 metric ton, EURO2	transport, freight, lorry 3.5-7.5 metric ton, EURO2	tyre wear emissions, lorry	0.0.00015	kg		
2238405f-3c	transport, freight, lorry 3.5-7.5 metric ton, EURO3	transport, freight, lorry 3.5-7.5 metric ton, EURO3	tyre wear emissions, lorry	0.0.00041	kg		
c9cf9325-786	transport, freight, lorry 3.5-7.5 metric ton, EURO3	transport, freight, lorry 3.5-7.5 metric ton, EURO3	tyre wear emissions, lorry	0.0.00041	kg		
c32e3e7b-8c	transport, freight, lorry 3.5-7.5 metric ton, EURO4	transport, freight, lorry 3.5-7.5 metric ton, EURO4	tyre wear emissions, lorry	0.0.00041	kg		
e93789fa-88	transport, freight, lorry 3.5-7.5 metric ton, EURO4	transport, freight, lorry 3.5-7.5 metric ton, EURO4	tyre wear emissions, lorry	0.0.00041	kg		
34c9c939-acf	transport, freight, lorry 3.5-7.5 metric ton, EURO5	transport, freight, lorry 3.5-7.5 metric ton, EURO5	tyre wear emissions, lorry	0.0.00041	kg		
ce389875-84	transport, freight, lorry 3.5-7.5 metric ton, EURO5	transport, freight, lorry 3.5-7.5 metric ton, EURO5	tyre wear emissions, lorry	0.0.00041	kg		
108f29a6-c0	transport, freight, lorry 3.5-7.5 metric ton, EURO6	transport, freight, lorry 3.5-7.5 metric ton, EURO6	tyre wear emissions, lorry	0.0.00041	kg		
7db2ba74-27	transport, freight, lorry 3.5-7.5 metric ton, EURO6	transport, freight, lorry 3.5-7.5 metric ton, EURO6	tyre wear emissions, lorry	0.0.00041	kg		
eafe548d-c2	transport, freight, lorry 3.5-7.5 metric ton, unregulated	transport, freight, lorry 3.5-7.5 metric ton, unregulated	tyre wear emissions, lorry	0.0.00015	kg		
65fee428-93	transport, freight, lorry 7.5-16 metric ton, EURO1	transport, freight, lorry 7.5-16 metric ton, EURO1	tyre wear emissions, lorry	0.0.00015	kg		
7efb62b5-56	transport, freight, lorry 7.5-16 metric ton, EURO2	transport, freight, lorry 7.5-16 metric ton, EURO2	tyre wear emissions, lorry	0.0.00015	kg		
1174e725-27	transport, freight, lorry 7.5-16 metric ton, EURO3	transport, freight, lorry 7.5-16 metric ton, EURO3	tyre wear emissions, lorry	0.0.00023	kg		
3b2d90ac-44	transport, freight, lorry 7.5-16 metric ton, EURO3	transport, freight, lorry 7.5-16 metric ton, EURO3	tyre wear emissions, lorry	0.0.00023	kg		
1f9c33a7-1c	transport, freight, lorry 7.5-16 metric ton, EURO4	transport, freight, lorry 7.5-16 metric ton, EURO4	tyre wear emissions, lorry	0.0.00023	kg		
71968cf-e7	transport, freight, lorry 7.5-16 metric ton, EURO4	transport, freight, lorry 7.5-16 metric ton, EURO4	tyre wear emissions, lorry	0.0.00023	kg		
5a776197-f5	transport, freight, lorry 7.5-16 metric ton, EURO5	transport, freight, lorry 7.5-16 metric ton, EURO5	tyre wear emissions, lorry	0.0.00023	kg		
646d4962-40	transport, freight, lorry 7.5-16 metric ton, EURO5	transport, freight, lorry 7.5-16 metric ton, EURO5	tyre wear emissions, lorry	0.0.00023	kg		
04275777-30	transport, freight, lorry 7.5-16 metric ton, EURO6	transport, freight, lorry 7.5-16 metric ton, EURO6	tyre wear emissions, lorry	0.0.00023	kg		
5e477fc4-c9	transport, freight, lorry 7.5-16 metric ton, EURO6	transport, freight, lorry 7.5-16 metric ton, EURO6	tyre wear emissions, lorry	0.0.00023	kg		
5aa00730-41	transport, freight, lorry 7.5-16 metric ton, unregulated	transport, freight, lorry 7.5-16 metric ton, unregulated	tyre wear emissions, lorry	0.0.00015	kg		
6d57f164-fe	transport, freight, lorry with refrigeration machine, 3.5-7.5 ton, EURO3	transport, freight, lorry with refrigeration machine, 3.5-7.5 ton, EURO3	carbon dioxide, liquid refrigerant, tyre wear emissions, lorry	0.0.00041	kg		
81ec65fc-97f	transport, freight, lorry with refrigeration machine, 3.5-7.5 ton, EURO3	transport, freight, lorry with refrigeration machine, 3.5-7.5 ton, EURO3	carbon dioxide, liquid refrigerant, tyre wear emissions, lorry	0.0.00041	kg		
04d75b5a-73	transport, freight, lorry with refrigeration machine, 3.5-7.5 ton, EURO3	transport, freight, lorry with refrigeration machine, 3.5-7.5 ton, EURO3	refrigerant, cooling transport, freight, lorry with refrigeration machine, 3.5-7.5 ton, EURO3	0.0.00041	kg		
8bddb73a-d	transport, freight, lorry with refrigeration machine, 3.5-7.5 ton, EURO3	transport, freight, lorry with refrigeration machine, 3.5-7.5 ton, EURO3	refrigerant, freezing transport, freight, lorry with refrigeration machine, 3.5-7.5 ton, EURO3	0.0.00041	kg		
ee533d89-c9	transport, freight, lorry with refrigeration machine, 3.5-7.5 ton, EURO4	transport, freight, lorry with refrigeration machine, 3.5-7.5 ton, EURO4	carbon dioxide, liquid refrigerant, tyre wear emissions, lorry	0.0.00041	kg		
bdafa55e-91	transport, freight, lorry with refrigeration machine, 3.5-7.5 ton, EURO4	transport, freight, lorry with refrigeration machine, 3.5-7.5 ton, EURO4	carbon dioxide, liquid refrigerant, tyre wear emissions, lorry	0.0.00041	kg		
a39db7d2-52	transport, freight, lorry with refrigeration machine, 3.5-7.5 ton, EURO4	transport, freight, lorry with refrigeration machine, 3.5-7.5 ton, EURO4	refrigerant, cooling transport, freight, lorry with refrigeration machine, 3.5-7.5 ton, EURO4	0.0.00041	kg		
9fbcfc3f-155	transport, freight, lorry with refrigeration machine, 3.5-7.5 ton, EURO4	transport, freight, lorry with refrigeration machine, 3.5-7.5 ton, EURO4	refrigerant, freezing transport, freight, lorry with refrigeration machine, 3.5-7.5 ton, EURO4	0.0.00041	kg		
426e8a9f-ce	transport, freight, lorry with refrigeration machine, 3.5-7.5 ton, EURO5	transport, freight, lorry with refrigeration machine, 3.5-7.5 ton, EURO5	carbon dioxide, liquid refrigerant, tyre wear emissions, lorry	0.0.00041	kg		
426bcb29-40	transport, freight, lorry with refrigeration machine, 3.5-7.5 ton, EURO5	transport, freight, lorry with refrigeration machine, 3.5-7.5 ton, EURO5	carbon dioxide, liquid refrigerant, tyre wear emissions, lorry	0.0.00041	kg		

