Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Federal Department of Economic Affairs,
Education and Research EAER

Agroscope

Creating coherent life cycle databases for ecodesign and product declaration of agroindustrial products: how to deal with contradictory methodological requirements (?)

Jens Lansche *, Patrik Mouron, Rémy Teuscher, Thomas Nemecek, Gérard Gaillard

9th International Conference LCA of Food San Francisco, October 8, 2014

Background

High demand for LCI databases in the agri-food sector

Reasons for the high demand:

- Importance of environmental impacts of agricultural sector for society
- High temporal and spatial variability of agricultural emissions and resulting environmental impacts
- Increasing public interest from science, companies and governments
- Development of policies based on LCA

Agroscope

Existing guidelines: variety and contradictions

Short Title	Full title of the guideline or standard	Reference
ISO 14040:2006	Environmental management - Life cycle assessment - Principles and framework	ISO (2006b)
ISO 14044:2006	Environmental management - Life cycle assessment – Requirements and guidelines	ISO (2006c)
ILCD Handbook	International Reference Life Cycle Data System (ILCD) Handbook - General guide for Life Cycle Assessment - Detailed guidance	JRC (2010)
Shonan Guidance Principles	Global Guidance Principles for Life Cycle Assessment Databases , A basis for greener processes and products	UNEP/SETAC (2011)
Ecoinvent data quality guidelines	Overview and methodology. Data quality guideline for the ecoinvent database version 3	Weidema et al (2013)
BPX 30-323-0	Environmental communication on mass market products — Part 0: General principles and methodological framework	Afnor (2011)
PAS 2050:2011	The Guide to PAS 2050:2011: How to carbon footprint your products, identify hotspots and reduce emissions in your supply chain	BSI (2011)
PEF Guide	Product Environmental Footprint (PEF) Guide, Annex II to the Recommendations of the Commission of 9 April 2013 on the use of common methods to measure and communicate the life cycle environmental performance of products and organizations	EC (2013)
Envifood protocol	Environmental Assessment of Food and Drink Protocol	Envifood (2013)
MTT Guidelines	Guidelines for the assessment of the life cycle greenhouse gas emissions of food	Hartikainen et al (2012)
IDF Guide	A common carbon footprint approach for dairy – The IDF guide to standard lifecycle assessment methodology for the dairy sector	IDF (2010)
IPCC Guidelines	Guidelines fo National Greenhouse Gas Inventories -Agriculture, Forestry and other Land Use.	IPCC (2006)
ISO 14025:2006	Environmental labels and declarations - Type III environmental declarations - Principles and procedures	ISO (2006a)
ISO 14067:2013	Carbon footprint of products—requirements and guidelines for quantification and communication.	ISO (2013)

Several initiatives are creating LCI database in this context at present

Several initiatives and projects are creating LCI databases in this context:

- ACYVIA (Bosque et al. 2012)
- Agri-BALYSE® (Koch and Salou 2013)
- Asian Agri-Food database (Hayashi 2013)
- Australian LCI Database initiative (ALCAS 2014)
- Base IMPACTS® (ADEME 2014)
- Chilean Food and Agriculture LCA database (Emhart et al. 2013)
- ecoinvent (Weidema et al. 2013)
- World Food LCA database (Lansche et al. 2013)
- and many others

How to deal with this variety of guidelines and contradictions?

Database developer perspective: Avoid contradiction of the guidelines by categorizing the database and setting a hierarchy among the guidelines

Agroscope

I Proposed approach

- Step 1: Categorizing the guidelines and database as “general database” or “specific database”. For categorizing a data-base we propose to use specifications for the geography, application, and sectors that are addressed.
- Step 2: Identify the most relevant guidelines related to the database and setting a hierarchy among them.
- Step 3: Identify the methodological options that are crucial for the database. Options for LCI occur e.g. for system boundary choice, direct emission modeling, allocation methods, end-of-life modeling, data source choices and the dataset documentation.
- Step 4: Decide which methodological option to choose use in order to meet the criteria identified in step1.

I Example

This four-step procedure is applied to two ongoing database projects that are:

- WFLDB (World Food LCA Database): This project is developing datasets for selected agricultural primary products as well as food and beverage products produced in the most relevant countries that supply the global market.
- ACYVIA (Analyse de CYcle de Vie dans les Industries Agro-alimentaires): This project addresses environmental product declaration of food transformation processes at national-level in France.

