EF 3.1

Errors and corrections when importing the database to openLCA

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September 2023

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1   Background

This document provides a short description of the corrections made to the EF 3.1 database to be able to implement it in openLCA. The EF 3.1 database is composed of several different repositories available at the respective nodes and free to download (after registration) as ILCD files.

When importing the new updated databases, there were some errors when validating – these are now corrected, see below for description of error and correction. Each error and its cause and correction are described. This text is summary of a larger text where all cases are individually listed. This is available on request.

2   Import procedure

The ILCD datasets from the respective nodes were imported into openLCA 2.0.2 in the following order:

Node	File	URL
JRC	EF-v3.1	https://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml
Sphera	EF3_1_official_data_energy_transport_packaging_EoL	https://lcdn.thinkstep.com/
	EF31_pt2_official_datasets	
CEPE	EF_3_1_logical_datastock	http://lcdn-cepe.org/
ESIG	EF_SOLVENTS_3_1_PUBLIC	https://data.esig.org/
ecoinvent	EF3_1_Chemicals_Part_1_public[1]	http://ecoinvent.lca-data.com/
	EF3_1_Chemicals_Part_2_public	
	EF3_1_Apparel_1_public	
	EF3_1_Apparel_2_public	
	EF3_1_Apparel_3_public	
	EF3_1_Others_public	
	EF3_1_Plastics_public	
Blonk	EF_3_1_MASTER	http://lcdn.blonkconsultants.nl/Node/
	EF_3_1_AGROFOOD	
	EF_3_1_RENEWABLES	
	EF_3_1_FEED	

3　Error messages and corrections

The validation function in openLCA and common sense was used to identify issues with the EF 3.1 database.

3.1　Duplicate unit name or synonym

This error occurs because of, which one could guess, there is a duplicate of either a unit, or that there is a duplicate in the list of synonyms. Consequently, one of the duplicates are removed. For example, there could be 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".

3.2　Invalid characterization factor at "0"

An error that occurs due to the characterization factor is missing. These errors were corrected by removing all flow property factors where the conversion factor was 0.

3.3　UUID duplicate

Some processes held sources which were empty and held the same UUID as the process itself. The sources were removed from the process and deleted.

3.4　No quantitative reference

If there was no quantitative reference defined, this was added. For process "Recycling of copper from clean scrap, production mix, at plant, collection, transport, pretreatment, copper content in input scrap 90%, copper losses 1%" the flow "copper scrap" was added as quantitative reference. The same for "Photovoltaic slanted-roof installation, multi-Si panel or laminate, production mix, at plant, photovoltaic installation, 3 kilowatt peak" where the flow "Photovoltaic slanted-roof installation, multi-Si panel" was set as quantitative reference.

3.5　Product flow to waste flow

For the process "End of life of beverage cartons, production mix, at plant, collection, transport, cleaning, 1kg of cardboard waste disposed" the flow "Beverage carton waste; see comment; production, at plant; processing" was transformed into a waste flow and set as quantitative reference as this clearly represented a waste treatment process.

For various processes titled: "Treatment of decommissioned [boat]", the product flows which were an input and marked as quantitative reference were updated to product flows as they represented waste treatment processes.

3.6   Waste flow to product flow and vice versa

For the process "Recycling of textiles into fibers, production mix, at plant, collection, transport, sorting, fibration, spinning, textile waste, efficiency 85%. Fiber composition estimated as 60% synthetic fiber and 40% natural fiber." the flow "Used textile, natural and synthetic" was transformed into a waste flow and set as quantitative reference. Moreover, the product flows "Recycled fiber, natural" and "Recycled fiber, synthetic" were updated to product flows.

3.7   RoW dublicate

In the process "Process steam from biomass (solid) 90%, production mix, at plant, technology mix regarding firing and flue gas cleaning, MJ, 90% efficiency" RoW was used as country code instead of ROW. This was corrected and the country code RoW was deleted.

3.8   Characterization and weighting factors

Sourced from the EF 3.1 reference package (https://eplca.jrc.ec.europa.eu/permalink/EF3_1/EF-v3.1.zip) normalization and weighting factors were added:

Impact categories	WF [%]
Acidification	6.20%
Climate change	21.06%
Ecotoxicity, freshwater	1.92%
EF-particulate matter	8.96%
Eutrophication, freshwater	2.80%
Eutrophication, marine	2.96%
Eutrophication, terrestrial	3.71%
Human toxicity, cancer	2.13%
Human toxicity, non-cancer	1.84%
Ionising radiation	5.01%
Land use	7.94%
Ozone depletion	6.31%

Photochemical ozone formation	4.78%
Resource depletion, fossils	8.32%
Resource depletion, minerals and metals	7.55%
Water use	8.51%

Impact categories	Unit	NF
Acidification	mol H+ eq./person	5.556954123060E+01
Climate change	kg CO2 eq./person	7.553083162851E+03
Ecotoxicity, freshwater	CTUe/person	5.671658633706E+04
EF-particulate matter	disease incidences/person	5.953668211255E-04
Eutrophication, freshwater	kg P eq./person	1.606852128288E+00
Eutrophication, marine	kg N eq./person	1.954518155192E+01
Eutrophication, terrestrial	mol N eq./person	1.767549997889E+02
Human toxicity, cancer	CTUh/person	1.725289765387E-05
Human toxicity, non-cancer	CTUh/person	1.287357350081E-04
Ionising radiation	kBq U-235 eq./person	4.220163390150E+03
Land use	pt/person	8.194981829230E+05
Ozone depletion	kg CFC-11 eq./person	5.234838338402E-02
Photochemical ozone formation	kg NMVOC eq./person	4.085919773478E+01
Resource depletion, fossils	MJ/person	6.500425966402E+04
Resource depletion, minerals and metals	kg Sb eq./person	6.362261523695E-02
Water use	m3 water eq of deprived water/person	1.146870864076E+04

3.9   Geoshapes

Geoshapes (all.geojson) were downloaded from https://geography.ecoinvent.org/ and implemented into the database. In openLCA, the 'update existing only' option was chosen during the import. This is of course not a mistake in the existing datasets provided in the nodes, but allows to show results on the location map in openLCA.

3.10   Multiple product flows with the same name

Quite some product flows held the same name and same properties but different UUIDs. To allow linking of product flows in openLCA, the product flows were merged.

3.11   Duplicate unit name or synonym (C_wt; water_ct)

It was found that carbon and water content were defined as "C_wt" and "water_ct" but also as "Carbon content" and "water content". Hence, they were merged if possible.

3.12   Adding regional codes for product systems

For the sake of clarity, we added country codes to the product systems' names based on the country code of the referenced process.

3.13   Elementary flow is used as input and output

Error is not a problem and can be ignored.

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