



Global Metrics for Sustainable Feed

November 2024

THE GLOBAL FEED LCA INSTITUTE

supporting the global metrics for sustainable feed

www.globalfeedlca.org





INTRODUCTION

Laura Nobel

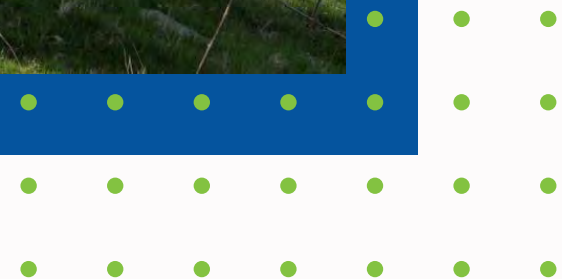
- **GFLI manager**
- **projectmanager at Agribusiness Service**

Responsible for overall management for the Global Feed LCA Institute. Laura's role is contributing to the bigger picture, stimulating companies to prioritize sustainability through the LCA method, and finding synergies with relevant stakeholders. On the day-to-day basis, she engages in nearly all aspects of maintaining and growing the institute. Such as preparing key meetings and working groups like the Technical Management Committee and the Board of Directors, coordinating communication streams, drafting documentations, and developing and maintaining relevant partnerships.



Content

- 01** Introduction
- 02** Timeline
- 03** GFLI database
- 04** Data generation
- 05** What's more to come
- 06** Membership



GFLI's mission

What is GFLI

Independent non-profit Institute with the purpose of;

- Providing a globally accessible, evolving animal feed ingredient Life Cycle Analysis (LCA) database;
- Supporting compliant, credible, and transparent environmental assessment of animal feed ingredients and their role in the environmental footprint of animal derived products; and
- Fostering continuous improvement of the environmental performance of animal derived products.

GFLI database

The database allows feed, livestock and aquaculture sectors to:

- use data based on a harmonized methodology;
- calculate the environmental footprint of products in a transparent and trustworthy manner; and
- benchmark and make meaningful comparisons.

Makes it possible to produce feed with a lower footprint; resulting also in food products with a lower footprint/kg (farmed fish/pig/poultry).

GFLI timeline

while the Institute is established in 2019, a long road came before...



2010-2015
Start of research
LCA



2015
GFLI established as
coalition project



2016-2018
GFLI methodology created
according to FAO-LEAP &
PEFCR Feed



2019
GFLI as non-profit
entity, start of institute



2020 onwards
Publication of the
database, member-based
institute, developments



GFLI in a nutshell

An Institute

Day-to-day management



Partnerships

Partnerships with stakeholders in food and feed



Methodology

Alignment with major developments, flexible but thorough methodological approaches



Database

Managing and improving the database



GFLI AND GLOBAL DEVELOPMENTS



Alignment

Alignment with major developments to allow compliance with (inter)national regulations and initiatives to simplify reporting duties



Database use

Reliable and credible data source for benchmarking, assessments, and scope 3 emissions



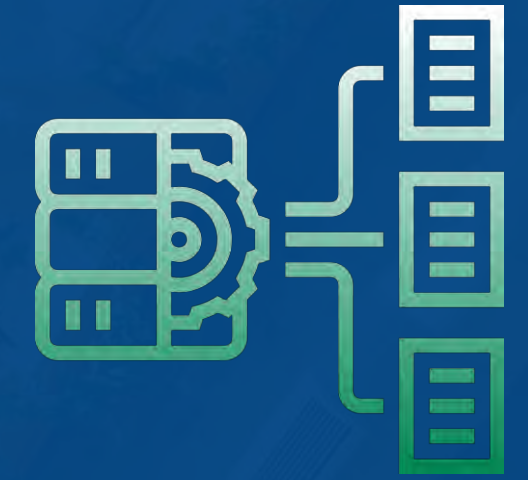
Partnership

Collaboration to increase interoperability, simplifying supply chain communication, & solving data gaps

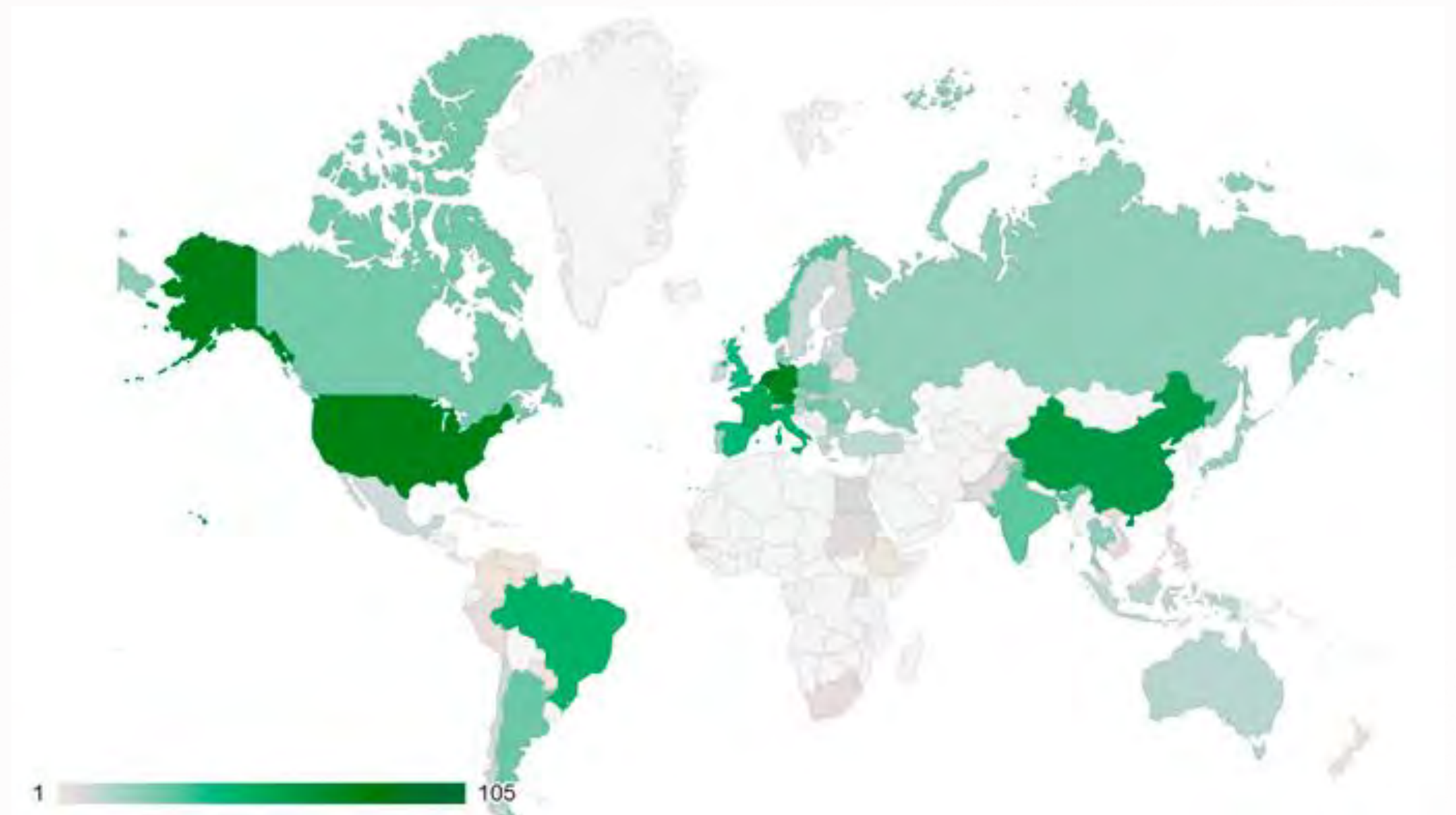
A modern, bright office interior with wooden desks, chairs, and large indoor plants. The space is open-plan with a high ceiling and large windows. The text 'GFLI DATABASE' is overlaid in the center in a bold, blue, sans-serif font. Green geometric shapes are on the left and right sides.

