



thinkstep  
**GaBi**

Product Sustainability  
Performance

# GaBi in Education

Guideline

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Deliver more sustainable products  
and reduce operational costs



# LCA and GaBi for students

Life Cycle Assessment is a valuable part of the curriculum, especially for future professionals who will have influence on the environmental performance of products and processes, like industrial designers, environmental managers, environmental policy makers, engineers etc.

It is estimated that at the design stage the environmental impacts can be reduced by 70% (Graedel, T.E., and Allenby, B.R. Industrial Ecology. © 1995 Prentice-Hall, New Jersey). Life Cycle Assessment is a method widely utilized in industry and a very important topic in environmental policymaking. Introducing LCA into your education process makes future professionals more competitive on the job market. LCA allows students to gain skills in finding practical solutions and improvement potentials, thus forming a positive problem-solving mindset.

This document aims to guide teachers in the integration of LCA and GaBi Software into the learning program. It provides a suggestion for an LCA and GaBi course content and advises approximate time to be reserved for these subjects in the curriculum.

## GaBi education license

Thinkstep AG provides our Professions LCA Software GaBi free of charge for universities and colleges. GaBi Education includes fully functional GaBi software with a comprehensive database.

The Software comes with an extended version of the Professional database that contains more than 2500 processes.

The only software functionality in our GaBi education version that users cannot access is the “import” function. This functionality was removed to limit the unauthorized commercial use of the software.

## LCA in curriculum

GaBi is an LCA software and it is helpful when students have an LCA background before starting to use GaBi.

Appendix A contains the suggested content of an LCA introduction course. The suggested course should take around 8 hours<sup>1</sup>, optionally followed by some exercises on defining LCA project goal and scope elements according to the ISO 14044.

## GaBi in curriculum

GaBi is a powerful software and an expert tool for LCA practitioners. When offering GaBi in your learning program, please expect the reasonable time for the software learning and for the modelling practice. If you would like your students to play with a LCA tool just for a few hours (or a couple of days) – please have a look at the “Envision in Curriculum” chapter, this may be a better fit for you.

If you expect your students to model product systems in GaBi we suggest the time for software learning and modelling to be at least **30** hours, ideally spread over time (e.g. few hours a week for a semester or two). Depending on how complex your product model and model analysis are the required time may vary.

We have years of experience teaching GaBi software. From our experience, we collected a few suggestions that professors and teachers may find useful:

- It is helpful when new GaBi students have some Life Cycle Assessment (LCA) background. LCA methodology is a topic serious enough on its own. Understanding LCA terms and logic makes a new software experience much more intuitive.
- It is helpful when students have done some GaBi exercises on their own before receiving a training. GaBi website ([GaBi learning center page](#)) provides enough tutorials and exercises for this purpose. Additionally, [GaBi trial version](#) can be downloaded and is valid for 30 days. The download contains additional tutorials and exercises.
- We found it efficient when the software training is spread over time and includes enough hands-on modelling. For example, the training can be split into two parts. The first (beginner level) takes around 8 hours<sup>2</sup>. It can be taught in one piece or in smaller portions. Appendix B contains the suggested course content for the GaBi beginner level training. This training should be followed by enough hands-on modelling exercises. The content of the exercises should be defined by the teacher, it can be specific of the area of studies and can include tasks like collecting data, checking the data quality, building product models, evaluating results and running some simple scenarios.
- Once the students have internalized their knowledge by using GaBi on their own; the next level of training can be provided. Appendix C contains the suggested content of the GaBi intermediate level training. The duration of this course is also 8 hours<sup>2</sup> and can be taught in one piece or in smaller portions.

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<sup>1</sup> The suggested time is based on groups of around 6 people. In big groups more time may be needed to achieve the same learning outcome.

<sup>2</sup> The suggested time is based on groups of around 6 people. In big groups more time may be needed to achieve the same learning outcome.



- After the intermediary GaBi course, students should be able to practice their new skills on their own and create relatively complex LCA models, play with scenarios, and analyse the results with elaborate techniques such as hot-spot analysis and identification of optimization potentials.

## GaBi: potential topics in curriculum

- Life cycle inventory: evaluate cumulative energy demand, solid waste generation, etc.
- Life cycle impacts: evaluate Global Warming Potential, Acidification Potential, etc.
- Life cycle Hot-Spot analysis: identify the environmental hot spots in the life cycle of a product
- Design optimization: evaluate the environmental impacts of multiple product design scenarios
- Technology optimization: evaluate the environmental impacts of multiple technology options
- Sensitivity Analysis: Identify the most important variables in your product system

More potential topics: Eco-efficiency assessment, Product Life cycle costs assessment, Product Life cycle Social impacts assessment, Monte-Carlo simulations with product model, Environmental Product Declarations with GaBi, a whole building LCA.

## Envision in curriculum

Envision is a tool that enables LCA practitioners to create interactive LCA reports for non-expert users. For example, an Envision report can contain multiple variables in product design or technology. Students can vary the defined parameters and evaluate the environmental implications of their choices without modelling the LCA systems. Students do not need to understand the LCA modelling in this case. An advanced GaBi user can create an LCA model and apply the simplified user interface on top of the model. In case students' interaction with LCA is limited to a few hours or few days, Envision may be a good option creating a meaningful and interesting learning experience. Thinkstep website provides a [demo Envision report](#) on packaging design free of charge.



