ÖKOBAUDAT in openLCA

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Content

GreenDelta

openLCA

1 About ÖKOBAUDAT

The ÖKOBAUDAT (current version 2024-I from 02.10.2024) database is the mandatory database for the Assessment System for Sustainable Building (Bewertungssystem Nachhaltiges Bauen, BNB). Datasets are provided for various building products, and are meant to fulfil requirements of the EN15804 and beyond (see Principles for acceptance of LCA data in ÖKOBAUDAT[1]). The database contains Environmental Product Declarations, EPDs, and Life Cycle Assessment datasets typically based on the Sphera MLC background database. To ensure comparability, only datasets based on the "Sphera MLC" background database are currently available for life cycle assessment calculations in the Bewertungssystem Nachhaltiges Bauen für Bundesgebäude (BNB). Further datasets based on the ecoinvent LCA database are provided in ÖKOBAUDAT as 'additional datasets'. These are only by exception to be used within the BNB, and are therefore not the primary source for BNB-aligned assessments. These generic LCA data sets are mostly following EN 15804:2012+A2:2019; older ones that are following EN 15804:2012+A1 are also present but are no longer updated. Explanation is that they are made available for ongoing projects in ÖKOBAUDAT until further notice.

Idea for ÖKOBAUDAT is to support the preparation of life cycle assessments for entire constructions. Claim is further that the datasets can be imported into common building life cycle assessment (LCA) tools. There are further expectations with the database, especially to be a prerequisite for ensuring that LCA data is prepared in a standardised manner throughout Europe. The documentation for the database with these claims and expectations, and more details, can be found at the official website[2].

Note that this document has been prepared independent from the BBSR and independent from the entities involved in creating the ÖKOBAUDAT database.

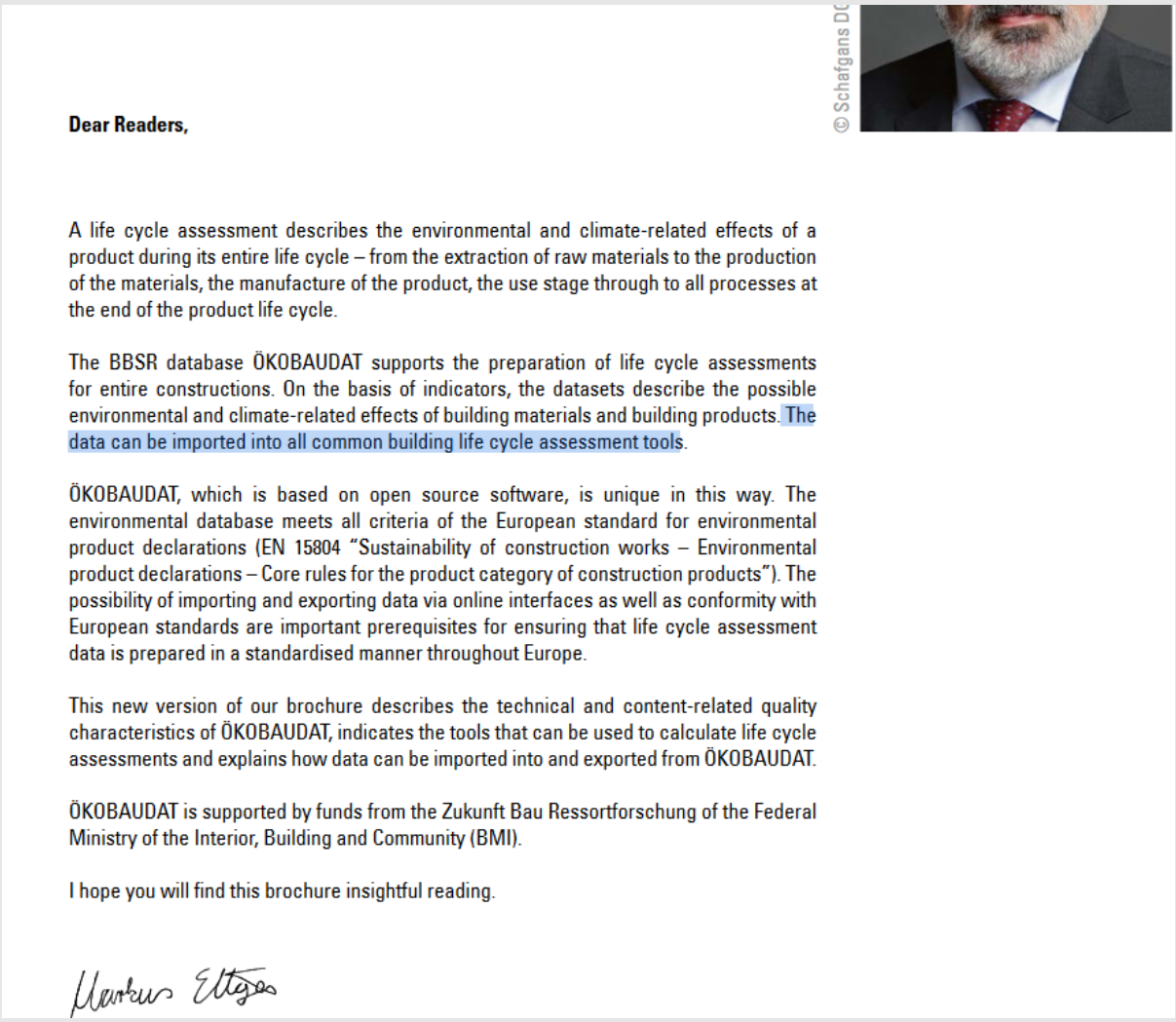
2 ÖKOBAUDAT in openLCA

Data for this version was obtained from the soda4LCA function built in openLCA to connect to the “node” of the ÖKOBAUDAT (https://oekobaudat.de/OEKOBAU.DAT/). The latest available version ‘OBD_2024_I’ was downloaded in April 2026. The following sections detail how to work

[1] https://www.oekobaudat.de/en/service/downloads.html

[2] Zukunft Bauen, Forschung für die Praxis | Volume 11, ÖKOBAUDAT, Basis for the building life cycle assessment (oekobaudat.de).

with ÖKOBAUDAT in openLCA. The EPD features of openLCA will be useful in this explanation[3]. Despite some progress compared to previous years, we will show that the imported data still needed some adjustments and may benefit from additional work, unlike promised by the statement made by the database providers, Figure 1. We hope that this explanation itself is useful, too, and in turn contributes to further advancing the quality of the ÖKOBAUDAT database.



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Dear Readers,

A life cycle assessment describes the environmental and climate-related effects of a product during its entire life cycle – from the extraction of raw materials to the production of the materials, the manufacture of the product, the use stage through to all processes at the end of the product life cycle.

The BBSR database ÖKOBAUDAT supports the preparation of life cycle assessments for entire constructions. On the basis of indicators, the datasets describe the possible environmental and climate-related effects of building materials and building products. The data can be imported into all common building life cycle assessment tools.

ÖKOBAUDAT, which is based on open source software, is unique in this way. The environmental database meets all criteria of the European standard for environmental product declarations (EN 15804 "Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products"). The possibility of importing and exporting data via online interfaces as well as conformity with European standards are important prerequisites for ensuring that life cycle assessment data is prepared in a standardised manner throughout Europe.

