

2.3: Conclusions and Review

There are many tools to assist life cycle assessments. There are software and data packages designed for performing LCAs. No matter the form of the software, the use of some sort of LCA software and data management system is needed in LCAs. The life cycle inventory step of an LCA often requires a large data set listing hundreds of emissions to the environment. Keeping track of these flows manually is arduous, so LCA software is designed to manage these flows and perform specific functions such as impact assessments based on the inventory as well as uncertainty analysis.

There is a large list of LCA software emerging with various features. A basic overview of how data and LCA software will first be provided then a list of software packages. LCA software can be split into several components:

- The software package
- Data sets
- Life cycle impact assessment (LCIA) methods

Software packages such as SimaPro, openLCA, and Gabi are frameworks or calculators that keep track of data and performs intensive numerical calculations. With the many flows and detailed 49 data, much effort has been invested in creating efficient calculation methods to speed up analysis time. This framework, however, is not useful without inventory data. There are many premade datasets provided from sources such as Ecoinvent, Gabi and United States Department of Agriculture (USDA) that contain previous life cycle inventory results for various chemicals, materials, energy, services, and waste treatment processes. LCA software can access this previously developed data and include a chemical or other process from a dataset in their LCA without needing to perform an entire LCA on that particular material or process. This fundamental aspect of LCA, the leveraging of previous study results for new studies, is a key benefit of LCA software and can save countless hours on the LCI step. LCIA methods are procedures and conversions that are used in performing a LCIA such as global warming potential characterizations and weighting methods. There are many accepted LCIA methods that calculate LCA results using different impact categories, types of impacts, and weighting methods.

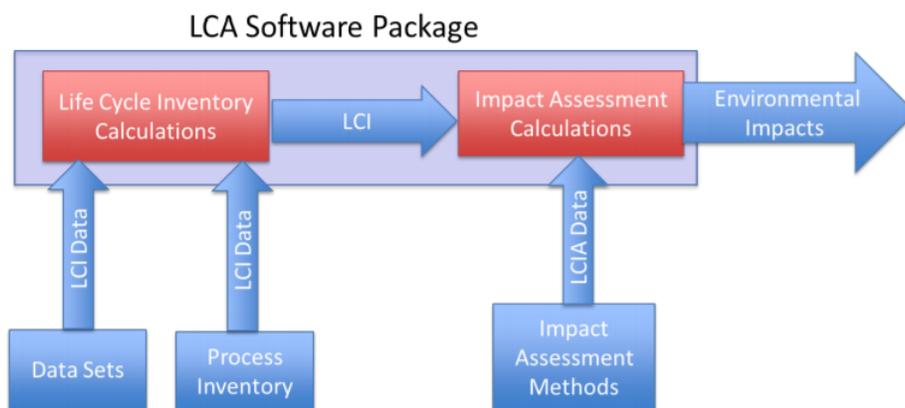


Figure 2.3.1: Life cycle assessment software structure

Figure 2.3.1 visually depicts how the different components of LCA software and data interact. The life cycle inventory step requires data from datasets (e.g., Ecoinvent) and primary data gathered by the LCA practitioner surrounding the process or product under analysis. The combination of these two types of data with the use of LCA software calculations gives an LCI. The LCI data can then be used to perform an impact assessment using the LCIA methods (e.g., TRACI).

Table 2.3.1: Three common LCA Software package options

Software	Licensing	Datasets	Software Features	Website

Software	Licensing	Datasets	Software Features	Website
openLCA	Open source and free	Ecoinvent, Gabi, USLCI, CML and others	Fast calculation engine, easily share models, no yearly subscription, process based with transparent data, used for USDA digital commons LCA data development	www.openLCA.org
SimaPro	Paid licensing	Ecoinvent, USLCI, CML and others	Process based with transparent data, good customer support, robust uncertainty analysis	www.pre-sustainability.com/simapro
Gabi	Paid Licensing	Gabi dataset, Ecoinvent, USLCI	Robust dataset, visual process flow, based modeling, ease of use	www.gabi-software.com

Review Questions

1. Define the opportunities that could benefit from an LCA and why?
2. Is LCA going to be completely exhaustive in any of the various gate scenarios for determination of impacts?
3. What software is available for LCA?
4. Come up with a process and define 10 or less flows to allow you to calculate impacts.

Further Reading

1. Margni and Curran 2012 (See “Chapter 2 Supplementary Material in Moodle site)
2. Novel Screening Technique: Integrated Combinatorial Green Chemistry & Life Cycle Analysis (CGC-LCA): ojs.cnr.ncsu.edu/index.php/Bi...ning_Technique

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