GFLI DATABASE

DATABASE



- $\geq 1,830$ datasets covering main ingredients for European countries and North American states/provinces, but also regional averages (global, Europe, North America)
- Three allocations: economic, mass matter, gross energy
- Includes Data Quality Rating (DQR), (EU PEF Method)





DATABASE FORMATS

Life cycle assessment

- Output of emissions per ton/ingredient
- 2 impact assessment methods included (ReCiPe & EF3.1)
- Ingredient comparisons
- Measuring average environmental footprint for compound feed

Lifecycle inventory (system processes)

- The system processes is the aggregated inventory of inputs and outputs of each dataset
- allows for flows to be manipulated to perform contribution or sensitivity analysis
- the resources (input), output (ingredient and emissions related to its production) are shown
- to see the changes to the end-product's environmental footprint

Unit process level

- The disaggregated inventory of inputs and outputs to the level used for modelling
- all details of how each dataset has been established and its linked processes are included
- allows for contribution or sensitivity analysis

Not all ingredients will be available in unit process level due to sensitivities for industry data

How can the GFLI data be used?

With the LCIA database format, you can calculate a compound feed based on the available ingredients in the database. Read the LCIA guidance document on website ([url](#))!

	TIR	TeR	GR	Unit		
1	1,92	1,42	1,68	ton		
2	1,92	1,42	1,68	ton		
3	1,92	1,42	1,68	ton		
4	1,92	1,42	1,68	ton		
5	1,92	1,42	1,68	ton		
6	1,92	1,42	1,68	ton		
7	1,92	1,42	1,68	ton		
8	1,92	1,42	1,68	ton		
9	1,92	1,42	1,68	ton		
10	1,92	1,42	1,68	ton		
11	1,92	1,42	1,68	ton		
12	1,92	1,42	1,68	ton		
13	1,92	1,42	1,68	ton		
14	1,92	1,42	1,68	ton		
15	1,92	1,42	1,68	ton		
16	1,92	1,42	1,68	ton		
17	1,92	1,42	1,68	ton		
18	1,92	1,42	1,68	ton		
19	1,92	1,42	1,68	ton		
20	1,92	1,42	1,68	ton		
21	1,92	1,42	1,68	ton		
22	1,92	1,42	1,68	ton		
23	1,79	2,14	1,92	1,68	ton	
24	1,79	2,14	1,92	1,42	1,68	ton

01



Leverage GFLI data for feed formulation ingredients

Integrate GFLI data in LCA studies or software tools



02

03



Define local footprint of feed and animal protein

Identify opportunities for impact reduction (scenario analysis)



04

05



Deliver sustainability reports and innovate

Communicate impact results and impact reduction



06

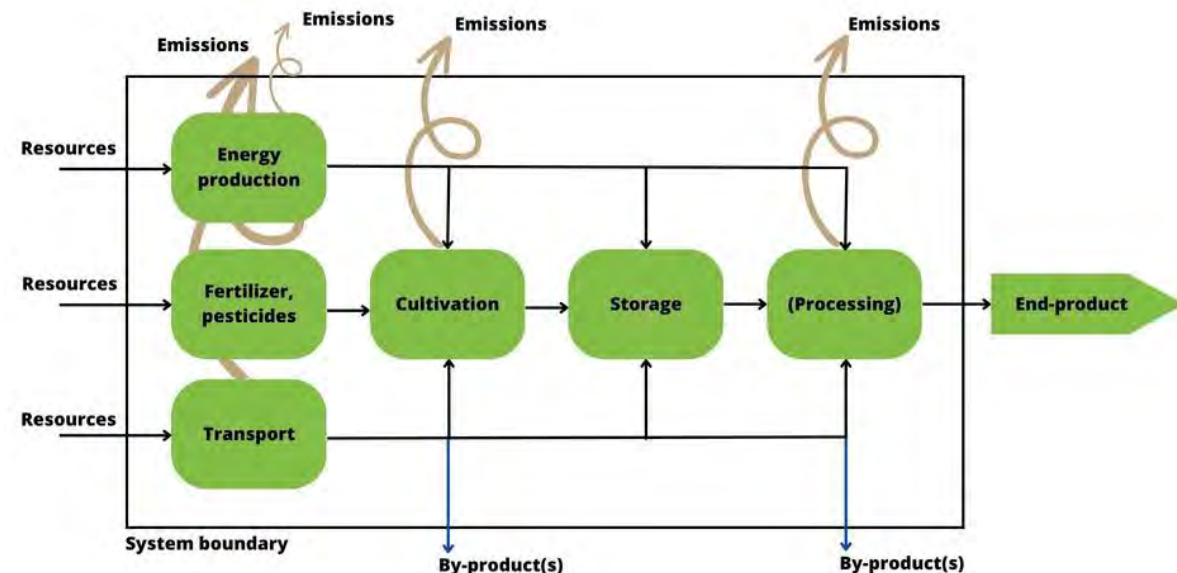
How can the GFLI data be used?