This new version of our brochure describes the technical and content-related quality characteristics of ÖKOBAUDAT, indicates the tools that can be used to calculate life cycle assessments and explains how data can be imported into and exported from ÖKOBAUDAT.

ÖKOBAUDAT is supported by funds from the Zukunft Bau Ressortforschung of the Federal Ministry of the Interior, Building and Community (BMI).

I hope you will find this brochure insightful reading.

Markus Eltges

Figure 1: screenshot from the ÖKOBAUDAT brochure, excerpt (from [2])

[3] https://greendelta.github.io/openLCA2-manual/epds/index.html.

3 Importing ÖKOBAUDAT into openLCA, for openLCA users

The prepared ÖKOBAUDAT database can be downloaded as a .zolca file from Nexus, https://nexus.openlca.org/. Upload this .zolca file in openLCA to have access to the full database[4]. That is, right-click in the openLCA navigation panel → New database → From file→ select the ÖKOBAUDAT .zolca file that you downloaded; or Main menu: Database → New database → From file → select the ÖKOBAUDAT .zolca file that you downloaded. The database will be then available in openLCA and can be activated/opened by double-clicking it.

4 How ÖKOBAUDAT looks like in openLCA

This section describes selected elements of the database in openLCA, and how to work with them.

4.1 Environmental Product Declarations (EPDs)

When opening the ÖKOBAUDAT database in openLCA, you will see that it does not contain any process datasets. Instead, datasets are represented as EPDs, see Figure 2. We believe this well reflects the nature of the original datasets; in older openLCA versions, and in other LCA tools, EPDs are typically shown as process datasets, in lack of a different element. How to work with EPDs in openLCA is detailed in our manual[5].

As shown in Figure 3, the EPDs contain life cycle stage results, called "modules" (A1-A3, C2, C3 for example), and some meta-information such as the author etc.

[4] Creating a database loading it from file - openLCA 2 manual (greendelta.github.io)

[5] https://greendelta.github.io/openLCA2-manual/epds/index.html.