Where is data quality measured and documented?

4 LC calculation result, system process



The background image shows a mountainous landscape. In the foreground, there is a rocky, light-colored slope. The middle ground features a dense forest of evergreen trees covering the lower slopes. In the background, more mountain peaks are visible under a cloudy sky. A semi-transparent purple rectangular box is positioned in the lower-middle part of the image, containing white text.

How data quality is addressed in openLCA

Addressing data quality in openLCA

- So far:
 - Show data quality assessment done by data provider to user
 - Enable users to define and set up own data quality systems
 - Link data quality with uncertainty where needed
 - Allow calculation of data quality over the life cycle
 - Show in calculation result
 - Find best suited processes (somehow)

Show data quality assessment done by data provider to user

P Inputs/Outputs: hard coal, import from AU | hard coal | APOS, U - RLA



▼ Inputs

+ × 1.23

Flow	Category	Amount	Unit	Costs/Revenues	Uncertainty	Avoided waste	Provider	Data quality e...	Location	Description
Fe hard coal	051:Mining of hard coal/0510:...	1.00200	kg		lognormal: g...		P market for...	(3; 5; 5; 5; 2)		Compensatio...
Fe transport, freight train	491:Transport via railways/4912:...	0.20000	t*km		lognormal: g...		P market for...	(1; 2; 3; 1; 1)		The weighted ...
Fe transport, freight, sea, bulk c...	501:Sea and coastal water trans...	15.00000	t*km		lognormal: g...		P market for...	(3; 3; 3; 1; 1)		Rough estima...

