Agri-footprint 7.0 for openLCA

Software version:	openLCA 2.5.0
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Cover photo by Julia Cilleruelo Palomero

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1 Introduction

Blonk Milieu Advies B.V, developers of Agri-footprint, and GreenDelta GmbH, developers of openLCA, have been working the past months on developing Agri-footprint for openLCA. This report will guide you through an introduction to the Agri-footprint database followed by the implementation documentation of the database to openLCA and comparison of results against the version in SimaPro.

2 About Agri-footprint 7.0

The Agri-footprint database developed by Blonk Milieu Advies B.V. aims to provide a thorough and consistent life cycle inventory (LCI) database for the agriculture and food sector. The database covers data on food, feed and agricultural intermediate products and it facilitates transparency enabling a more rapid transformation to sustainable food supply chains in multiple ways.

The database can be particularly of interest for the feed sector since it's the source database for the Global Feed Lifecycle Institute (GFLI) database, the European Commission EF feed databases, and is therefore relevant for all animal sectors that want to generate compliant footprint studies.

Agri-footprint aims to be compliant to the most widely used methodology standards for agricultural and food LCA and footprinting by connecting to data from leading statistical institutes (such as FAO and Eurostat), industry publications, and scientific literature. For agricultural modelling the product environmental footprint calculation rules are followed as published in the latest PEF guidelines, (EU) 2021/2279 "Commission Recommendation of 15 December 2021 on the use of the Environmental Footprint methods to measure and communicate the life cycle environmental performance of products and organizations."

Since the first release in 2014 the Agri-footprint has been expanded and updated 6 times to arrive at the current version: Agri-footprint 7. There are now around 5,000 processes, 420 market mixes, 582 cultivations, 212 food products, and 37 animal production systems across 60+ geographies included in the Agri-footprint database.

2.1 Changes from Agri-footprint 6.3

	Agri-footprint 6.3	Agri-footprint 7.0
Ecoinvent background data	3.8	3.10
FAO stats	5 year average (2014-2018)	5 year average (2018-2022)
LUC data	3 year average from FAO (2015)	Latest 3 year average from FAO (2019)
Number of items included	4800+	4800+

3 Database implementation to openLCA

The database was delivered by Blonk Milieu Advies B.V in SimaPro CSV format. In order to implement it in openLCA and make the database compatible with the openLCA LCIA Method package, the database was mapped to the openLCA reference flow system.

Agri-footprint 7.0 database can be used along with other databases in openLCA like ecoinvent, the EN 15804 add-on, Circularity Package, Carbon Minds, PLEX, Agribalyse, IDEMAT, Circularity Food Package and soca.

4 Results comparison against SimaPro

The full database was calculated using the EF 3.1 LCIA Method from the openLCA LCIA Method package. The results were compared against those from SimaPro, see Figure 1.