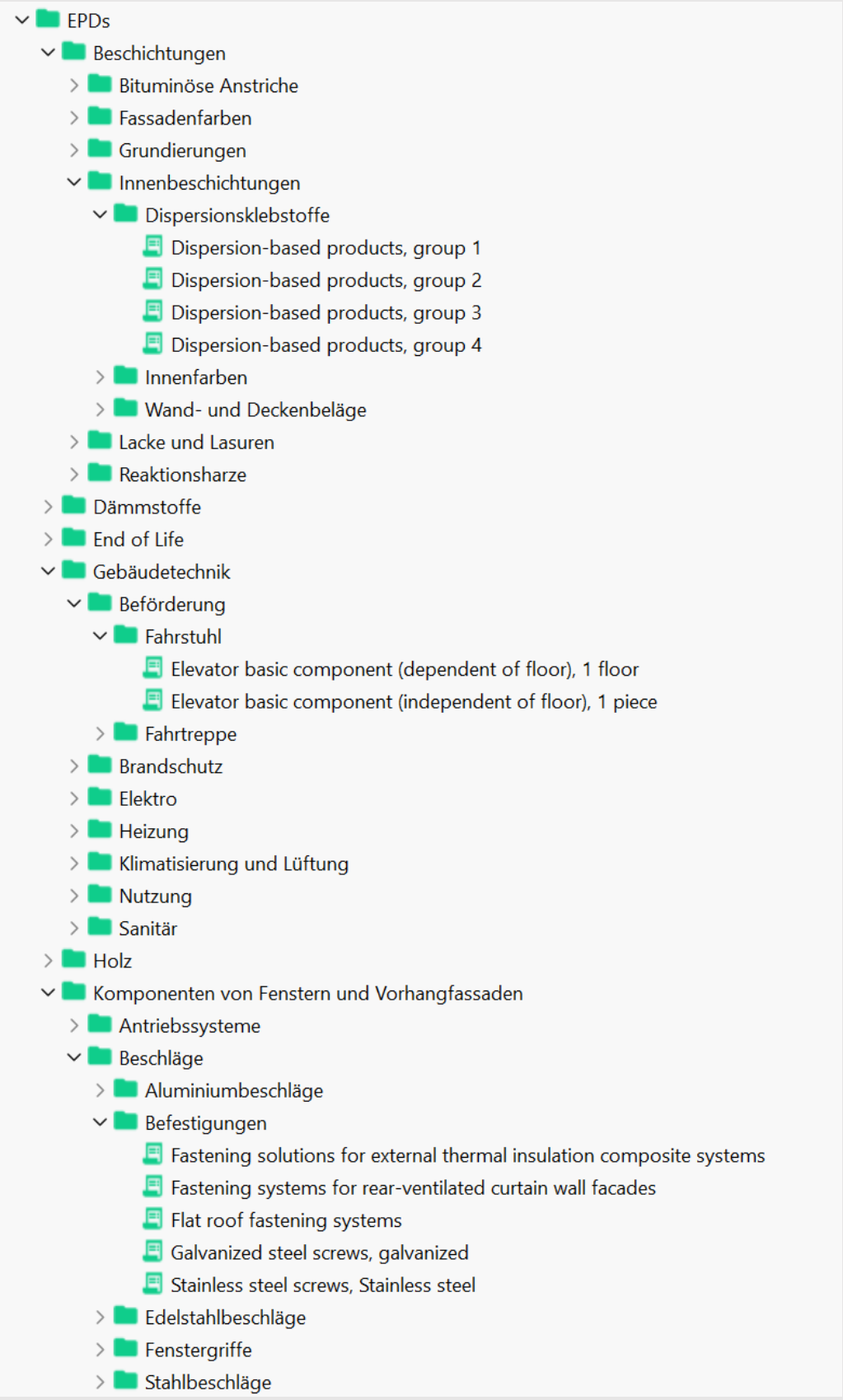


Figure 2: EPDs in the navigation Panel

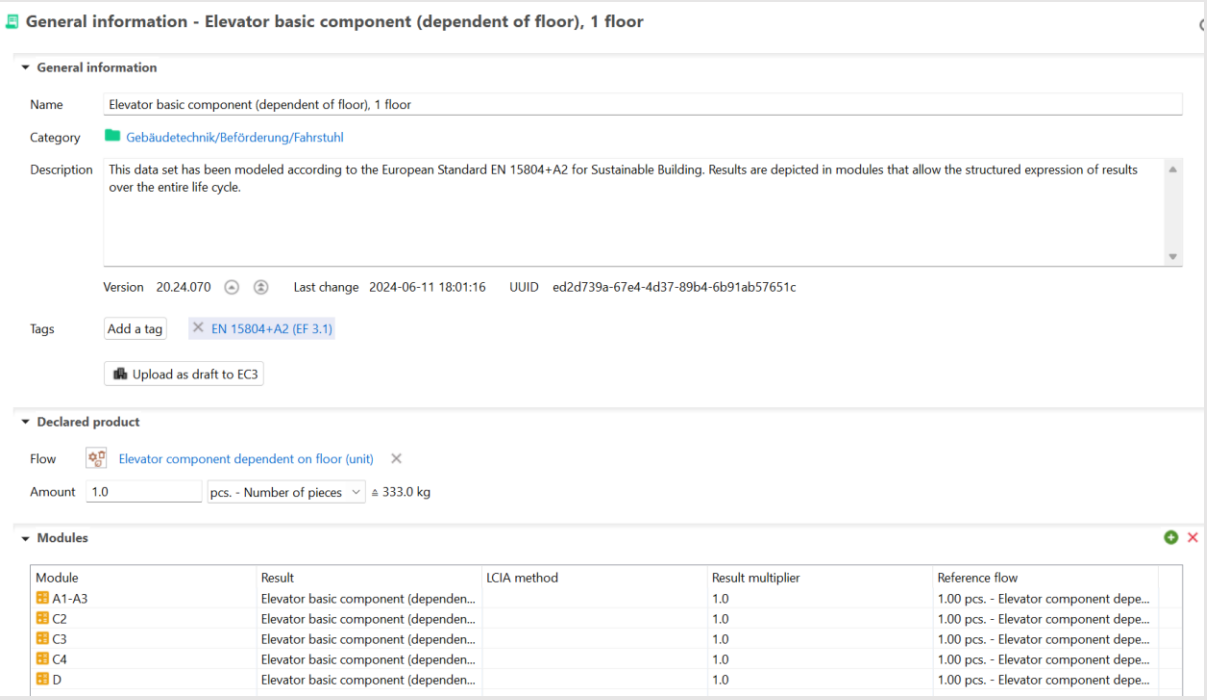


Figure 3: Example of an EPD from the ÖKOBAUDAT database– Elevator basic component (dependent of floor), 1 floor

4.2 Results for life cycle stages

Another useful element of openLCA present in this database is “results”. Life cycle stages of EPDs are results, and each EPD comprises several results. For the EPD, they are called modules. An example can be seen again in Figure 2 above, the EPD has A1-A3, C2, C3, and D as results. The result can be opened from the EPD (Fig. 4; or also independently, from the category tree).

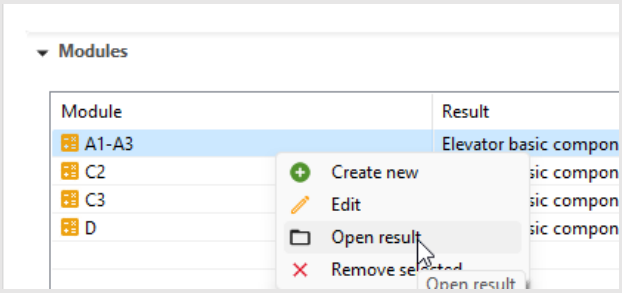


Figure 4: Opening a result from the EPD

The result looks like this (Fig. 5). It mainly contains the calculation results, a reference to the applied assessment method, and the product with amount and unit. Results can also be linked to life cycle models (“product system”), but in the ÖKOBAUDAT, this feature is not used since the database does not contain any product systems / life cycle models, but only fully aggregated datasets.

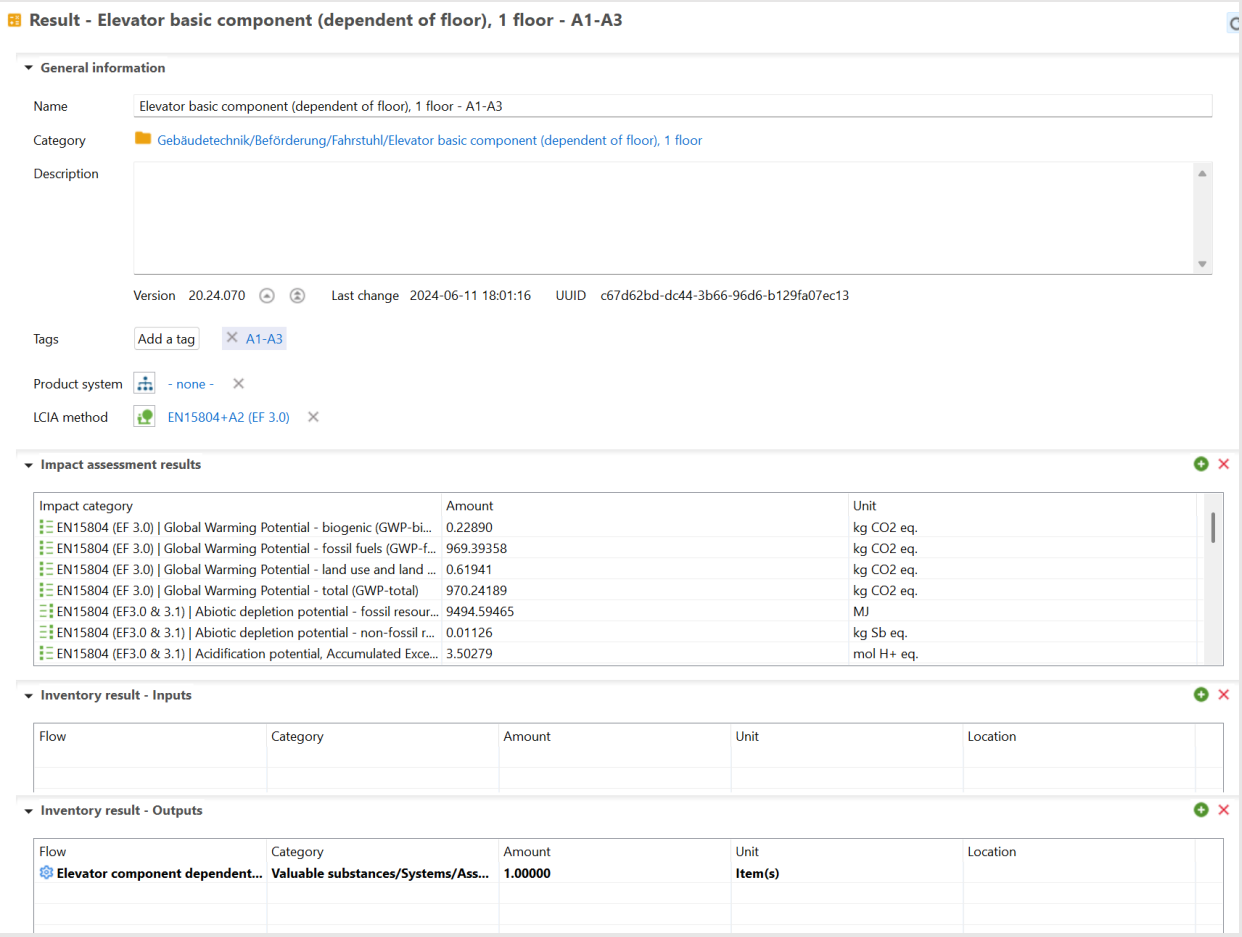


Figure 5: Example for a life cycle stage result

4.3 Impact assessment methods and categories

The database contains already impact assessment methods and impact categories. There are three “main” methods: EN15804+A1 (using CML 4.8 characterization factors), and two variants of EN15804+A2 — one based on EF 3.0 and one based on EF 3.1. Inventory indicators are always contained in all of the three main methods. TRACI 2.1 is not used in any of the EPDs and results in the database but is anyhow provided. As common in openLCA 2, impact categories are independent from the methods, as the methods are a mere “umbrella” for the respective impact categories (Fig. 6). These methods use the UUIDs from the Indata group and from the European Commission, where applicable, and are taken from the EN15804 method pack for openLCA.