Unit process level

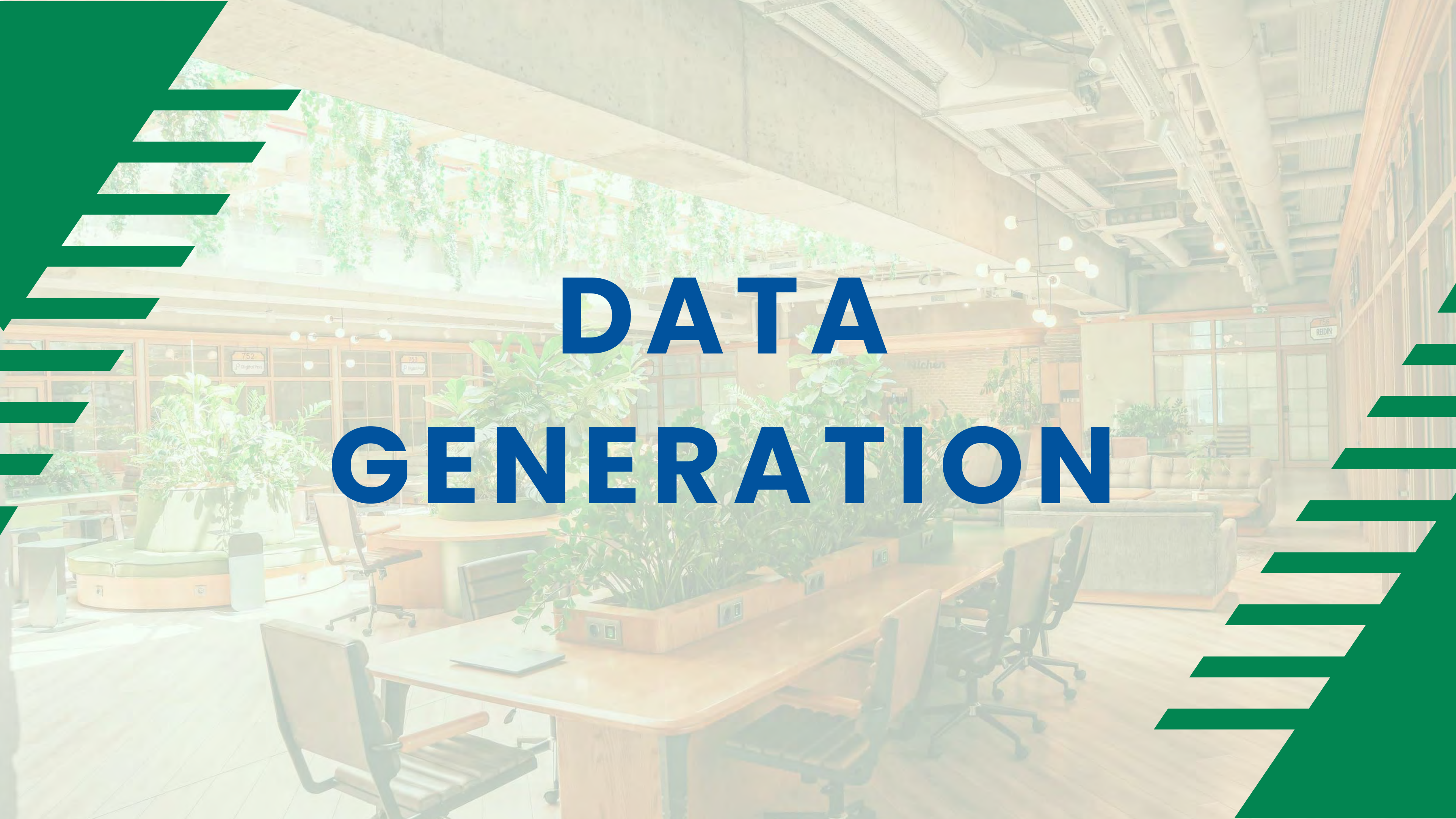
Through the unit process level data, underlying processes become available, such as:

- Water use
- Land use
- Manure & fertilizer input
- Pesticides use
- Energy input
- etc.