# Appendix A – LCA introduction course

Module name	Module content for students
<b>Sustainability &amp; Environmental decision support</b>	
Introduction	Leading environmental issues Key principles of sustainability: the necessity of system approach
Sustainability in industry today	Short overview of main terms, initiatives, standards and topics
<b>Life Cycle Assessment</b>	
Introduction to LCA	Why LCA - definition & how it works - main terms: input, output, unit process, flow, system boundaries (cradle-to-gate, gate-to-gate, etc.) - workflow from goal & scope to interpretation Examples of LCA applications
LCA Project Goal and Scope	Goal and audience of the project Attributional and Consequential LCA (definitions) Scope of the project (as in ISO standard) – the product system to be studied; – the functions and functional unit of the product system; – the system boundary and allocation procedures; – impact categories selected and methodology of impact assessment; – assumptions and limitations; – initial data quality requirements; Examples and exercises
Life Cycle Inventory & data quality	How to collect data, calculate the LCI and handle data gaps
Allocation	Why allocation Possible means of allocation ISO and other standards (PCRs, etc.) on allocation Examples & exercises
Life Cycle Impact Assessment	Environmental problems and how we measure them Areas of Protection (Human Health, Ecosystem Quality, Resources) Midpoint / Endpoint indicators Classic LCA impacts with explanation of the environmental mechanism (GWP, AP etc.) Mathematics of Life Cycle Impact Assessment (how this is calculated): classification and characterization
Life Cycle Impact Assessment - Advanced	Introduction to models behind the characterization factors How the impacts are calculated Global, regional and local impacts Uncertainties (especially in toxicity impacts) Review of new impact assessment methods(CML, ReCipe, etc.) Mandatory and optional parts of Impact assessment (classification, characterization, normalization, weighting, grouping) How to choose impact methodology (CML vs. ILCD recommend.)
LCIA Interpretation	Evaluation (completeness check, consistency check) Limitations Contribution-, Sensitivity-, Uncertainty analysis
LCA report and critical review	Communicating LCA: ISO requirements for communication, critical review and LCA report

A total duration of 8 hours is expected for this introduction course.



## Appendix B – GaBi beginner training

Module name	Module content for students
Introduction to GaBi	What GaBi can do. Support resources (GaBi user forum, Gabi videos, video tutorials, manual, technical support hotline) Open GaBi, connect and activate database; navigate around the software
Build your first LCA model (gate-to-gate)	Understand how to handle flows. Understand how to create and handle processes. Instance vs DB view. Process types (agg,p-agg, etc), data sources, tracking of the intermediary flows. Understand how to create and handle plans. Drag and drop feature. Build a plan from existing objects. Plan view options. Connect processes. Fix the plan to reference flow. Use existing parameters. Search options in GaBi. LCIA preview.
Dashboards: calculate and view results	How to calculate LCIA results. Dashboards as part of the balance. How to read results from a dashboard. Defaults dashboards - ILCD, CML, TRACI. Customize dashboard view and use balance as GaBi object.
Introduction to parameters: play with alternatives	Introduction to Parameters. Parameter explorer. Use existing process parameters and define your scenarios. Change values and activate scenarios to effectively control your balance view.
Make a cradle-to-gate model	Create new objects. Creating a new process. Adding input flows. Process documentation. Creating a new flow and adding amounts. Use new and existing objects to build a cradle-to-gate LCA model. Adding a plan to a plan. Plan comments.
Balance: find answers	Classical LCIA balance table. Balance table structure: Columns and rows. Browsing through the balance. Finding relative contributions. How to separate input output tables. How to see non-elementary flows (e.g. solid wastes). How to look at your inventory in different units, including the units of environmental impacts. How to see all quantities at the same time. Weak point analysis.
Parameters: add a change dimension	Why parameters: Applications, advantages, examples. Exercises: Create a process parameter. Free and fixed parameters. See results with two different parameter settings. Formulas for parameters. Make your own process parameters and define scenarios with them. Compare potential alternatives for products or processes.
Database content	Data in prof and extensions, data on demand. Protected content. Documentation in GaBi.
GaBi family: what else is out there	GaBi tools and files formats.

A total duration of 8 hours is expected for this training.



## Appendix C – GaBi intermediate training

Module name	Module content for students
Make a cradle-to-gate model	Create new objects. Creating a new process. Adding input flows. Process documentation. Creating a new flow and adding amounts. Use new and existing objects to build a cradle-to-gate LCA model. Adding a plan to a plan. Plan comments.
Balance: find answers	Classical LCIA balance table. Balance table structure: Columns and rows. Browsing through the balance. Finding relative contributions. How to separate input output tables. How to see non-elementary flows (e.g. solid wastes). How to look at your inventory in different units, including the units of environmental impacts. How to see all quantities at the same time. Weak point analysis.
Parameters: add a change dimension	Why parameters: Applications, advantages, examples. Exercises: Create a process parameter. Free and fixed parameters. See results with two different parameter settings. Formulas for parameters. Make your own process parameters and define scenarios with them. Compare potential alternatives for products or processes.
Make a complete life cycle model	Intensive hands-on modelling. Review of previous material and new modelling tools. Documentation. Allocation function in GaBi. GaBi Options menu.
Balance tools	Define a specific balance view. See results in groups. See filtered results. Normalisation and weighting in Gabi.
Parameters: advanced skills	Plan parameters, global parameters. Connecting parameters on different levels and creating scenarios. Playing with results through parameter explorer.
i-report	Establishing the i-report start settings. Creating collapsible sections. Creating drop-down menus. Creating sliders and setting min and max values. Creating an i-report with an existing template. Building the i-report - Inserting a diagram. Building the i-report - Inserting a table. Building the i-report - Structure, appearance and editing. Saving and exporting i-report.
Database content	Data in prof and extensions, data on demand. Protected content. Documentation in GaBi.
GaBi family: what else is out there	GaBi tools and files formats.
GaBi Data management	GaBi updates Standards for LCA data exchange – gbx – ILCD –EcoSpold Import and export of models and databases. GaBi compress functionality Creating additional versions of the Professional database.

A total duration of 8 hours is expected for this training.