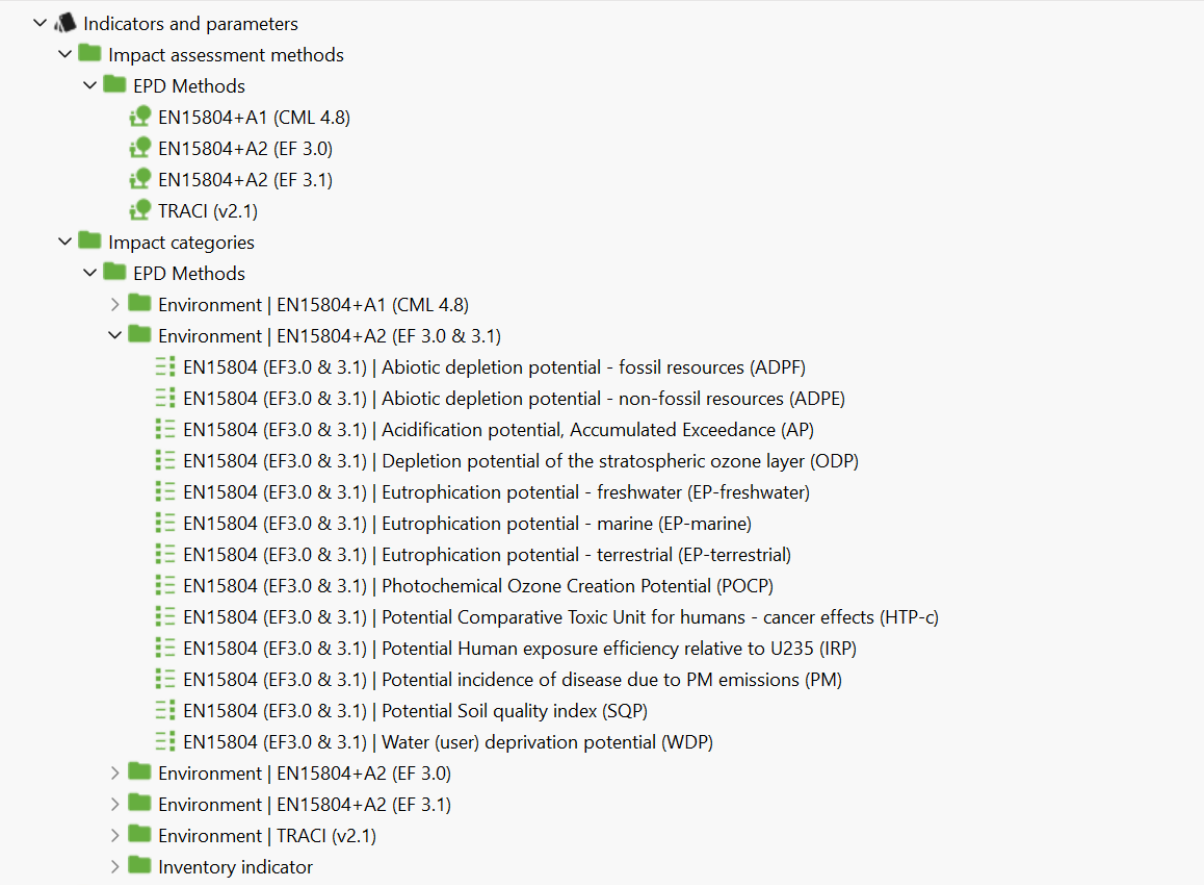
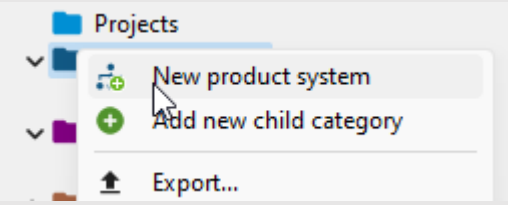


Figure 6: Impact assessment methods and Impact categories in openLCA.

4.4 Modelling with the ÖKOBAUDAT in openLCA

The results in the ÖKOBAUDAT database can be used directly in life cycle models in openLCA. For example, when we create a simple demo product system...



...with a dummy demo process, we can connect results to this demo process, calculate the system, and will obtain a result.