▼ Outputs

+ × 1.23

Flow	Category	Amount	Unit	Costs/Revenues	Uncertainty	Avoided prod...	Provider	Data quality e...	Location	Description
Fe hard coal	051:Mining of hard coal/0510:...	1.00000	kg	0.03600 EUR	none					
Fe Particulates, > 10 um	Emission to air/unspecified	0.00200	kg		lognormal: g...			(2; 5; 5; 5; 2)		For a lack of ...

Show data quality assessment done by data provider to user, **editable**

Welcome | market for jatropa seed | jatropa seed | APOS, U | Analysis result of market for jatropa seed | jatropa seed | APOS, U | P hard coal, import from AU | hard coal | APOS, U -

Pedigree matrix

Click on the matrix cells to select entries

	1	2	3	4	5
Reliability	Verified data based on measurements	Verified data partly based on assumptions or non-verified data based on measurements	Non-verified data partly based on qualified estimates	Qualified estimate (e.g. by industrial expert)	Non-qualified estimates
Completeness	Representative data from all sites relevant for the market considered, over and adequate period to even out normal fluctuations	Representative data from > 50% of the sites relevant for the market considered, over an adequate period to even out normal fluctuations	Representative data from only some sites (< < 50%) relevant for the market considered or > 50% of sites but from shorter periods	Representative data from only one site relevant for the market considered or some sites but from shorter periods	Representativeness unknown or data from a small number of sites and from shorter periods
Temporal correlation	Less than 3 years of difference to the time period of the data set	Less than 6 years of difference to the time period of the data set	Less than 10 years of difference to the time period of the data set	Less than 15 years of difference to the time period of the data set	Age of data unknown or more than 15 years of difference to the time period of the data set
Geographical correlation	Data from area under study	Average data from larger area in which the area under study is included	Data from area with similar production conditions	Data from area with slightly similar production conditions	Data from unknown or distinctly different area (North America instead of Middle East, OECD-Europe instead of Russia)
Further technological correlation	Data from enterprises, processes and materials under study	Data from processes and materials under study (i.e. identical technology) but from different enterprises	Data from processes and materials under study but from different technology	Data on related processes or materials	Data on related processes on laboratory scale or from different technology

Base uncertainty: or:

Show data quality assessment done by data provider to user, **editable**

The screenshot shows a software interface with a sidebar on the left containing a 'Data quality' dropdown menu. The dropdown is open, displaying four options, each preceded by a small green grid icon. A mouse cursor is hovering over the first option, 'Ciroth_Muller_Weidema_Lesage', which is highlighted with a light blue background. The other options are 'ecoinvent data quality system', 'ILCD data quality system', and 'PSILCA - Data quality system for social LCA data'. To the right of the dropdown, there are four input fields labeled 'Process schema', 'Data quality entry', 'Flow schema', and 'Social schema'. The 'Data quality entry' field is currently empty. At the bottom of the sidebar, there are four tabs: 'General information', 'Inputs/Outputs', 'Administrative information', and 'Modeling and validation', with 'General information' being the active tab.

Schema Type	Selected Data Quality System
Process schema	
Data quality entry	Ciroth_Muller_Weidema_Lesage
Flow schema	ecoinvent data quality system
Social schema	ILCD data quality system

General information | Inputs/Outputs | Administrative information | Modeling and validation