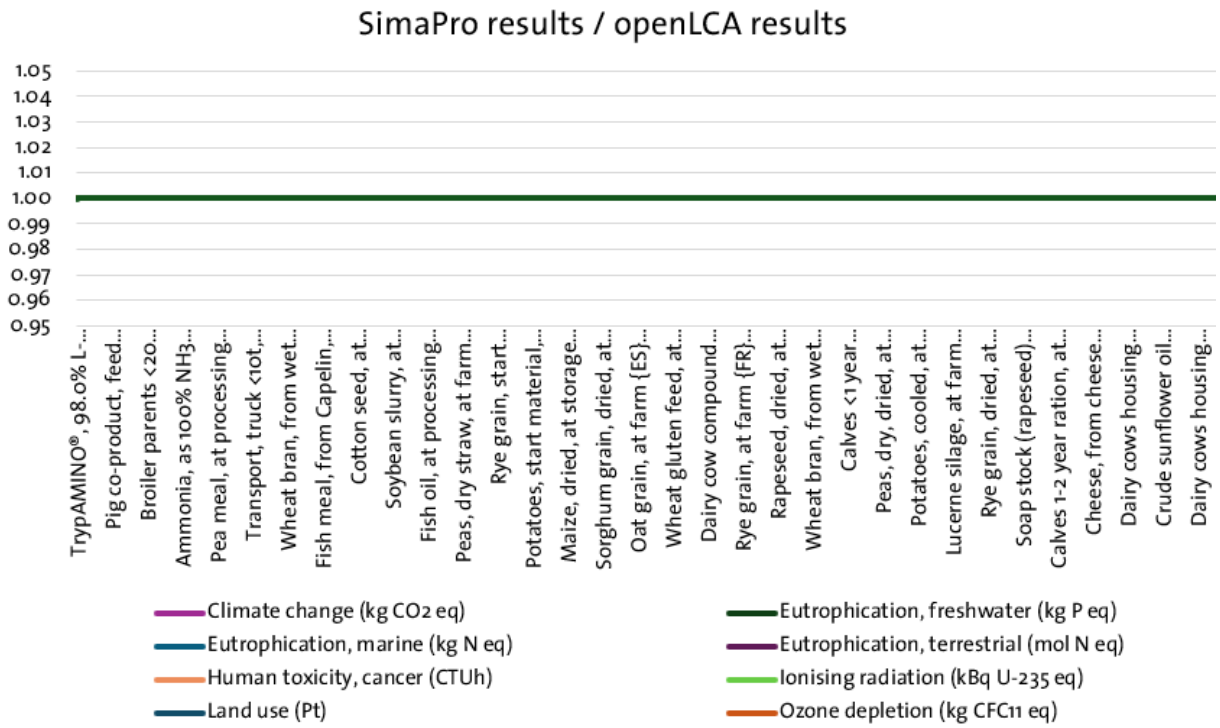

Figure 1. SimaPro results / openLCA results for Agri-footprint 7.0. The x-axis represents all processes from the database

Generally, the same results are observed between both database implementation, however, there were some discrepancies between few results on some impact categories. These differences arise from the EF 3.1 LCIA Method implementation in SimaPro vs openLCA. The inventory of the database is the same in both software.

Land use

The flows described in Table 1, which are found in the inventory of the database, have characterisation factors (CF) in the openLCA EF 3.1 LCIA Method but not in the SimaPro version. This comes because that specific flow is not characterised in the original source from EF 3.1, but we think it should be taken into account in the Land use impact category.

From here, we have parametrised the characterisation factors tables for Land use impact category so that it shows compliance with SimaPro as a default. If users would like to take them into account, they should put a value of "0" for the compliant parameter.

Table 1. Flows causing discrepancy in the Land Use impact category from EF 3.1

Flow name	Compartment	CF	Units	CF flow in original EF 3.1
Transformation, to seabed, drilling and mining	Elementary flows/Resource /land	4472.6	(pt)/m2	Land transformation, to dump site
Occupation, seabed, drilling and mining	Elementary flows/Resource /land	105.24	(pt)/m2*a	Land occupation, dump site
Occupation, seabed, infrastructure	Elementary flows/Resource /land	139.1	(pt)/m2*a	Land transformation, industrial area

Figure 2. Location of parameters in openLCA. The compliant vs realistic parameters were added to offer the option to have results compliant with SimaPro or realistic in GreenDelta's view. It only influences Land use impact category and the default is set as compliant with SimaPro.

Resource use, fossil

There are certain flows in the Agri-footprint database inventory that are not characterised by the SimaPro EF 3.1 LCIA Method. These are:

- Gas, natural, 36.6MJ per m3 | Resource, in ground
- Oil, crude, 43.4 MJ per kg | Resource, in ground
- Gas, mine, off-gas, process, coal mining/m3 | Resource, in ground

On the openLCA side, we mapped these flows to flows that were characterised in our method package, resulting in a registered impact, see Figure 3.