Agroscope

I Categorizing guidelines

Short Title	Full title of the guideline or standard	Reference
From general to specific guidelines		
ISO 14040:2006	Environmental management - Life cycle assessment - Principles and framework	ISO (2006b)
ISO 14044:2006	Environmental management - Life cycle assessment – Requirements and guidelines	ISO (2006c)
ILCD Handbook	International Reference Life Cycle Data System (ILCD) Handbook - General guide for Life Cycle Assessment - Detailed guidance	JRC (2010)
Shonan Guidance Principles	Global Guidance Principles for Life Cycle Assessment Databases , A basis for greener processes and products	UNEP/SETAC (2011)
Ecoinvent data quality guidelines	Overview and methodology. Data quality guideline for the ecoinvent database version 3	Weidema et al (2013)
BPX 30-323-0	Environmental communication on mass market products — Part 0: General principles and methodological framework	Afnor (2011)
PAS 2050:2011	The Guide to PAS 2050:2011: How to carbon footprint your products, identify hotspots and reduce emissions in your supply chain	BSI (2011)
PEF Guide	Product Environmental Footprint (PEF) Guide, Annex II to the Recommendations of the Commission of 9 April 2013 on the use of common methods to measure and communicate the life cycle environmental performance of products and organizations	EC (2013)
Envifood protocol	Environmental Assessment of Food and Drink Protocol	Envifood (2013)
MTT Guidelines	Guidelines for the assessment of the life cycle greenhouse gas emissions of food	Hartikainen et al (2012)
IDF Guide	A common carbon footprint approach for dairy – The IDF guide to standard lifecycle assessment methodology for the dairy sector	IDF (2010)
IPCC Guidelines	Guidelines fo National Greenhouse Gas Inventories -Agriculture, Forestry and other Land Use.	IPCC (2006)
ISO 14025:2006	Environmental labels and declarations - Type III environmental declarations - Principles and procedures	ISO (2006a)
ISO 14067:2013	Carbon footprint of products—requirements and guidelines for quantification and communication.	ISO (2013)

I categorizing databases and selection of guidelines

	WFLDB General database	ACYVIA Specific database
Geographical specification	Global	National
Application addressed	Ecodesign and EPD	EPD
Sectorial specification	Agriculture and food industry	Food industry
Guidelines (order of importance)	1. ISO 14040/ 44 2. ILCD handbook 3. ENVIFOOD 4. Others	1. BPX 30-323-0 2. ILCD entry-level 3. ISO 14040/ 44 4. Others

→ methodological isssues are solved thanks to the hierarchy!

I dealing with remaining methodological contradictions

For remaining contradictions, a hierarchy of basic principles can be developed that support to make appropriate methodological decisions in respect to LCI modelling. Such criteria can be:

- scientific principles like reproducibility
- internal consistency of the database
- acceptance by stakeholders

Agroscope

Lessons learned

- categorizing and creating hierarchies for both guidelines and databases is helpful to select suitable guidelines for creating LCI databases
- methodological contradictions can be avoided
- there is not one specific «right» solution for all purposes, the solution can vary from case to case

Agroscope

Thank you for your attention

Agroscope good food, healthy environment

BACKUP

II Approaches for LCI databases (user perspective)

1) un-allocated database

Advantage:

- can be adapted to all methodological requirements (e.g. different guidelines)
- High flexibility

Disadvantage:

- user has to deal himself with issues like allocation (decision and implementation)
- needs a very sophisticated LCA software (vs. user-friendliness/useability!)

Agroscope

II Approaches for LCI databases (user perspective)

2) different allocation models applied (different database versions in parallel)

Advantage:

- User can select «suitable» database and directly apply according to specific methodological requirements
- Sensitivity analysis (e.g. comparing different allocation models)
- Creator of database takes responsibility for correctness

Disadvantage:

- Complexity
- Different results for same product
- User can influence result by selection of allocation model

II Approaches for LCI databases (user perspective)

3) allocated database for general guidelines (e.g ISO), transparent and fully documented

Advantage:

- User can apply directly for several purposes
- Implementation of specific methodological requirements possible

Disadvantage:

- User has to deal with implementation of specific requirements (e.g. for allocation) if necessary (own responsibility)

Agroscope

II Approaches for LCI databases (user perspective)

4) allocated database for a specific guideline and application

Advantage:

- User can apply directly for a specific purpose
- Methodological requirements are already applied

→ ready to use

Disadvantage:

- Limited to a specific application

Examples from LCI projects

- WFLDB:

2-step approach:

  - Allocated database within the project period
  - Submision to ecoinvent as un-allocated unit processes
    - Ecoinvent system models will be applied as WFLDB datasets are accepted

- ACYVIA:

2-step approach:

  - allocated database for specific guidelines and application
  - ADEME uses it to create Base IMPACTS®

Agroscope