With this information, contribution or sensitivity analysis can be researched for process improvements

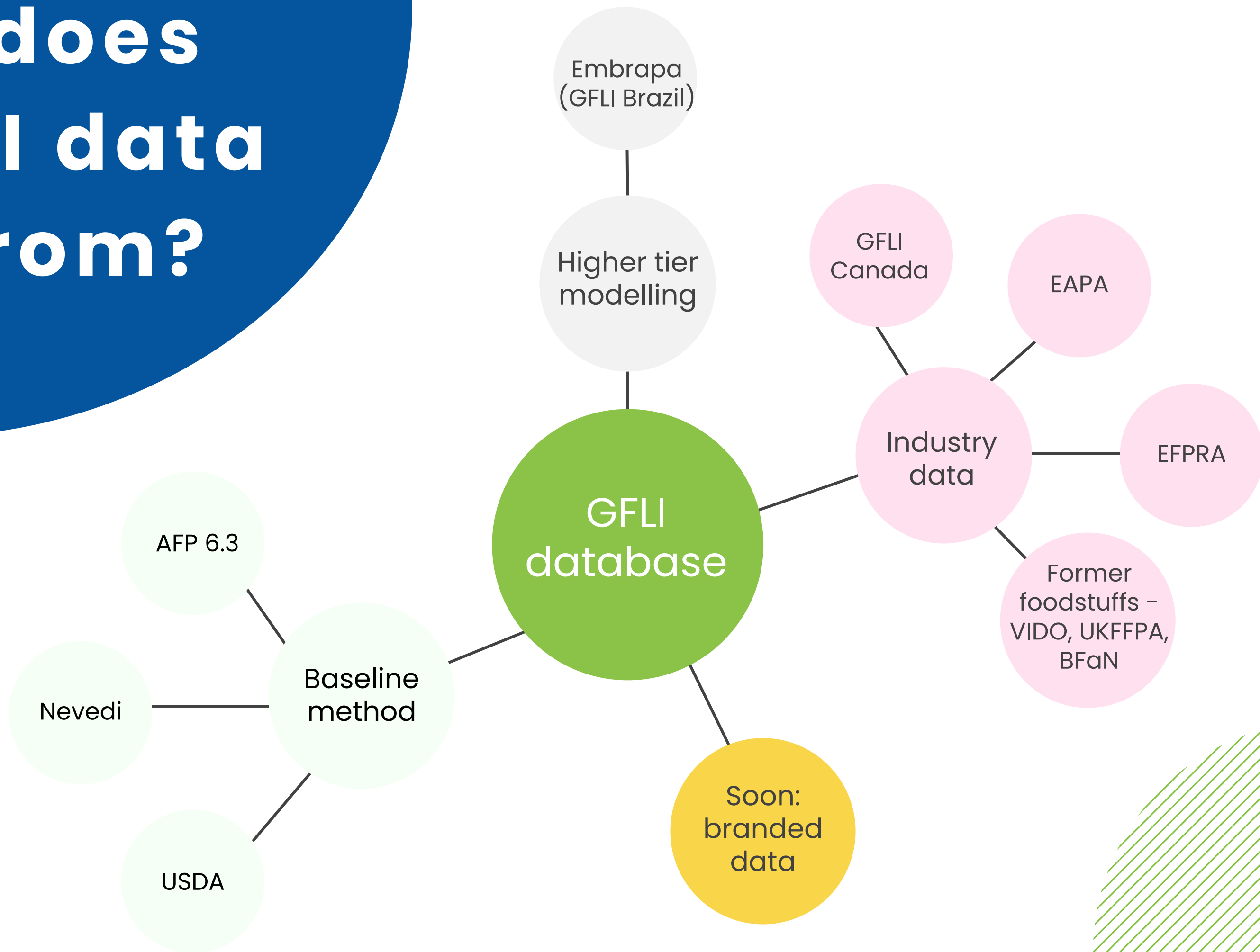


Output to be measured (Products and co-products)	Amount	Unit	Quantity	Allocation	Waste type	Category	Comment
Wheat grain at farm/RE Economic	Output_0 = 79463	kg	Mass	83.87 %	Component	Agricultural/Plant prod.,Cereals	Dry matter: 887 kg/kg; Gross Energy 13.86 MJ/kg
Wheat straw at farm/RE Economic	Output_1 = 44761	kg	Mass	16.13 %	Component	Agricultural/Plant prod.,Cereals	Dry matter: 887 kg/kg; Gross Energy 16.17 MJ/kg
Agri							
Outputs to settlement: Amount products	Amount	Unit	Distribution: SO2 or 21: Min	Max	Min	Max	Comment
Agri							
Agri							
Water use: Irrigation water	0.00000017	m3	Undefined				Irrigation water based on yield and "blue water footprint" (Meunier & Hoesung, 2010)
Land use: annual crop	1000	m2	Undefined				Land use based on estimated crop cycle described in Agri-Analyzer 5.0 methodology report
Transformation: from forest, unspecified	0	m2	Undefined				Land use change impacts based on Direct Land Use Change Assessment Tool 2016, Bonn Consultants, Göttingen
Transformation: from grassland	0	m2	Undefined				Land use change impacts based on Direct Land Use Change Assessment Tool 2016, Bonn Consultants, Göttingen
Transformation: from permanent crop	3478	m2	Undefined				Land use change impacts based on Direct Land Use Change Assessment Tool 2016, Bonn Consultants, Göttingen
Transformation: from annual crop	1045	m2	Undefined				Land use change impacts based on Direct Land Use Change Assessment Tool 2016, Bonn Consultants, Göttingen
Transformation: to annual crop	126	m2	Undefined				Land use change impacts based on Direct Land Use Change Assessment Tool 2016, Bonn Consultants, Göttingen
Agri							
Manure (incl. at farm/RE Economic)	2522	kg	Undefined				Same manure applied for soil maintenance. Based on FAO data on manure management (2012-2016) and methodology described in appendix 4 of Velasco et al. (2012)
Manure (excl. at farm/RE Economic)	308.8	kg	Undefined				Roughly manure applied for soil maintenance. Based on FAO data on manure management (2012-2016) and methodology described in appendix 4 of Velasco et al. (2012)
Di ammonium phosphate, as 100% (NPK 15-15-15), at plant/RE Economic	24.76	kg	Undefined				Derived from Ammonium phosphate consumed in Germany (BASTAT, 2016-2012) and total NPK use for wheat cultivation (FA 2011)
Ammonium sulfate, as 100% (NPK 21-0-0), at plant/RE Economic	35.71	kg	Undefined				Derived from Ammonium sulfate consumed in Germany (BASTAT, 2016-2012) and total NPK use for wheat cultivation (FA 2011)
Calcium ammonium nitrate (CAN), (NPK 28.5-0-0), at plant/RE Economic	261	kg	Undefined				Derived from Calc.amn. nitrate consumed in Germany (BASTAT, 2016-2012) and total NPK use for wheat cultivation (FA 2011)
NPK compound (NPK 15-15-15), at plant/RE Economic	21.02	kg	Undefined				Derived from N P K compound consumed in Germany (BASTAT, 2016-2012) and total NPK use for wheat cultivation (FA 2011)
Liquid urea-ammonium nitrate solution (NPK 30-0-0), at plant/RE Economic	94.71	kg	Undefined				Derived from nitrogen applying consumed in Germany (BASTAT, 2016-2012) and total NPK use for wheat cultivation (FA 2011)
Urea, as 100% CO(NH2)2 (NPK 46-0-0), at plant/RE Economic	97.11	kg	Undefined				Derived from Urea consumed in Germany (BASTAT, 2016-2012) and total NPK use for wheat cultivation (FA 2011)
PK compound (NPK 0-22-22), at plant/RE Economic	1.846	kg	Undefined				Derived from P K compound consumed in Germany (BASTAT, 2016-2012) and total NPK use for wheat cultivation (FA 2011)