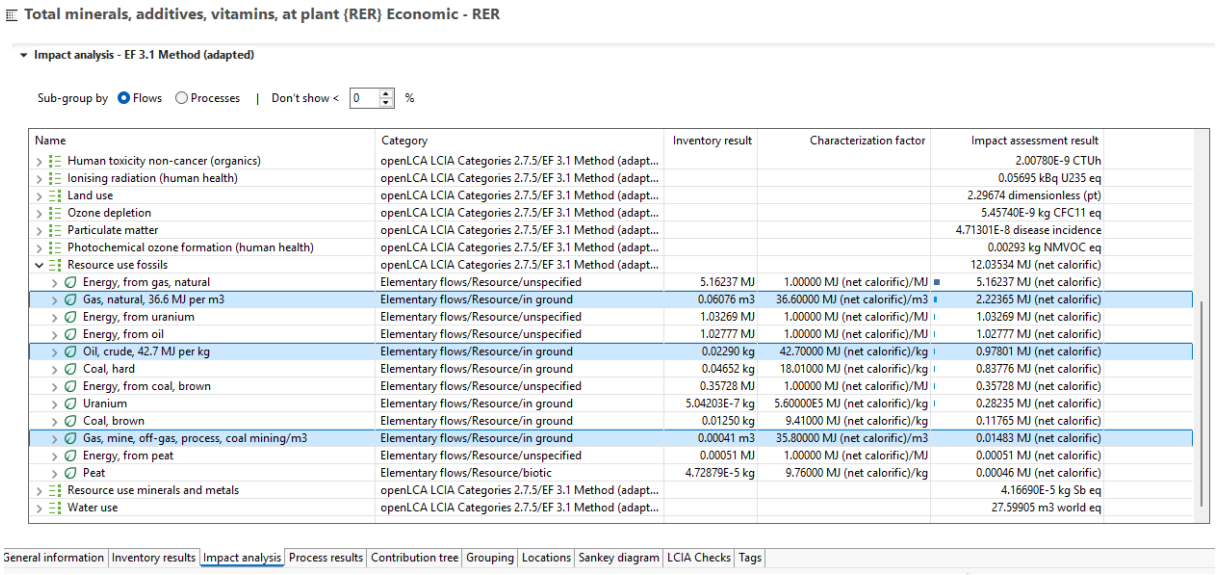

Figure 3. Flows that are taken into account by the openLCA EF 3.1 LCIA Method but not by the SimaPro version.

This results in a higher impact registered for openLCA calculations.

Only 5 processes are affected with a change in result of 7-24%. These are:

- BiolysÃ‚Â®, 54.6% L-Lysine, at Evonik plant {US}
- ThreAMINOÃ‚Â®, 98.5% L-Threonine, at Evonik plant {HU}
- Total minerals, additives, vitamins, at plant {RER} Economic
- TrypAMINOÃ‚Â®, 98.0% L-Tryptophan, at Evonik plant {SK}
- ValAMINOÃ‚Â®, 98.0% L-Valine, at Evonik plant {SK}

Water use

The EF 3.1 LCIA Method only has water flows that are regionalised at country level. In the openLCA reference flow system (and also in SimaPro) there are flows that represent a region smaller than a country, e.g. a state within the United States of America, or a region with larger countries, e.g. Europe. The EF methodology[1] explains how to deal with these flows. We have summarised the criteria in Table 2.

[1] https://eplca.jrc.ec.europa.eu/permalink/Guide_EF_DATA.pdf

Table 2. Implementation criteria from the Environmental Footprint methodology, and how it is dealt with in openLCA vs SimaPro.

Implementation criteria	openLCA implementation	SimaPro implementation
1. macro-regions e.g. Europe should be an average of regions inside.	Uses average factor for countries in that region (source: AWARE 1.0)	Uses global average factor
2. bigger regions, e.g. ROW, should have a GLO location factor	Uses global average factor	Uses global average factor
3. smaller regions should have the country code	Uses country level factor	Uses country level factor
Conclusion	**EF 3.1 Water use compliant**	**Not compliant (and less precise)**

This means that the water use impact will be different between openLCA and SimaPro.

5 Get Agri-footprint for openLCA

You can obtain Agri-footprint for openLCA in our market place openLCA Nexus: https://nexus.openlca.org/database/Agri-footprint

GreenDelta, owner of openLCA Nexus, is an official reseller of the database.

6 Contact and feedback

Feedback is welcome! Email us at nexus@greendelta.com

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