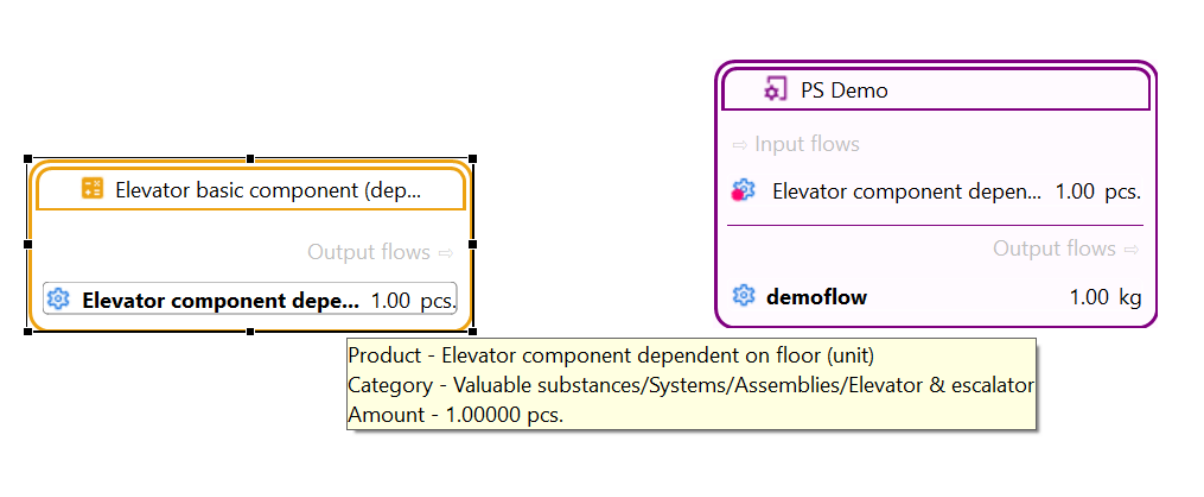


Figure 7: Example product system with dummy process and result, yet unconnected

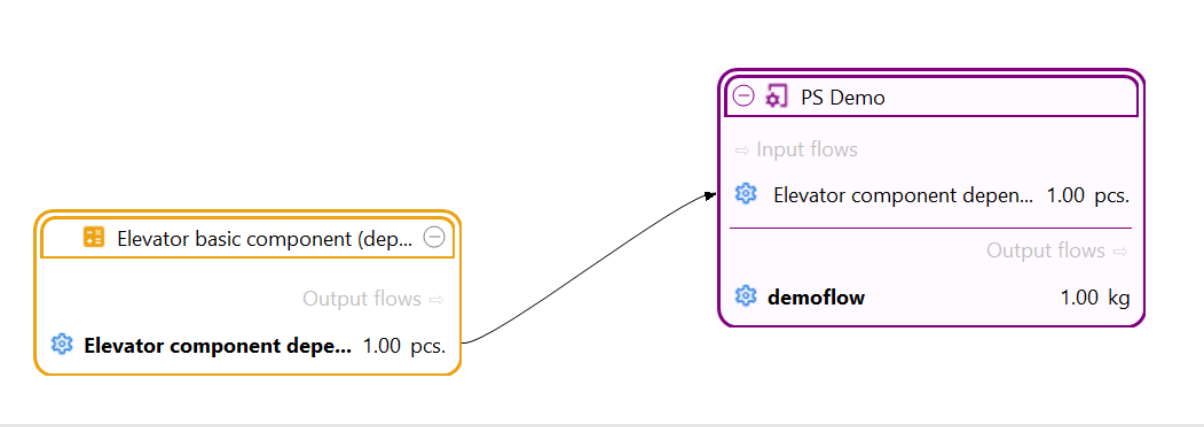
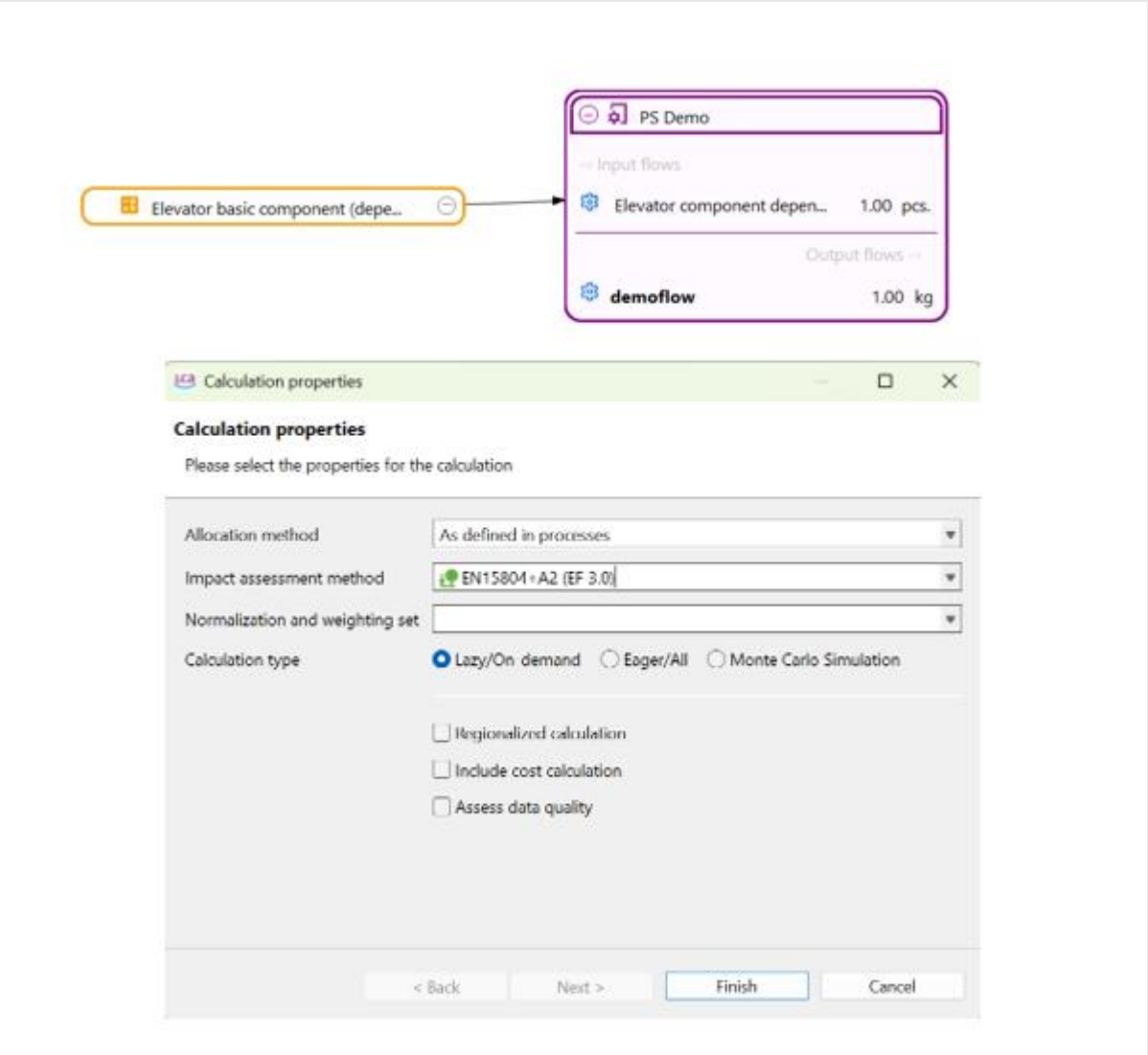


Figure 8: Example product system with dummy process and result, connected

This can then be calculated.



... and yields a result (Fig. 9).

PS Demo

Impact analysis - EN15804+A2 (EF 3.0)

Sub-group by Processes Flows | Don't show < 1 %

Name	Category	Inventory result	Characterizatio...	Impact assessment result
EN15804 (EF 3.0) | Global Warming Potential - biog	EPD Methods/Environment | EN15804+A2 (EF...			0.22890 kg CO2 eq.
EN15804 (EF 3.0) | Global Warming Potential - fossi	EPD Methods/Environment | EN15804+A2 (EF...			969.39358 kg CO2 eq.
EN15804 (EF 3.0) | Global Warming Potential - land	EPD Methods/Environment | EN15804+A2 (EF...			0.61941 kg CO2 eq.
EN15804 (EF 3.0) | Global Warming Potential - total	EPD Methods/Environment | EN15804+A2 (EF...			970.24189 kg CO2 eq.
Elevator basic component (dependent of floor),	Gebäudetechnik/Beförderung/Fahrstuhl			970.24189 kg CO2 eq.
EN15804 (EF 3.0) | Global warming potential except	EPD Methods/Environment | EN15804+A2 (EF...			0.00000 kg CO2 eq.
EN15804 (EF 3.0) | Potential Comparative Toxic Unit	EPD Methods/Environment | EN15804+A2 (EF...			0.00000 CTUe
EN15804 (EF 3.0) | Potential Comparative Toxic Unit	EPD Methods/Environment | EN15804+A2 (EF...			0.00000 CTUh
EN15804 (EF3.0) | Abiotic depletion potential - foss	EPD Methods/Environment | EN15804+A2 (EF...			9494.59465 MJ
EN15804 (EF3.0) | Abiotic depletion potential - non	EPD Methods/Environment | EN15804+A2 (EF...			0.01126 kg Sb eq.
Elevator basic component (dependent of floor),	Gebäudetechnik/Beförderung/Fahrstuhl			0.01126 kg Sb eq.
EN15804 (EF3.0) | Acidification potential, Accumulat	EPD Methods/Environment | EN15804+A2 (EF...			3.50279 mol H+ eq.
Elevator basic component (dependent of floor),	Gebäudetechnik/Beförderung/Fahrstuhl			3.50279 mol H+ eq.
EN15804 (EF3.0) | Depletion potential of the stratos	EPD Methods/Environment | EN15804+A2 (EF...			2.29628E-9 kg CFC-11 eq.
EN15804 (EF3.0) | Eutrophication potential - freshw	EPD Methods/Environment | EN15804+A2 (EF...			0.00104 kg P eq.
EN15804 (EF3.0) | Eutrophication potential - marine	EPD Methods/Environment | EN15804+A2 (EF...			0.59753 kg N eq.
EN15804 (EF3.0) | Eutrophication potential - terrestr	EPD Methods/Environment | EN15804+A2 (EF...			6.50724 mol N eq.
EN15804 (EF3.0) | Photochemical Ozone Creation P	EPD Methods/Environment | EN15804+A2 (EF...			1.97239 kg NMVOC eq.
EN15804 (EF3.0) | Potential Comparative Toxic Unit	EPD Methods/Environment | EN15804+A2 (EF...			0.00000 CTUh
EN15804 (EF3.0) | Potential Human exposure efficie	EPD Methods/Environment | EN15804+A2 (EF...			0.00000 kBq U235 eq.
EN15804 (EF3.0) | Potential incidence of disease due	EPD Methods/Environment | EN15804+A2 (EF...			0.00000 Disease Incidence
EN15804 (EF3.0) | Potential Soil quality index (SQP)	EPD Methods/Environment | EN15804+A2 (EF...			0.00000 Dimensionless
EN15804 (EF3.0) | Water (user) deprivation potentia	EPD Methods/Environment | EN15804+A2 (EF...			57.95838 m3 World eq.