Single superphosphate, as 100% CaH2PO4 (NPK 0-21-0), at plant/RE Economic	0.1822	kg	Undefined				Derived from Single superphos. consumed in Germany (BASTAT, 2016-2012) and total NPK use for wheat cultivation (FA 2011)
Triple superphosphate, as 80% CaH2PO4 (NPK 0-48-0), at plant/RE Economic	3.377	kg	Undefined				Derived from Triple superphos. consumed in Germany (BASTAT, 2016-2012) and total NPK use for wheat cultivation (FA 2011)
Potassium chloride (NPK 0-0-60), at plant/RE Economic	27.36	kg	Undefined				Derived from Potassium chloride consumed in Germany (BASTAT, 2016-2012) and total NPK use for wheat cultivation (FA 2011)
Potassium sulfate (NPK 0-0-50) (Mannheim), at plant/RE Economic	1.849	kg	Undefined				Derived from Potassium sulfate consumed in Germany (BASTAT, 2016-2012) and total NPK use for wheat cultivation (FA 2011)
Basic slag (incl. at farm/RE Economic)	0	kg	Undefined				Capital good used for cultivation
Lime (incl. at farm/RE Economic)	400	kg	Undefined				Lime use on depending amount based on default values used in feedbase (2012)
Wheat grain start material, at seed production/RE Economic	157.8	kg	Undefined				Amount of start material
Tractor, truck 10-20t, EURO4, 80% full, empty return/RE Economic	114.8	km	Undefined				Transport of manure (30 km)
Tractor, truck 10-20t, EURO4, 80% full, empty return/RE Economic	55.81	km	Undefined				Transport of other materials (30 km)
Fungicide, at plant/RE Economic	0.2012	kg	Undefined				Fungicide use derived from pesticide model
Fungicide, at plant/RE Economic	0.3796	kg	Undefined				Fungicide use derived from pesticide model
Herbicide, at plant/RE Economic	0.9764	kg	Undefined				Herbicide use derived from pesticide model
Insecticide emissions, at farm/RE Economic	0.2012	kg	Undefined				Emissions of insecticide active ingredients used within a specific region
Fungicide emissions, at farm/RE Economic	0.3796	kg	Undefined				Emissions of fungicide active ingredients used within a specific region
Herbicide emissions, at farm/RE Economic	0.9764	kg	Undefined				Emissions of herbicide active ingredients used within a specific region
Agri							
Energy from diesel burned in machinery/RE Economic	4157	MJ	Undefined				Total fuel demand for on-field activities of arable crop except irrigation. Derived from "Energy model for crop cultivation"
Energy from diesel burned in machinery/RE Economic	0.00000347	MJ	Undefined				Total fuel demand for irrigating arable crops. Derived from "Energy model for crop cultivation"
Electricity mix, AC, consumption mix, at consumer, v. 189 (DE S) 0.000000853	0.000000853	MJ	Undefined				Total electricity use for irrigating arable crops. Derived from "Energy model for crop cultivation"
Agri							
Details							
Carbon dioxide, fossil	176	kg	Undefined				Lime and dolomite emissions based on tier 1 calculations described in Guidelines for National Greenhouse Gas Inventories (IPCC, 2006)
Carbon dioxide, fossil	86.87	kg	Undefined				Fertilizer emissions based on tier 1 calculations described in Guidelines for National Greenhouse Gas Inventories (IPCC, 2006)
Dinitrogen monoxide	2.837	kg	Undefined				Direct Fertilizer emissions based on tier 1 calculations described in Guidelines for National Greenhouse Gas Inventories (IPCC, 2006)
Dinitrogen monoxide	0.7661	kg	Undefined				Indirect Fertilizer emissions based on tier 1 calculations described in Guidelines for National Greenhouse Gas Inventories (IPCC, 2006)
Ammonia	12.58	kg	Undefined				Fertilizer emissions based on tier 2 ammonia emissions described in Air Pollutant Emission Guidebook (EMEP/USA, 2016)
Nitrogen monoxide	1.25	kg	Undefined				Fertilizer emissions based on NO emissions based on global mean fertilizer-relevant NO emissions (EMEP/USA, 2016)