Show data quality assessment done by data provider to user, **editable**

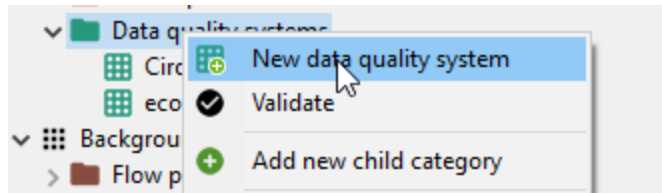
Pedigree matrix

Click on the matrix cells to select entries

	1	2	3	4	5
Reliability	Verified data based on measurements	Verified data partly based on assumptions or non-verified data based on measurements	Non-verified data partly based on qualified estimates	Qualified estimate (e.g. by industrial expert)	Non-qualified estimates
Completeness	Representative data from all sites relevant for the market considered, over and adequate period to even out normal fluctuations	Representative data from > 50% of the sites relevant for the market considered, over an adequate period to even out normal fluctuations	Representative data from only some sites (< 50%) relevant for the market considered or > 50% of sites but from shorter periods	Representative data from only one site relevant for the market considered or some sites but from shorter periods	Representativeness unknown or data from a small number of sites and from shorter periods
Temporal correlation	Less than 3 years of difference to the time period of the data set	Less than 6 years of difference to the time period of the data set	Less than 10 years of difference to the time period of the data set	Less than 15 years of difference to the time period of the data set	Age of data unknown or more than 15 years of difference to the time period of the data set
Geographical correlation	Data from area under study	Average data from larger area in which the area under study is included	Data from area with similar production conditions	Data from area with slightly similar production conditions	Data from unknown or distinctly different area (North America instead of Middle East, OECD-Europe instead of Russia)
Further technological correlation	Data from enterprises, processes and materials under study	Data from processes and materials under study (i.e. identical technology) but from different enterprises	Data from processes and materials under study but from different technology	Data on related processes or materials	Data on related processes on laboratory scale or from different technology

OK Cancel

Enable users to define and set up own data quality systems



market for jatropha seed | jatropha seed | APOS, U | Analysis result of market for jatropha seed | jatropha seed | APOS, U - RLA | Croth, Muller, Weidema, Lesage

Version: 00.00.003
UUID: 64925569-1840-4067-94d8-43a02f125934
Last change: 2017-04-06T10:58:06+0200
Tags: Add a tag
Source: Croth A. et al. 2016

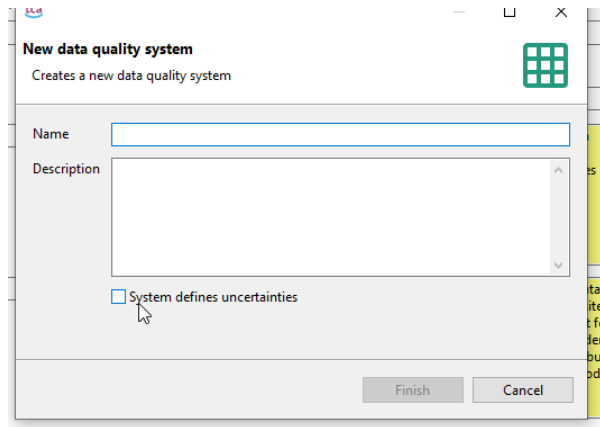
Indicators & Scores

	1	2	3	4	5	
Reliability	Verified data based on measurements	Verified data partly based on assumptions or non-verified data based on measurements	Non-verified data partly based on qualified estimates	Qualified estimate (e.g. by industrial expert)	Non-qualified estimates	Add score Remove indicator
Completeness	Representative data from all sites relevant for the market considered, over and adequate period to even out normal fluctuations	Representative data from > 50% of the sites relevant for the market considered, over an adequate period to even out normal fluctuations	Representative data from only some sites (< 50%) relevant for the market considered or > 50% of sites but from shorter periods	Representative data from only one site relevant for the market considered or some sites but from shorter periods	Representativeness unknown or data from a small number of sites and from shorter periods	Remove indicator
Temporal correlation	Less than 3 years of difference to the time period of the data set	Less than 6 years of difference to the time period of the data set	Less than 10 years of difference to the time period of the data set	Less than 15 years of difference to the time period of the data set	Age of data unknown or more than 15 years of difference to the time period of the data set	Remove indicator
Geographical correlation	Data from area under study	Average data from larger area in which the area under study is included	Data from area with similar production conditions	Data from area with slightly similar production conditions	Data from unknown or distinctly different area (North America instead of Middle East, OECD-Europe instead of Russia)	Remove indicator
Further technological correlation	Data from enterprises, processes and materials under study	Data from processes and materials under study (i.e. identical technology) but from different enterprises	Data from processes and materials under study but from different technology	Data on related processes or materials	Data on related processes on laboratory scale or from different technology	Remove indicator
Add indicator	Remove score	Remove score	Remove score	Remove score	Remove score	

Uncertainties

	1	2	3	4	5
Reliability	1.0	1.54	1.61	1.69	25.0
Completeness	1.0	1.03	1.04	1.08	25.0
Temporal correlation	1.0	1.03	1.1	1.19	1.29
Geographical correlation	1.0	1.04	1.08	1.11	25.0
Further technological correlation	1.0	1.18	1.65	2.08	2.8

