



LCA Commons

Modifications for openLCA

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1 Background

LCA Commons is available from the LCA Digital Commons website of the USDA, where various different repositories from different entities generating LCA data and managing LCA databases in the US are contained and provided to the public [1]. In October 2023, the entire content of these repositories was downloaded, with the intention to provide it for openLCA, and has been made available now in openLCA Nexus [2]. During the preparation, several aspects were

modified in the data, to curate data, and to improve user experience. These are documented in this text. The data revisions often start from openLCA validation messages.

Idea for this text is to provide a concise overview of the changes performed. A detailed, per dataset log file of the changes is available on request.

2 Modifications to curate datasets – major points

2.1 Allocation factors do not sum up to 1

Allocation factors not adding up to one are simply incorrect, and lead to incorrect calculation results for systems containing these multifunctional processes with allocation factors. This error could occur in case the allocation factors were either not calculated, or there were values inserted that for some reason summed up to something else than 1. In many cases, allocation factors simply had to be calculated, whereas for others, corrections or even additional values to perform unit conversions had to be found. In the former case, correction could be to allocate loads, choose default method or correct cases where two product both were allocated a load of 1 (hence resulting in a total of 2). In the latter case, product could have different property factors (e.g., kg and m³), hence it was necessary to look for e.g., densities to give all products among which to allocate the same property factor.

2.2 Invalid exchange flow @ o | Invalid exchange flow unit; flow=o, property=o, unit=o | Invalid exchange @ o

This error occurs simply if some value is missing, be it the name of the flow, the flow unit, its property, or the entire exchange row. These cases were corrected by trying to identify the exchange and its values in previous versions of the repositories, i.e. in the LCA Commons database, and insert these. In (exceptional) cases where the exchange flow could not be identified, the exchange was deleted.

2.3 Error in exchange formula

Errors in the exchange formula can have different reasons; there might be an owner of the exchange missing, the parameter name is wrong, a not-allowed separator/sign might be used in names. Further, it can be that formulas contained variables with no value or that there were variables that were not used. There could also be duplicates of the same exchanges that causes

error, which need to be deleted. In these cases, they were searched for in the old database. Signs that were not allowed were exchanged for such that were allowed (e.g., ‘;’ was exchanged for ‘_’). Exchanges without owner or with non-relevant or missing values that could not be identified were deleted.

2.4 Has multiple impact factors in impact category

If the same flow occurs several times in an impact category, openLCA takes the first entry it finds for a calculation. This means that for fully duplicate entries, this is simply inefficient, but for different factors, this makes a calculation potentially not reproducible. This issue has been fixed, by identification of the cases, deleting the “plain” duplicates, and modifying

2.5 No quantitative reference

If there was no quantitative reference defined, this was added. For process “nitrogen fertilizer mix; average production, at US regional storehouse; as N” the product “nitrogen fertilizer mix; average production, at US regional storehouse; as N” was added as quantitative reference.

For product systems “market pig; deep pit manure mgmt; at farm”, flow property was set to number of items, unit as items and target amount as 1.

2.6 Invalid flow property factor of 0

Flow property factors are used for converting between units in different flow properties, e.g. mass and volume. In the original data, quite some had a factor of 0 which does not make sense; it was set to 1, the default value, and it was checked whether this factor of 1 is justified.

2.7 Allocation do not sum up to 1 and empty flow or unit

In a case where the allocation did not sum up and there were also missing flows, flow categories and sometimes also units, these were identified in the previous version of the database and added to the current database. After that, the allocation could be calculated.

3 Modifications to curate datasets – minor points

3.1 Duplicate unit name or synonym

A duplicate unit name is probably confusing to users. In these cases, one of the duplicates was removed or renamed. For example, there were two versions of the unit of currency \$, or “m2a” was mentioned twice in the list of synonyms to the unit of area*time “m2*a”. Severity: minor.

3.2 No impact direction defined

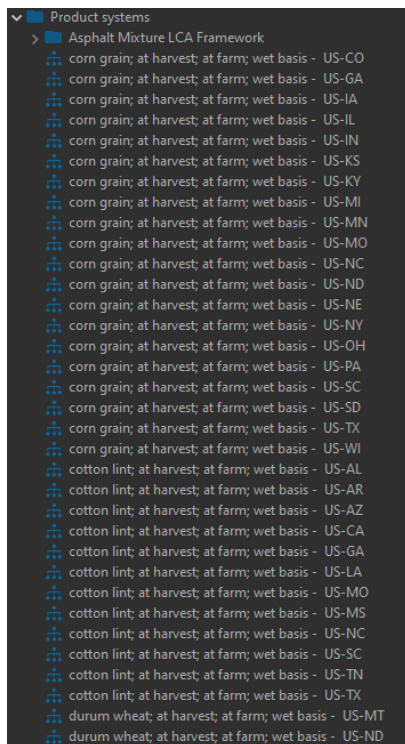
Impact direction is a new feature of openLCA 2, it allows to clearly specify whether an impact category is directed towards the input (resource depletion) or the output (climate change). This overcomes the need for openLCA to check this on the fly, for each calculation, and “guess” the direction to provide a positive result for either direction. In the LCA Commons methods, there were cases where the direction of an impact was not defined, which was then added.

3.3 Elementary flow is used as input and output

With the impact direction set (see above), this is not a problem and hence ignored.

3.4 Duplicate product system names

The database contains many product systems, quite some for the same type of crop in different region, with the same name. To allow easier identification, the location was added to the name.



4 Use advice for the database

The database contains more than ten-thousand (10882, to be precise) datasets for the US and North American background especially, for many different industries. Datasets are mostly unit processes.

The database is available as one combined database in openLCA Nexus. It has the reference flow system as provided by the original datasets, and comes with its own method package. It should not be used with other databases in openLCA Nexus as the flows will not fit to the other databases and to other LCIA methods as well. A version mapped to the openLCA reference flow system is under preparation.

Some supply chains in the database are truncated and are meant to be completed with datasets from ecoinvent. In the present database, with a system not fitting to the ecoinvent flow system, these supply chains are not completed, and left as they are.

The database has providers added to process flows, so that a direct calculation is possible.

5 References

[1] <https://www.lcacommons.gov/>

[2] <https://nexus.openlca.org/>

6 Contact

Nexus is run by GreenDelta GmbH, and LCA Commons on Nexus is provided by GreenDelta. For contact and inquiries, please refer to

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