Carbon dioxide, land transformation	92.22	kg	Undefined				Land use change impacts based on Direct Land Use Change Assessment Tool 2016, Bonn Consultants, Göttingen
Dinitrogen monoxide	0.3483	kg	Undefined				Direct Manure emissions based on tier 1 calculations described in Guidelines for National Greenhouse Gas Inventories (IPCC, 2006)
Dinitrogen monoxide	0.1782	kg	Undefined				Indirect Manure emissions based on tier 1 calculations described in Guidelines for National Greenhouse Gas Inventories (IPCC, 2006)
Ammonia	8.475	kg	Undefined				Manure emissions based on tier 1 calculations described in Guidelines for National Greenhouse Gas Inventories (IPCC, 2006)
Dinitrogen monoxide	1.291	kg	Undefined				Direct Crop residue emissions based on tier 1 calculations described in Guidelines for National Greenhouse Gas Inventories (IPCC, 2006)
Dinitrogen monoxide	0.2989	kg	Undefined				Indirect Crop residue emissions based on tier 1 calculations described in Guidelines for National Greenhouse Gas Inventories (IPCC, 2006)
Agri							
Emissions to water	Sub-component	Amount	Unit	Distribution: SO2 or 21: Min	Max	Min	Max
Nitrate	195.3	kg	Undefined				Fertilizer emissions based on tier 1 calculations described in Guidelines for National Greenhouse Gas Inventories (IPCC, 2006)
Ammonia	0.8857	kg	Undefined				Fertilizer emissions based on total P and "applied P component" impact factor (BACPa, 2013)
Cadmium	38.11	mg	Undefined				Heavy metals emissions based on heavy metals emissions described in Nemecek & Schneider (2012)
Chromium	20768	mg	Undefined				Heavy metals emissions based on heavy metals emissions described in Nemecek & Schneider (2012)
Copper	3331	mg	Undefined				Heavy metals emissions based on heavy metals emissions described in Nemecek & Schneider (2012)
Mercury	0.7381	mg	Undefined				Heavy metals emissions based on heavy metals emissions described in Nemecek & Schneider (2012)
Nickel	0	mg	Undefined				Heavy metals emissions based on heavy metals emissions described in Nemecek & Schneider (2012)
Lead	290.7	mg	Undefined				Heavy metals emissions based on heavy metals emissions described in Nemecek & Schneider (2012)
Zinc	27720	mg	Undefined				Heavy metals emissions based on heavy metals emissions described in Nemecek & Schneider (2012)
Nitrate	86.25	kg	Undefined				Manure emissions based on tier 1 calculations described in Guidelines for National Greenhouse Gas Inventories (IPCC, 2006)
Dinitrogen monoxide	0.4887	kg	Undefined				Manure emissions based on total P and "applied P component" impact factor (BACPa, 2013)
Ammonia	599.2	kg	Undefined				Crop residue emissions based on tier 1 calculations described in Guidelines for National Greenhouse Gas Inventories (IPCC, 2006)
Agri							
Emissions to soil	Sub-component	Amount	Unit	Distribution: SO2 or 21: Min	Max	Min	Max
Cadmium	agricultural	2936	mg	Undefined			Heavy metals emissions based on heavy metals emissions described in Nemecek & Schneider (2012)
Chromium	agricultural	132200	mg	Undefined			Heavy metals emissions based on heavy metals emissions described in Nemecek & Schneider (2012)
Copper	agricultural	3688	mg	Undefined			Heavy metals emissions based on heavy metals emissions described in Nemecek & Schneider (2012)
Mercury	agricultural	26.06	mg	Undefined			Heavy metals emissions based on heavy metals emissions described in Nemecek & Schneider (2012)
Nickel	agricultural	9827	mg	Undefined			Heavy metals emissions based on heavy metals emissions described in Nemecek & Schneider (2012)
Lead	agricultural	19900	mg	Undefined			Heavy metals emissions based on heavy metals emissions described in Nemecek & Schneider (2012)
Zinc	agricultural	441300	mg	Undefined			Heavy metals emissions based on heavy metals emissions described in Nemecek & Schneider (2012)
Agri							