Link data quality with uncertainty where needed



New data quality system
Creates a new data quality system

Name

Description

☐ System defines uncertainties

Finish Cancel

▼ Uncertainties					
	1	2	3	4	5
Reliability	<input type="text" value="1.0"/>	<input type="text" value="1.54"/>	<input type="text" value="1.61"/>	<input type="text" value="1.69"/>	<input type="text" value="25.0"/>
Completeness	<input type="text" value="1.0"/>	<input type="text" value="1.03"/>	<input type="text" value="1.04"/>	<input type="text" value="1.08"/>	<input type="text" value="25.0"/>
Temporal correlation	<input type="text" value="1.0"/>	<input type="text" value="1.03"/>	<input type="text" value="1.1"/>	<input type="text" value="1.19"/>	<input type="text" value="1.29"/>
Geographical correlation	<input type="text" value="1.0"/>	<input type="text" value="1.04"/>	<input type="text" value="1.08"/>	<input type="text" value="1.11"/>	<input type="text" value="25.0"/>
Further technological correlation	<input type="text" value="1.0"/>	<input type="text" value="1.18"/>	<input type="text" value="1.65"/>	<input type="text" value="2.08"/>	<input type="text" value="2.8"/>

(of course, whether this linkage makes sense is a separate discussion)

Allow calculation of data quality over the life cycle

LCa Calculation properties

Please select the properties for the calculation

Allocation method: None

Impact assessment method: CML-IA baseline

Normalization and weighting set: EU25+3, 2000

Calculation type: ☐ Quick results ☒ Analysis ☐ Monte Carlo Simulation

☐ Regionalized calculation

☒ Include cost calculation

☒ Assess data quality

< Back Next > Finish Cancel

LCa Calculation properties

Data quality properties

Please select the properties for the data quality assessment

Process schema:ecoinvent data quality system

Flow schema:ecoinvent data quality system

Aggregation type: Weighted average

Rounding mode: Half up

















n.a. value handling:

< Back Next > Finish Cancel

Allow calculation of data quality over the life cycle, show in calculation result

market for jatropha seed | jatropha seed | APOS, U

Inputs

Name	Category	Sub-category	Amount	Unit	R	C	T	G	F
>  Aluminium, in ground	Resource	in ground	0.00059	kg	2	2	3	1	1
>  Anhydrite, in ground	Resource	in ground	1.41165E-8	kg					
>  Antimony, in ground	Resource	in ground	2.40713E-9	kg	2	2	5	5	1
>  Argon-40	Resource	in air	4.25638E-5	kg	1	1	5	1	1
>  Arsenic, in ground	Resource	in ground	6.07274E-8	kg	1	2	1	1	1
>  Barium, in ground	Resource	in ground	0.00040	kg	4	4	5	5	1
>  Basalt, in ground	Resource	in ground	0.00015	kg	3	4	5	4	3
>  Beryllium, in ground	Resource	in ground	9.92897E-10	kg	3	2	3	5	1
>  Borax, in ground	Resource	in ground	6.59611E-7	kg	4	3	5	4	5
>  Bromine, in water	Resource	in water	8.79379E-8	kg	4	5	3	4	1
>  Cadmium, in ground	Resource	in ground	4.57994E-8	kg	1	3	3	1	1
>  Calcite, in ground	Resource	in ground	0.01680	kg	3	3	4	4	3
>  Calcium, in ground	Resource	in ground	5.22240E-5	kg	1	3	3	1	1
>  Carbon dioxide, in air	Resource	in air	2.04857	kg	4	3	3	5	1
>  Carbon, organic, in soil or biomass stock	Resource	in ground	9.84245E-5	kg	2	2	4	2	1
>  Carnallite	Resource	in water	9.20673E-7	kg	5	4	5	4	4

Allow calculation of data quality over the life cycle, show in calculation result