Figure 9: Calculation result with modules from the EPD

This is very powerful we believe, well reflecting a common workflow when creating EPD models. Attention should be paid to the impact method used; the method applied in the calculation must be consistent with the method used for the result. openLCA 2 has "detached" categories from methods, and thus many impact categories are used in several methods, also for EPDs, but regarding climate change, for example, there are differences between EN15804 A1, EF3.0 and EF3.1.

4.5 Corrections done in the database published for openLCA

When preparing the database for openLCA, we needed to fix quite some technicalities. This is not too surprising as the EPDs contained in the ÖKOBAUDAT are created by many different entities, and also since the ILCD data format (ILCD+EPD, to be precise) originally used for the database in the node is typically heavy, complicated to process, and just cumbersome, compared the JSON-LD format used as default for openLCA for example. And yet, given the statements from the official communication (Fig. 1), it ***is*** somewhat surprising. Figure 10 shows an excerpt of some of the issues present in the original datasets after the import into openLCA. Note that these are not issues of openLCA we believe, but instead issues in the ILCD datasets.

Among the things to address, there are flow properties without valid values, one item without name, duplicate units, and UUIDs that are not unique as they should be but used for different

objects. Figure 10 shows a screenshot from the validation result in openLCA, after the initial import of ÖKOBAUDAT from the node.

Validation results

Data set	Message
Masseneinheit	duplicate unit name or synonym: oz
Masseneinheit	duplicate unit name or synonym: mg
Masseneinheit	duplicate unit name or synonym: lb
Masseneinheit	duplicate unit name or synonym: u
Masseneinheit	duplicate unit name or synonym: kg
Masseneinheit	duplicate unit name or synonym: t
Masseneinheit	duplicate unit name or synonym: g
Fläche-Einheit	duplicate unit name or synonym: ha
Fläche-Einheit	duplicate unit name or synonym: m2
Volumeneinheit	duplicate unit name or synonym: m3
Volumeneinheit	duplicate unit name or synonym: bbl
Volumeneinheit	duplicate unit name or synonym: yd3
Volumeneinheit	duplicate unit name or synonym: in3
Volumeneinheit	duplicate unit name or synonym: l
Unit of amount	duplicate unit name or synonym: unit
durchschnittliche Dübelsysteme für ...	invalid flow property reference @0
durchschnittliche Dübelsysteme für ...	invalid flow property reference @0
durchschnittliche Flachdachbefestigu...	invalid flow property reference @0
Lehmputzmörtel 1.6 (Kg)	reference flow property factor must be 1 @214
Lehmputzmörtel (Kg)	reference flow property factor must be 1 @214
Test 0,001	reference flow property factor must be 1 @214
Sylodyn NB	reference flow property factor must be 1 @205
	has an empty name
Beton C25/30/XC2 ECOPact/GK32/F...	duplicate reference ID: d3fd41dd-0c1f-4444-aa9f-333f466793d2
Concrete RC30/37 CIIA-L, Mix code ...	duplicate reference ID: 26c94674-201f-4046-83d9-035561ed8165
Concrete ECOPact C16/20Cl02D16S...	duplicate reference ID: 2eb97641-1944-4527-a5bf-9434203f0ebe
Concrete C32/40 CIIB-SL, Mix code ...	duplicate reference ID: 0b4e7413-0071-4868-92a0-91c79fa61276
Beton C25/30/XC2 ECOPact Prime/G...	duplicate reference ID: a7c798c8-1d42-4ccf-84b8-d60378c9ad1c
Concrete RC35/45 CIIB-V, Mix code ...	duplicate reference ID: 81005d66-511c-45b3-91e4-279420b122d8
Beton C30/37 X(C4 D1 S1 F1 A1 M1...	duplicate reference ID: 6ea7ceb4-891b-489b-9fdb-d5220badebfa
Beton C25/30/XC2 ECOPact Prime/G...	duplicate reference ID: 1e87251b-af56-4f03-b79b-96199e8a0756
Beton C30/37/XC2 ECOPact Prime/G...	duplicate reference ID: 669af354-152b-4b5e-842d-895018edf17c
Beton C30/37/XC2 ECOPact Prime/G...	duplicate reference ID: f70eda20-5698-4af0-9ea9-a86b437fa61a
Beton C25/30/XC2 ECOPact/GK32/F...	duplicate reference ID: 5a44767e-25e5-48e9-97c8-c4f8ba2dd9ee
Beton C30/37/XC2 ECOPact/GK32/F...	duplicate reference ID: 8fabc959-3baa-4a73-b659-840789e3d7fd
Beton C30/37/XC2 ECOPact/GK32/F...	duplicate reference ID: e5c3c2ca-e430-40e2-846a-7e7c8fd70240
Experto 52 Bulk Plant Alesd	duplicate reference ID: d1615643-e1f3-49e4-a2ff-becb244c448b
ECOPlanet Bulk Plant Alesd	duplicate reference ID: f3171dbc-2855-4a13-8f44-9e4babb80abf
Cement XX Sackware Plant Bridgevi...	duplicate reference ID: 04dc8d0c-3ace-4390-b628-59810c85a6c5
Cement XX Sackware Plant Bridgevi...	duplicate reference ID: 84456985-e38b-4f82-9da7-1d14c6467fdb
Optimo 42 Bulk Plant Alesd	duplicate reference ID: 97c76892-fb16-4d56-87db-f24e7159fa4b

Figure 10: Validation messages in openLCA after import of the raw data, excerpt

These were fixed as long as they affect correctness of the calculation and modelling results, or seem plain simple mistakes, such as forgotten names, duplicate units or missing flow properties. More structural improvements have not been applied so far, with the idea to maintain the original database as good as possible. This, however, means also that the numerous duplicate elements in the database, with a different UUID, have not been merged. This refers to product flows (Fig. 12), sources (Fig. 13), categories for authors (Fig. 14), and other aspects that are not affecting modelling and calculation.