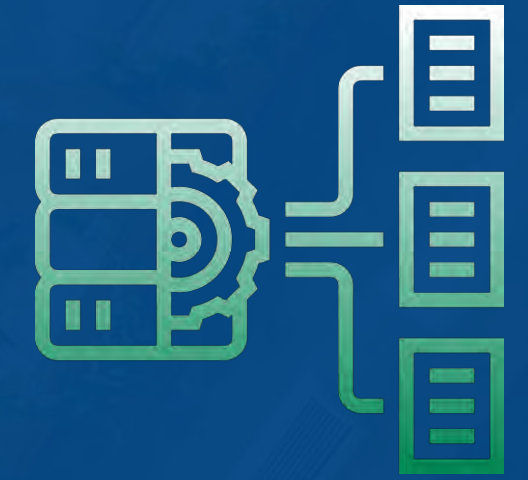
A modern office interior with a focus on greenery and natural light. The space features wooden desks, ergonomic chairs, and numerous indoor plants. Large windows in the background allow natural light to fill the room. The ceiling has exposed concrete beams and modern lighting fixtures. The overall atmosphere is bright, airy, and professional.

DATA GENERATION

Where does the GFLI data come from?

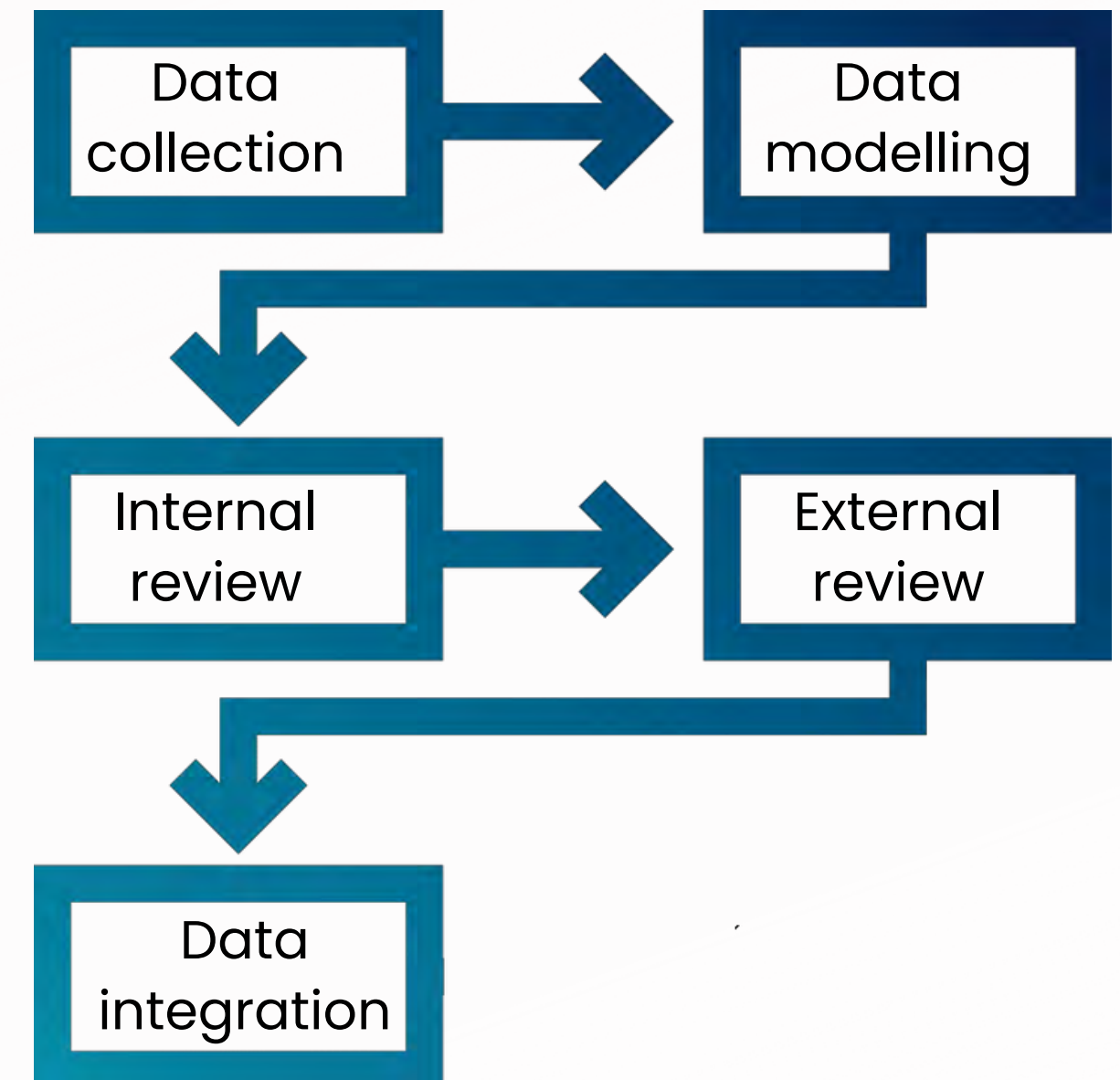


DATA GENERATION



- LCA data from various sources, which are contributed by data providers.
- Data providers may be research institutes, universities, associations, companies, a consortium of entities.
- Goal: collect and model data per GFLI methodology to fill gaps, improve existing datasets, or improve methodology (i.e. regionalized modelling).
- Branded data: product-specific data

To come: Data-in Generator tool to automatize (part of) the data modelling

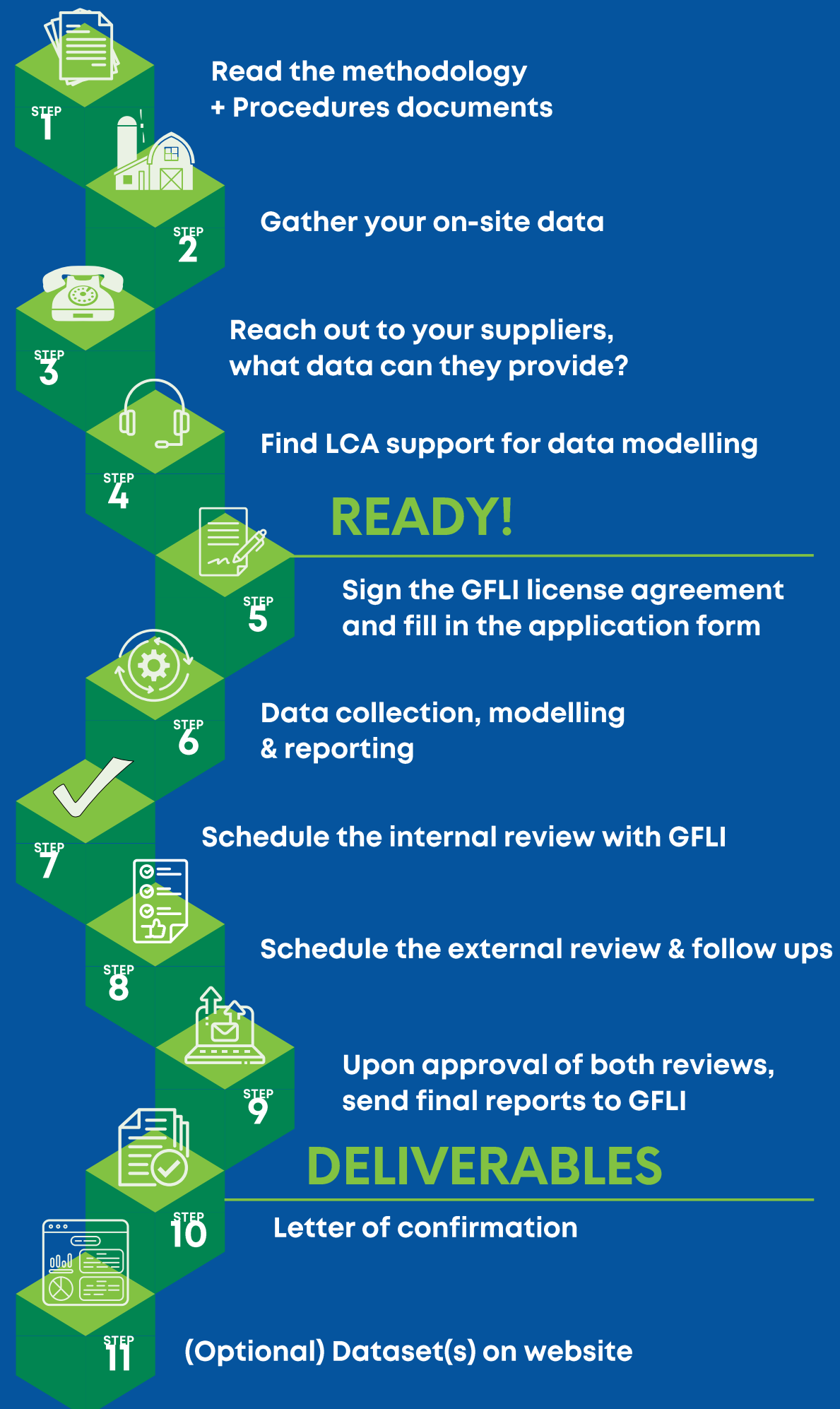




GFLI Branded data

The basic principle for branded data is to use as much primary data as possible. Branded data allows producers of feed ingredients to be transparent about the impacts of their specific products and provides credibility to their customers.