Name	Category	Sub-category	Amount	Unit	R	C	T	G	F
▼ Aluminium, in ground	Resource	in ground	0.00059	kg	2	2	3	1	1
P bauxite mine operation bauxite APOS, U - GL	072:Mining of no...	0729:Mining of other non...	0.00056	kg	2	2	3	1	1
P cobalt production nickel, class 1 APOS, U - G	072:Mining of no...	0729:Mining of other non...	1.10321E-5	kg	1	2	1	1	1
P cobalt production sulfuric acid APOS, U - GL	072:Mining of no...	0729:Mining of other non...	5.33297E-6	kg	1	2	1	1	1
P cobalt production copper concentrate, sulfide	072:Mining of no...	0729:Mining of other non...	2.86128E-6	kg	1	2	1	1	1
P cobalt production copper, anode APOS, U - C	072:Mining of no...	0729:Mining of other non...	2.59837E-6	kg	1	2	1	1	1
P cobalt production ferronickel APOS, U - GLO	072:Mining of no...	0729:Mining of other non...	1.46648E-6	kg	1	2	1	1	1
P zinc mine operation zinc concentrate APOS,	072:Mining of no...	0729:Mining of other non...	1.02078E-6	kg	1	3	3	1	1
P zeolite production, powder zeolite, powder A	202:Manufacture ...	2023:Manufacture of soap...	7.02606E-7	kg					
P cobalt production copper, cathode APOS, U	072:Mining of no...	0729:Mining of other non...	6.50234E-7	kg	1	2	1	1	1
P cobalt production electrolyte, copper-rich A	072:Mining of no...	0729:Mining of other non...	5.07718E-7	kg	1	2	1	1	1
P zeolite production, powder zeolite, powder A	202:Manufacture ...	2023:Manufacture of soap...	3.46913E-7	kg					
P zinc mine operation lead concentrate APOS,	072:Mining of no...	0729:Mining of other non...	2.02837E-7	kg	1	3	3	1	1
P cobalt production nickel concentrate, 16% Ni	072:Mining of no...	0729:Mining of other non...	1.47542E-7	kg	1	2	1	1	1
P zinc mine operation copper concentrate, sulfi	072:Mining of no...	0729:Mining of other non...	1.28613E-7	kg	1	3	3	1	1
P cobalt production cobalt APOS, U - GLO	072:Mining of no...	0729:Mining of other non...	1.26925E-7	kg	1	2	1	1	1

Allow calculation of data quality over the life cycle, show in calculation result

▼ Impact analysis: EF 3.0 Method (adapted)

Subgroup by processes ☒ Don't show < 1 %

Name	Category	Inventory result	Impact factor	Impact result	Unit	R	C	T	G	F
> Ionising radiation				0.04134	kBq U-235 eq	1	1	5	2	1
> Climate change				1.45100	kg CO2 eq	3	3	5	4	2
> Resource use, minerals and metals				1.29883E-5	kg Sb eq	3	1	2	2	1
> Human toxicity, cancer - inorganics				2.56851E-18	CTUh	2	3	1	4	3
> Photochemical ozone formation				0.00406	kg NMVOC ...	2	3	5	3	2
> Ecotoxicity, freshwater - inorganics				20.92396	CTUe	1	1	5	5	2
> Eutrophication, marine				0.00641	kg N eq	2	3	5	3	2
> Resource use, fossils				12.24467	MJ	2	2	5	3	2
> Human toxicity, non-cancer - inorganics				4.71327E-9	CTUh	2	2	5	4	2
> Eutrophication, freshwater				0.00069	kg P eq	1	1	3	1	1
> Human toxicity, cancer - metals				5.08230E-9	CTUh	4	5	5	5	5
> Climate change - Fossil				1.44824	kg CO2 eq	3	3	5	4	2
> Human toxicity, non-cancer - metals				1.97186E-7	CTUh	4	5	5	5	5
> Human toxicity, non-cancer				2.02688E-7	CTUh	4	5	5	5	5
> Acidification				0.04672	mol H+ eq	3	3	5	3	2
> Ecotoxicity, freshwater - organics				1.80870	CTUe	3	3	4	2	2
> Climate change - Biogenic				0.00126	kg CO2 eq	3	2	5	3	2
> Climate change - Land use and LU change				0.00151	kg CO2 eq	4	3	5	3	2
> Ozone depletion				8.37845E-8	kg CFC11 eq	2	3	5	5	3
> Human toxicity, non-cancer - organics				6.20786E-10	CTUh	3	2	5	4	3
> Ecotoxicity, freshwater - metals				121.00749	CTUe	2	3	5	5	4
> Human toxicity, cancer				5.61501E-9	CTUh	4	4	5	5	4
> Water use				3.10997	m3 depriv.	3	3	4	3	2
> Particulate matter				3.46113E-7	disease inc.	3	3	4	3	2
> Ecotoxicity, freshwater				143.57039	CTUe	2	3	5	5	4
> Human toxicity, cancer - organics				5.32712E-10	CTUh	1	1	5	1	1
> Land use				206.83832	Pt	1	1	3	1	1
> Eutrophication, terrestrial				0.19726	mol N eq	2	3	5	3	1

Allow calculation of data quality over the life cycle, show in calculation result

▼ Impact analysis: EF 3.0 Method (adapted)