We also left the duplicate UUIDs in the database, which occur for mainly one company, since we would have needed to assign new UUIDs which is against the idea of only moderately adjusting the database (Fig. 15).

It is interesting that quite some of the issues are also apparent in the old ELCD and ILCD database of the European Commission, created about 15 years ago or so in the software then known as GaBi (such as the somewhat messy category system, see Fig. 14).

Finally, we added an SQL script to allow users to re-link all EPDs to the EN15804+A2 EF 3.1 impact categories (Figure 16). This can be useful when building a new LCA model, since EF 3.1 is the current standard. Running the script is, of course, not mandatory.

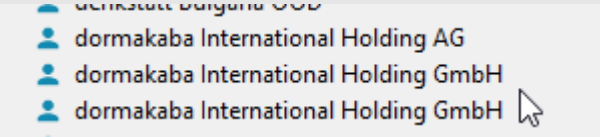


Figure 11: Duplicate actor / organisation names in the database, screenshot from openLCA; all these have different UUIDs

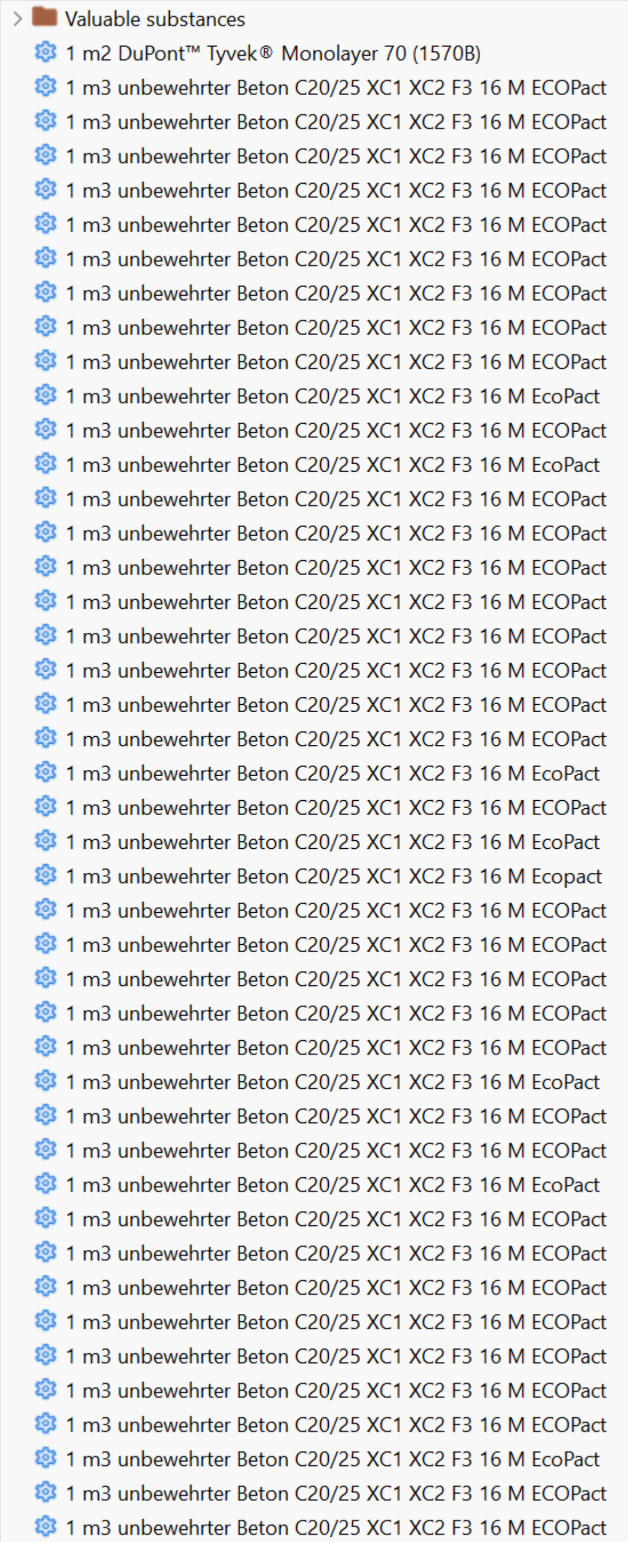


Figure 12: Duplicate or very similar product names in the database, screenshot from openLCA; all these flows have different UUIDs

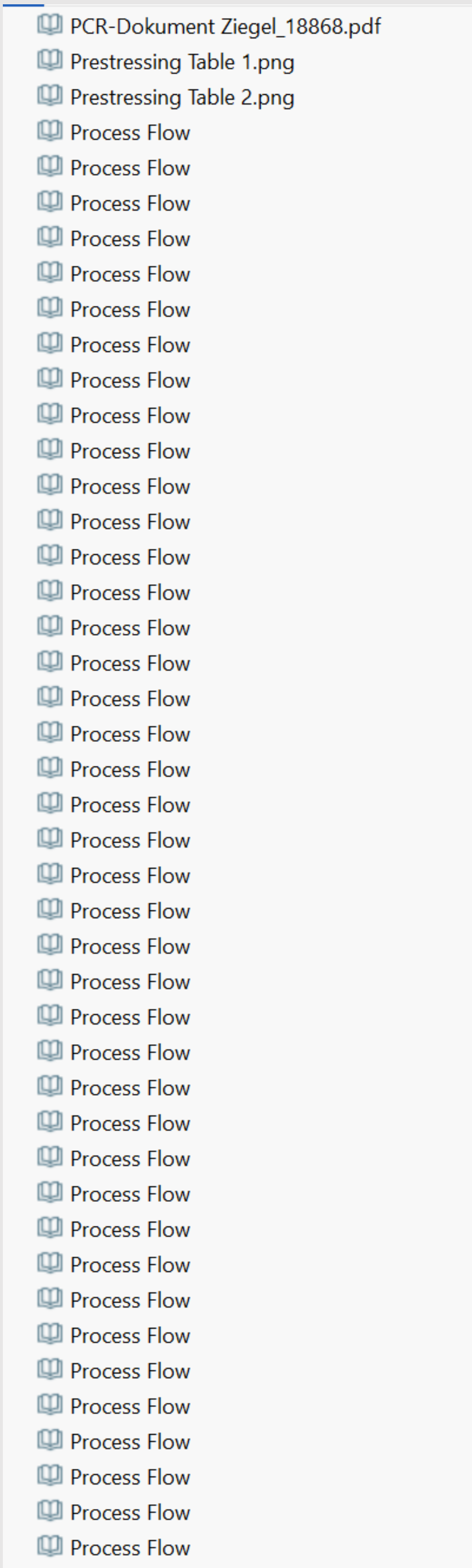


Figure 13: Duplicate source names in the database, screenshot from openLCA; all these have different UUIDs

Figure 14: Somewhat messy category system for actors in the database, excerpt, screenshot from openLCA

