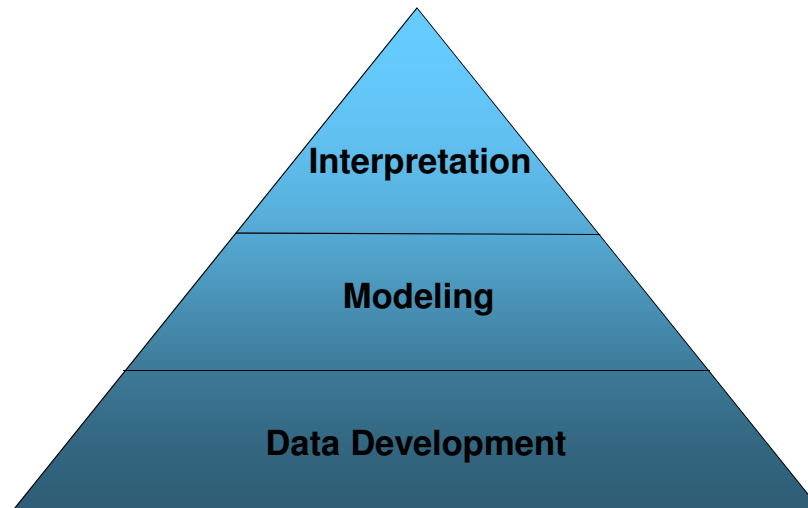


LCA Databases and Software

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The quality of an LCA is a reflection of the underlying data and how it's assembled



The ability to gather data and import it into a modeling tool is essential to performing an LCA



Unit Processes

LCI databases

Determining if a unit process is right for you

Useful data sources

Filling holes

Writing effective documentation

Essential functions of LCA models

What to look for when choosing a modeling tool

LCA Databases

A unit process accounts for the energy and material flows for a specific activity of a supply chain



An **income statement** tracks the financial flows for a company over a given period.



Similarly, a **unit process** tracks the energy and material flows of an activity on the basis of 1 unit of production.

Data are available in public LCI databases or can be purchased

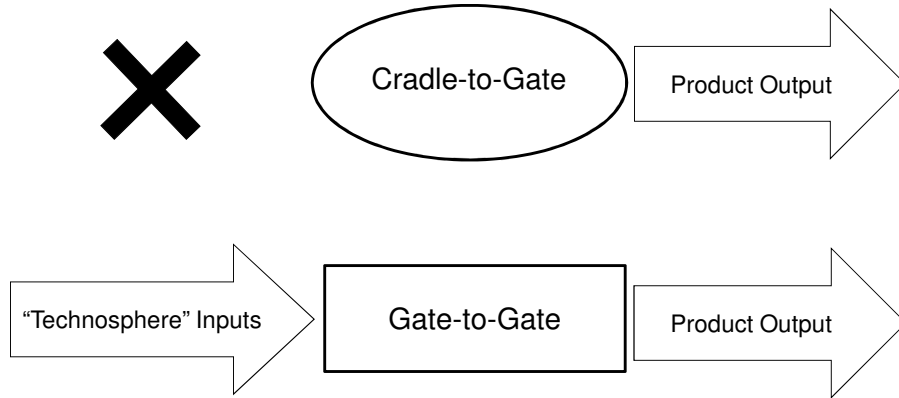
Public Data

- U.S. LCI Database (fossil fuels, minerals, commodity plastics, crops)
- GREET model (transportation fuels, including bio-fuels)
- BEES (construction materials)

Proprietary Data

- PE International (bundled with GaBi software)
- Eco Invent (thousands of European unit processes)

The scope and boundaries of a unit process affect its ease of import into an LCA model



Cradle-to-gate unit processes are easier to use, but gate-to-gate unit processes are *usually* more transparent.