Subgroup by processes ☒ Don't show < 1 %

Name	Category	Inventory result	Impact factor	Impact result	Unit	R	C	T	G	F
> ☸ Ionising radiation				0.04134	kBq U-235 eq	1	1	5	2	1
> ☸ Climate change				1.45100	kg CO2 eq	3	3	5	4	2
▼ ☸ Resource use, minerals and metals				1.29883E-5	kg Sb eq	3	1	2	2	1
> P copper mine operation and beneficiation, sulfide ore copper conce	072:Mining of non-ferrous metal ores / 0729:Mining of othe...			2.88545E-6	kg Sb eq	3	1	1	1	1
▼ P copper mine operation and beneficiation, sulfide ore copper conce	072:Mining of non-ferrous metal ores / 0729:Mining of othe...			1.38280E-6	kg Sb eq	3	1	1	1	1
F Tellurium, in ground	Resource / in ground	2.51991E-8 kg	40.70000 kg Sb eq/kg	1.02560E-6	kg Sb eq	3	1	1	1	1
F Copper, in ground	Resource / in ground	0.00011 kg	0.00137 kg Sb eq/kg	1.45828E-7	kg Sb eq	3	1	1	1	1
F Selenium, in ground	Resource / in ground	3.75005E-7 kg	0.19400 kg Sb eq/kg	7.27509E-8	kg Sb eq	3	1	1	1	1
F Gold, in ground	Resource / in ground	1.01386E-9 kg	52.00000 kg Sb eq/kg	5.27209E-8	kg Sb eq	3	1	1	1	1
F Silver, in ground	Resource / in ground	3.65436E-8 kg	1.18000 kg Sb eq/kg	4.31215E-8	kg Sb eq	3	1	1	1	1
F Molybdenum, in ground	Resource / in ground	2.38921E-6 kg	0.01780 kg Sb eq/kg	4.25279E-8	kg Sb eq	3	1	1	1	1
> P copper mine operation and beneficiation, sulfide ore copper conce	072:Mining of non-ferrous metal ores / 0729:Mining of othe...			1.01177E-6	kg Sb eq	3	1	1	1	1
▼ P gold mine operation and gold production, unrefined gold, unrefine	072:Mining of non-ferrous metal ores / 0729:Mining of othe...			7.38046E-7	kg Sb eq	2	1	3	5	1
F Gold, in ground	Resource / in ground	1.41932E-8 kg	52.00000 kg Sb eq/kg	7.38046E-7	kg Sb eq	2	1	3	5	1
> P zinc mine operation zinc concentrate APOS, U - GLO	072:Mining of non-ferrous metal ores / 0729:Mining of othe...			7.06708E-7	kg Sb eq	1	3	3	1	1
> P copper mine operation and beneficiation, sulfide ore copper conce	072:Mining of non-ferrous metal ores / 0729:Mining of othe...			7.02794E-7	kg Sb eq	3	1	1	1	1
> P copper mine operation and beneficiation, sulfide ore copper conce	072:Mining of non-ferrous metal ores / 0729:Mining of othe...			5.43365E-7	kg Sb eq	3	1	1	1	1
> P copper mine operation and beneficiation, sulfide ore copper conce	072:Mining of non-ferrous metal ores / 0729:Mining of othe...			5.19641E-7	kg Sb eq	3	1	1	1	1
> P copper mine operation and beneficiation, sulfide ore copper conce	072:Mining of non-ferrous metal ores / 0729:Mining of othe...			5.06873E-7	kg Sb eq	3	1	1	1	1
> P copper mine operation and beneficiation, sulfide ore copper conce	072:Mining of non-ferrous metal ores / 0729:Mining of othe...			4.32309E-7	kg Sb eq	3	1	1	1	1
> P copper mine operation and beneficiation, sulfide ore copper conce	072:Mining of non-ferrous metal ores / 0729:Mining of othe...			4.14739E-7	kg Sb eq	3	1	1	1	1
▼ P silver-gold mine operation with refinery gold APOS, U - RoW	072:Mining of non-ferrous metal ores / 0729:Mining of othe...			4.04860E-7	kg Sb eq	2	4	5	5	1
F Gold, in ground	Resource / in ground	4.20854E-9 kg	52.00000 kg Sb eq/kg	2.18844E-7	kg Sb eq	2	4	5	5	1
F Silver, in ground	Resource / in ground	1.57641E-7 kg	1.18000 kg Sb eq/kg	1.86016E-7	kg Sb eq	2	4	5	5	1
> P copper mine operation and beneficiation, sulfide ore copper conce	072:Mining of non-ferrous metal ores / 0729:Mining of othe...			3.51246E-7	kg Sb eq	3	1	1	1	1
> P copper production, cathode, solvent extraction and electrowinning p	242:Manufacture of basic precious and other non-ferrous m...			2.18783E-7	kg Sb eq	2	2	5	1	1
> P phosphate rock beneficiation phosphate rock, beneficiated APOS,	089:Mining and quarrying n.e.c. / 0891:Mining of chemical a...			1.76761E-7	kg Sb eq	1	2	5	3	1
> P silver mine operation with extraction lead concentrate APOS, U - P	072:Mining of non-ferrous metal ores / 0729:Mining of othe...			1.72006E-7	kg Sb eq	3	3	3	1	1
> P gold production gold APOS, U - AU	072:Mining of non-ferrous metal ores / 0729:Mining of othe...			1.50958E-7	kg Sb eq	3	3	5	1	1
> P gold-silver mine operation with refinery gold APOS, U - RoW	072:Mining of non-ferrous metal ores / 0729:Mining of othe...			1.48679E-7	kg Sb eq	3	4	5	5	1
> P molybdenite mine operation copper concentrate, sulfide ore APOS	072:Mining of non-ferrous metal ores / 0729:Mining of othe...			1.44936E-7	kg Sb eq	2	2	5	1	1
> P zinc mine operation lead concentrate APOS, U - GLO	072:Mining of non-ferrous metal ores / 0729:Mining of othe...			1.40428E-7	kg Sb eq	1	3	3	1	1
> P chromite ore concentrate production chromite ore concentrate AF	072:Mining of non-ferrous metal ores / 0729:Mining of othe...			1.34081E-7	kg Sb eq	2	2	5	1	1
> ☸ Human toxicity, cancer - inorganics				2.56851E-18	CTUh	2	3	1	4	3
> ☸ Photochemical ozone formation				0.00406	kg NMVOC ...	2	3	5	3	2
> ☸ Ecotoxicity, freshwater - inorganics				20.92396	CTUe	1	1	5	5	2
> ☸ Eutrophication, marine				0.00641	kg N eq	2	3	5	3	2
> ☸ Resource use, fossils				12.24467	MJ	2	2	5	3	2
> ☸ Human toxicity, non-cancer - inorganics				4.71327E-9	CTUh	2	2	5	4	2
> ☸ Eutrophication, freshwater				0.00069	kg P eq	1	1	3	1	1
> ☸ Human toxicity, cancer - metals				5.08230E-9	CTUh	4	5	5	5	5