Validation results

Data set	Message
Holcim ECOPlanet A3 LH Bulk pla...	duplicate reference ID: aab24d1d-8841-4711-b038-08dadef1256a
Holcim Sulfo 5 R Bagged plant Lä...	duplicate reference ID: cca7554b-b06a-46be-b026-08dadef1256a
Holcim Duo 3 N-NA Bulk plant D...	duplicate reference ID: 3f4d9259-cfdc-42c7-afba-08dadef1256a
Holcim ECOPlanet A3 Bulk plant B...	duplicate reference ID: bd832da8-e250-4f87-afb2-08dadef1256a
Holcim Pur 4 R Bulk plant Lägerdorf	duplicate reference ID: b15257c9-0b2a-4a08-b014-08dadef1256a
Holcim Pur 5 N Bulk plant Höver	duplicate reference ID: dccdc87f-c782-4b7f-afec-08dadef1256a
Holcim Duo 4 N Bulk plant Höver	duplicate reference ID: a4e71f19-49eb-4b02-afd2-08dadef1256a
Holcim ECOPlanet B4 LH/SR/NA B...	duplicate reference ID: dd645dcc-0f43-4296-afd8-08dadef1256a
Holcim ECOPlanet A3 NA Bulk pla...	duplicate reference ID: 65c78922-4a7b-4d09-afc8-08dadef1256a
Holcim Pur 5 R Bulk plant Lägerdorf	duplicate reference ID: 5717c624-c704-4c09-b01c-08dadef1256a
Holcim Duo 3 N-LH/NA Bulk plant...	duplicate reference ID: a6ec38bc-0ea2-49a2-aff6-08dadef1256a
Holcim Duo 4 N-NA Bulk plant Br...	duplicate reference ID: 28c4ac84-e248-4b1f-afb0-08dadef1256a
Holcim Duo 3 N-LH/NA Bulk plant...	duplicate reference ID: 86c474b8-6538-4150-afac-08dadef1256a
Holcim Ferro 3 R-NA Bulk plant Lä...	duplicate reference ID: 41858b79-baea-4812-b008-08dadef1256a
Holcim Duo 3 N Bulk plant Dortm...	duplicate reference ID: a3eb7131-74b4-4a1f-afb6-08dadef1256a
Holcim ECOPlanet B4 LH/SR/NA B...	duplicate reference ID: cc8ed653-3a7e-4d00-b03a-08dadef1256a
Holcim Duo 3 N LH/SR/NA Bulk p...	duplicate reference ID: 56ae13d0-4181-4691-aff4-08dadef1256a
Holcim Duo 4 N-NA Bulk plant H...	duplicate reference ID: 0f7587f4-31d5-4e0f-afd6-08dadef1256a
Holcim Duo 4 N Bulk plant Lägerd...	duplicate reference ID: 3137016e-0c83-4475-aff8-08dadef1256a
Holcim Binder Bagged plant Höver	duplicate reference ID: 26855c20-be97-45c8-afd0-08dadef1256a
Holcim Duo 3 N Bulk plant Bremen	duplicate reference ID: d9b31aab-49a9-4355-afaa-08dadef1256a
Holcim ECOPlanet B4 LH/SR/NA B...	duplicate reference ID: df232880-f56e-4ec3-afda-08dadef1256a
Holcim Sulfo 5 R Bulk plant Läger...	duplicate reference ID: f6ec90be-d755-42fe-b024-08dadef1256a
Holcim Pur 4 N-NA Bulk plant Läg...	duplicate reference ID: 77ed0864-1a40-4870-b012-08dadef1256a
Holcim Pur 4 R-NA Bulk plant Läg...	duplicate reference ID: 314b12bb-12db-48af-b018-08dadef1256a
Holcim Duo 4 N Bulk plant Dortm...	duplicate reference ID: 519c12bc-e568-4766-afbc-08dadef1256a
Holcim Duo 3 N Bulk plant Schwel...	duplicate reference ID: fc53986c-4a48-4676-b030-08dadef1256a
Holcim ECOPlanet B3 LH/SR Bulk ...	duplicate reference ID: 60101d5c-81a9-48f8-afcc-08dadef1256a
Holcim ECOPlanet A3 Bulk plant S...	duplicate reference ID: 03f9bbf7-a70d-4d59-b036-08dadef1256a
Holcim Pur 4 N Bulk plant Lägerd...	duplicate reference ID: 9c7db368-55e2-49f5-b00e-08dadef1256a
Holcim Ferro 4 R Bulk plant Höver	duplicate reference ID: a563de27-93d2-48f4-afdc-08dadef1256a
Holcim ECOPlanet A3 Bulk plant L...	duplicate reference ID: e5a0a4a9-21e9-470d-affc-08dadef1256a
Holcim Duo 4 N-NA Bulk plant D...	duplicate reference ID: 8cec7a79-ac7a-4a67-afbe-08dadef1256a
Holcim ECOPlanet A3 Bagged pla...	duplicate reference ID: d05efb90-9a77-4c3d-affe-08dadef1256a
Holcim Hydroport Bulk plant Läge...	duplicate reference ID: aea58e1d-50ce-452b-b00c-08dadef1256a
Holcim Fluvio 4 N Bagged plant H...	duplicate reference ID: 0ece4e4b-032d-40cc-afe0-08dadef1256a
Holcim Pur 5 R Bagged plant Läge...	duplicate reference ID: 6a29ced5-a04c-47ed-b01e-08dadef1256a
Holcim Ferro 4 N-NA Bulk plant R...	duplicate reference ID: acc6cf54-2b87-4ece-b02e-08dadef1256a
Holcim Ferro 3 R Bagged plant Lä...	duplicate reference ID: 4b2637d2-5502-4991-b006-08dadef1256a
Holcim ECOPlanet A3 LH/NA Bulk ...	duplicate reference ID: e9a91105-1578-41b1-afb4-08dadef1256a
Holcim Pur 4 N Bagged plant Höv...	duplicate reference ID: c0661360-8499-475f-afe6-08dadef1256a

Figure 15: Duplicate UUIDs in the database, for EPDs (and results), excerpt, screenshot from openLCA

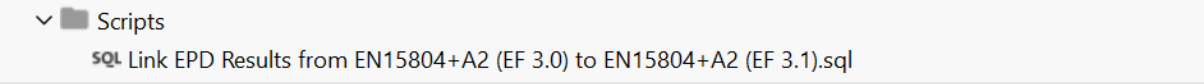


Figure 16: SQL script to re-link all EPDs to EN15804+A2 EF3.1

5 Conclusions

There have been some improvements compared to previous versions of ÖKOBAUDAT, for example we found less errors of duplicate units and missing flow property. But while the brochure may paint a somewhat optimistic picture for the database, quite some fixes were still needed. Nevertheless, the overall usage in openLCA remains promising. EPDs results can directly be added to life cycle models, which allows a smooth, transparent modelling of EPD life cycles, expands the available data sources for LCA and EPDs, and thus helps to upscale LCA and EPD creation.

Quite some of the existing issues seem influenced by the tool and tech stack used for the original database. Digital EPDs are now fully operational, and the integration in openLCA allows to focus on details that may not always be visible.

Overall, the database is very useful already, especially with the dedicated EPD and result features in openLCA. We hope this further work on our side will support the improvement of the database for the next release.