Some unit processes track hundreds of inputs and outputs, while others are a lot simpler

Example: Corn Crops (US LCI DB)

Inputs

INPUTS FROM TECHNOSPHERE
Diesel, combusted in industrial equipment
Dummy, Agrochemicals, at plant
Dummy, Phosphorous Fertilizer (TSP as P2O5), at plant
Dummy, Potash Fertilizer (K2O), at plant
Electricity, at grid, US, 2000
Gasoline, combusted in equipment
Liquefied petroleum gas, combusted in industrial boiler
Natural gas, combusted in industrial boiler
Nitrogen fertilizer, production mix, at plant
Quicklime, at plant
Transport, single unit truck, diesel powered
Transport, train, diesel powered
INPUTS FROM NATURE
Carbon dioxide
Occupation, arable, conservation tillage
Occupation, arable, conventional tillage
Occupation, arable, reduced tillage
Water
Water, well

Outputs

EMISSIONS TO AIR AND WATER
2,4-D
Acetochlor
Alachlor
Ammonia
Atrazine
Bentazone
Bromoxynil
Carbofuran
Chlorpyrifos
Cyanazine
Dicamba
Dimethenamid
Dinitrogen monoxide
Dipropylthiocarbamic acid S-ethyl ester
Disulfoton
Diuron
Glyphosate
...
PRODUCTS
Corn stover, at field
Corn, at field

How do I know if a unit process is right for me?

- ☑ Are the boundaries of the unit process clearly defined?
- ☑ Do I have to find additional, upstream unit processes to make the unit process work?
- ☑ Does the unit process account for the LCA metrics that are important to my study?
- ☑ Is the unit process based on reasonable technical assumptions?
- ☑ What's the vintage of the data?
- ☑ Is it geographically representative of my study?

Developing Your Own Data

Compiling your own data is necessary when LCA databases don't have what you're looking for

Primary Data Sources

- Data collected by producers
- Trade organization databases (members only)
- Government databases

Literature

- Journals
- Patents
- Marketing materials

Subject Matter Experts (SME)

- Researchers
- Investor relations



If your search for data hits a dead end, it's still possible to complete your LCA

Surrogate data is often used to fill holes in LCA models.

If in doubt, use data that probably overstates the actual burdens of your unit process.



Document your data limitations thoroughly

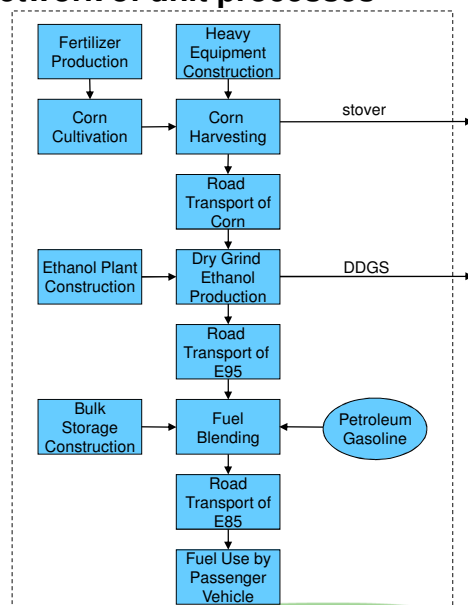
- Identify the data sources that resulted in dead ends
- Give reasons for your choice of surrogate data
- Estimate the sensitivity of your results to the data gap

LCA Modeling Software

An LCA model manages a network of unit processes

An effective LCA model should:

- Converge on values of intermediate streams
- Provide data for ancillary unit processes
- Manage co-products
- Allow parameter variation
- Apply impact assessment
- Provide tools for uncertainty analysis
- Allow easy export of results



Commercial and open source LCA software are available

GaBi (PE International)

SimaPro (PRe Consultants)

OpenLCA (www.openlca.org)

A spreadsheet approach is an alternative to specialized LCA software

GREET is based on a spreadsheet model.

Franklin Associates uses a spreadsheet model.

Spreadsheet LCAs offer transparency and flexibility, but require significant time for development and QA.

How do I know if a LCA modeling tool is right for me?

- Can it converge on a solution for a large network of unit processes?
- Does it include a useful library of unit process data?
- Does it allow co-product allocation and other LCA accounting methods?
- Does it allow parameter variation (for sensitivity analysis)?
- Does it have tools for uncertainty analysis?
- Can it apply impact assessment?
- Does it allow me to easily export results to other applications?

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