Allow calculation of data quality over the life cycle, show in calculation result

- (e.g., Agribalyse, manually calculated estimate of data quality for assumed most relevant parts of a life cycle, in excel → not necessary)

Find best
suited
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(somehow),
via GLAD
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Type of data more
LCA databases 44456

252291 data sets

P **EVALASTIC ® v loosely laid under load or mechanically attached module: A1-A3,**
Elastomer Roof Webs
Database: Ökobaumat
Location: Germany
Validity: 2014 - 2019

P **Isospan 1 Wooden concrete cladding stones with wood-fibre insulation OEKOPUR s 36.5/16.5 without Füllbeton module: C4, 79.5 kg/m2**
Concrete Precast and concrete goods
Databases: Ökobaumat
Location: Austria
Validity: 2017 - 2022

P **Woodchip boiler 120 - 400 kW module: D, 1 piece**
Heat generator
Databases: Ökobaumat
Location: Germany
Validity: 2016 - 2019

P **Isospan 2 Wooden concrete cladding stones with EPS insulation silver s 36.5/10.5 without Füllbeton module: B5, 69.8 kg/m2**
Concrete Precast and concrete goods
Databases: Ökobaumat
Location: Austria
Validity: 2017 - 2022

P **Dispersion-based solvent-free primers and adhesion agents for concrete and screeds module: A1-A3,**
Primers Paints and Plasters
Databases: Ökobaumat
Location: Germany
Validity: 2014 - 2019

P **Isospan 4 Wooden concrete sheath stones normal stone n 18 without Füllbeton module: C3, 49 kg/m2**
Concrete Precast and concrete goods
Databases: Ökobaumat
Location: Austria
Validity: 2017 - 2022

P **Argeton module: B1,**
Tiles and Plates

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The background image is a landscape photograph of a mountain valley. In the foreground, there is a rocky, light-colored slope. The middle ground shows a deep valley with dense evergreen forests covering the hillsides. In the background, more mountain peaks are visible under a sky with scattered white clouds. A semi-transparent purple rectangular box is positioned horizontally across the middle of the image, containing the word 'Outlook' in white text.

Outlook

Outlook: data quality in openLCA

- We are doing not so bad, but
 - Capacity building
 - User defined fitness for purpose
 - Real uncertainty
 - A challenge: full system compliance (EF, etc. -> cheat, “quality-washing”, ..)



GreenDelta

sustainability consulting + software



Thank you!

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