- Give insight to the company's emissions in order to track sustainability over multiple years
- Allow for sustainability reporting through a recognized methodology
- Allow for comparison with the industry averages in the GFLI database & able to use primary data alongside secondary data
- Insights on own supply chain, and be the driver of sustainability
- Marketing and communication purposes





**WHAT'S MORE
TO COME**

Current developments

With more members and funding, the GFLI will invest in further development of the database, a robust and sound methodology, and more partnerships within the feed and food chain to accommodate interoperability of systems and simplifying sustainability reporting.

Concrete examples:

- Integration of a Data-in Generator tool, simplifying the data generation process
- Creating and evaluating a robust methodological approach for novel feed ingredients
- Forming an IT framework for easy and secure access of the GFLI database
- Collaborations for high-quality emission models & the acceptance of higher tier modelling in the database
- Fill data gaps, such as vitamins, feed additives, novel feed ingredients, pasture-based ingredients
- And more...

GFLI membership benefits

Strategic partnerships

The GFLI is also looking for strategic partnerships to accelerate uptake of the database and brand familiarity in order to become the global reference for feed LCA.

Research & partnerships

Research institutes and Universities can use the GFLI database for reduced pricing (limited to research purposes);

How to become a GFLI Member:



GFLI offers membership to allow corporate and association front runners to collaborate pre-competitively to help maintain and improve the GFLI database as well as engage with other stakeholders in the feed and food chain.

- Be recognized as a catalyst for continuous improvement
- Contribute to the resilience of the entire feed and food chain



Associations

\$ 5.000

- Discount for data access
- 2 hours of consultancy with our LCA expert to reach your sustainability goals
- Discounts on additional consultancy hours
- Eligible to participate actively in the Institute by nominating representatives to the GFLI Board of Directors and Technical Management Committee
- Participation in working groups
- Invitation to the Annual Membership Meeting
- Members-only newsletter



Corporate members

Prices based on turnover of total revenues - \$ 6.500 - 11.500

- Access to the GFLI LCIA database (1 user)
- 30-50% discounts for commercial and developer use of the database in all 3 formats of the database
- 2 hours of consultancy with our LCA expert to reach your sustainability goals
- Discounts on additional consultancy hours and internal review for branded data
- Eligible to participate actively in the Institute by nominating representatives to the GFLI Board of Directors and Technical Management Committee
- Participation in working groups
- Invitation to the Annual Membership Meeting
- Members-only newsletter



Research Institutes

- Research license for discounted data use
- Partnership to further data generation and pre-competitive network for sustainable development

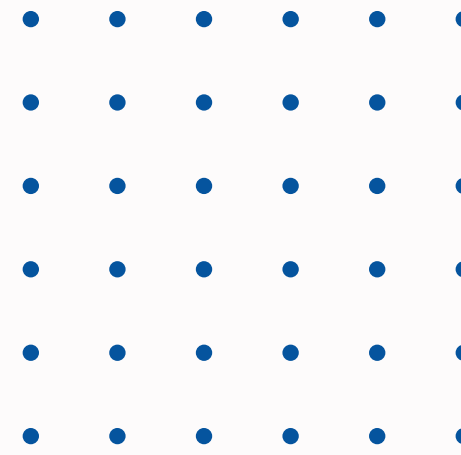
***Pricing based on 2023 fees.**



Join the GFLI!

Interested in membership, providing or accessing data, or becoming a strategic partner? Let us help you meet your sustainability goals! Contact the GFLI Secretariat for more information at: info@globalfeedlca.org

40⁺
MEMBERS



Check out our website!

GFLI Corporate members



GFLI Association members





Global Metrics for Sustainable Feed

THANK YOU

Contact:

-  +31 (0)68 684 65 81
-  info@globalfeedlca.org
-  www.globalfeedlca.org
-  Louis Braillelaan 80, 2719 EK
Zoetermeer, The Netherlands



Resources



Relevant documents

- **Methodology for regional/sectoral data-in projects:**
<https://globalfeedlca.org/wp-content/uploads/2023/01/GFLI-Methodology-and-Project-Guidelines.V2.pdf>
- **Procedures for a data-in project:** <https://globalfeedlca.org/wp-content/uploads/2023/01/GFLI-Procedures-for-Data-in-Projects.V2.pdf>
- **Methodology + procedures of branded data:**
<https://globalfeedlca.org/wp-content/uploads/2023/10/GFLI-Branded-Data-Methodology-and-procedures.V1-20231016-1.pdf>
- **LCIA guidance document** (how to read the GFLI database):
<https://globalfeedlca.org/wp-content/uploads/2023/11/GFLI-LCIA-Guidance-Document-version-2.1-20231127.pdf>

Overviews

- **Overview of available datasets in V2.2 database:**
<https://globalfeedlca.org/wp-content/uploads/2023/10/Overview-of-datasets-in-GFLI-database.pdf>
- **Fee structure for database access:** <https://globalfeedlca.org/wp-content/uploads/2023/12/Fee-structure-20231220.pdf>
- **GFLI leaflet:** <https://globalfeedlca.org/wp-content/uploads/2024/09/GFLI-Leaflet.onlineversion.pdf>