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2 Scope of usage

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GaBi User Guide

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3 Disclaimer

Achtung: Klassifikation von Informationen und Verschlüsselung von Daten

Sie starten ein System mit Inhalten, deren Kenntnis durch Unbefugte das Erreichen von Produkt- und Projektzielen gefährden könnte.

Stellen Sie sicher, dass schützenswerte Informationen – insbesondere beim Export - als solche markiert und richtig behandelt werden.

Informationen zur ordnungsgemäßen Klassifikation von Dokumenten und Informationen finden sie unter <http://klassifikation.wob.vw.vwg>.

Beachten Sie weiterhin die geltenden Kriterien für die Verwendung sicherer Passwörter zur Verschlüsselung von Daten.

Da viele Screenshots in diesem Handbuch der standardisierten GaBi software entstammen beachten Sie bitte die folgende Entsprechungen:

- GaBi entspricht **LEAD**
- BOM Import entspricht **SlimLCI**
- GaBi Server entspricht **LCI Powertool**

4 The GaBi Software Family

GaBi Product Sustainability Performance is the leading product sustainability solution. It combines modeling & reporting software, data content and consulting expertise to help save money, enhance your brand & reduce your risk. GaBi is the established standard software for Life Cycle Assessment (LCA) in all branches. GaBi allows users to assess the potential environmental burdens of a product or service in its production, use and disposal (end of life).

GaBi is a modeling, reporting & diagnostic software tool for LCA practitioners that drives product sustainability performance during design and planning.

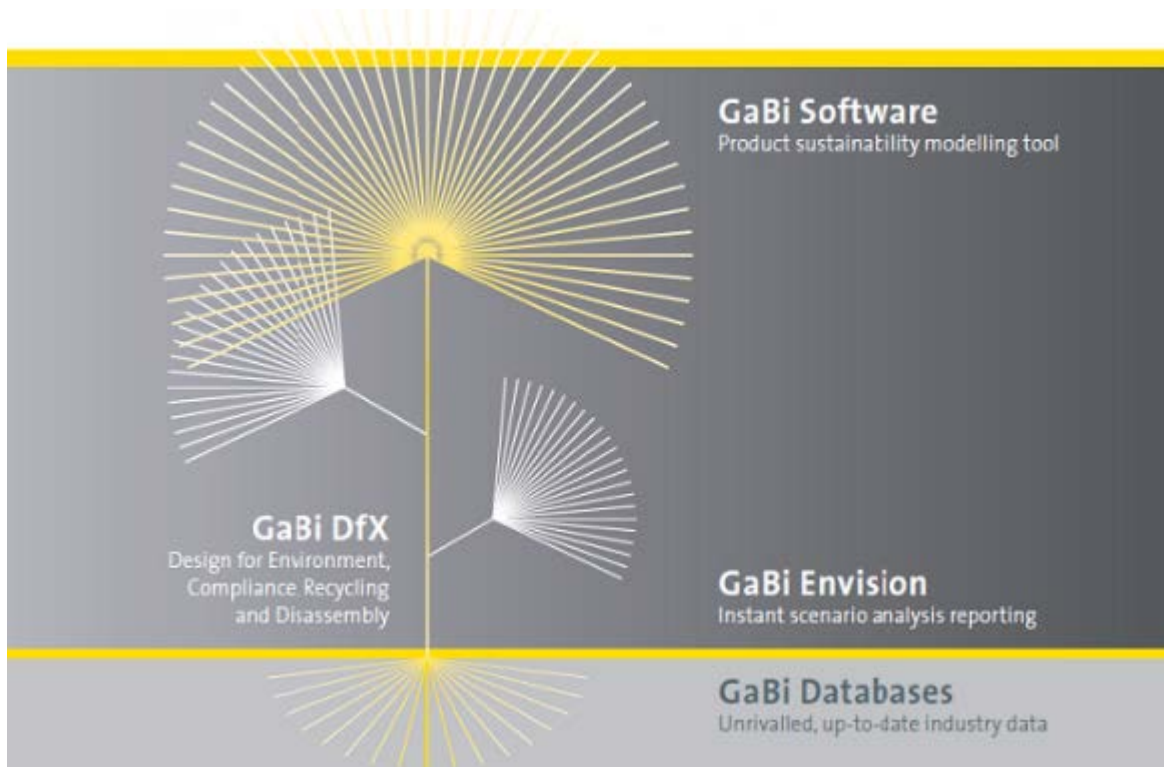
GaBi also supports:

- Carbon Footprint calculation
- Life Cycle Engineering projects (technical, economic and ecological analysis)
- Life Cycle Costing studies
- Life Cycle Working Environment studies
- Classical material and energy flow analysis
- Design for Environment applications
- Greenhouse Gas Accounting
- Benchmarking studies
- Environmental management system support (EMAS II)

GaBi Envision is an intuitive LCA tool for non-LCA experts allowing design teams to quickly evaluate ‘what-if’ scenarios in product and process design optimization. A GaBi 6 model together with GaBi databases underlie the GaBi Envision tool, ensuring the most robust modeling and content are working behind the scenes to provide reliable results. Users modify parameters via drop down menus or direct entry and view the environmental impacts immediately. There is no LCA experience required.

GaBi Dfx is the bill of materials (BOM) import tool and product lifecycle management (PLM) integration module for rapid LCA and compliance analysis of complex assemblies to support complete product portfolio reporting. If you want to consider different regulations during product design, such as the EU Directives for end-of-life vehicles, for electrical and electronic equipment waste, or for the restriction of hazardous substances while simultaneously keeping the environmental performance of your product in focus - then GaBi DfX is your tool. GaBi DfX is compatible with GaBi LCA models.

GaBi Content & Databases are the largest internally consistent collection of life cycle inventory data with over 4,500 ready-to-use profiles representing most industries. PE INTERNATIONAL ensures individual datasets are comparable by using consistent methods and boundaries in their construction. This means you can use datasets seamlessly together in your models, removing the time needed to check for system boundary inconsistencies. Over 20 years of life cycle expertise by PE INTERNATIONAL is captured in GaBi Databases, which always feature the most accurate Life Cycle Inventory profiles based on primary industry data.



5 GaBi Installation

5.1 Scope of Delivery

The GaBi email delivery includes:

- A GaBi program as a downloadable file
- A GaBi manual as a searchable help document

Contents of the GaBi download:

- Installation program for GaBi software (setup.exe)
- Databases (according to your purchase order)
- GaBi database documentation
- GaBi manual on the software as online help and a pdf file

A DVD providing access to a GaBi installation is only available on request.

5.2 Getting Started

Technical Requirements

Hardware requirements:

PC > 3500 MHz (single core) or PC > 2.0 GHz (dual core or higher);

2 GB main memory (RAM);

1000 MB free hard disk storage (the actual hard disk storage space required depends on the size of your databases);
and

Screen resolution of 1024 x 768 pixels or higher

Software requirements:

Windows XP or higher

If you are using a Mac, you may run GaBi through a Windows emulator or via a parallel platform

Your computer might consider PDF files generated in the web browser to be pop-ups. If this is the case, modify the settings for the particular site to allow pop-ups.

Running GaBi on Windows XP/Vista/Windows 7:

1. You need to have administrator rights in order to install GaBi software
2. You must have administrator rights in order to run the automatic updates of the GaBi software.

5.3 Installation

GaBi installation instructions Step 1: Download software package from the link provided

- An executable file will be downloaded onto your computer
- “Client_number_client_name.exe”

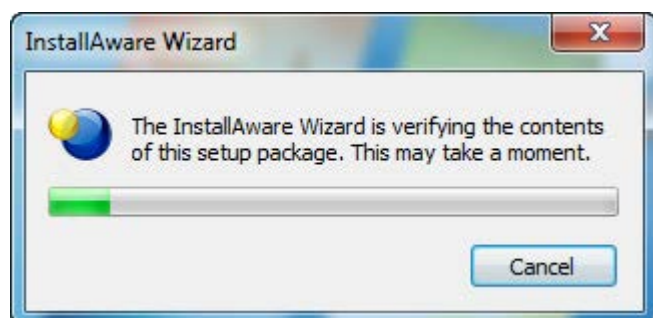


Step 2: Double click the .exe file

Click “Yes”.



- Now the GaBi Installation dialogue will start.



5.3.1 GaBi Software Installation

GaBi installation is a rather straightforward and self-explanatory process. Just start the downloaded installation package, or insert your GaBi installation DVD into your computer's optical disc drive, and follow the instructions.

Windows Vista and Windows 7 users, please note:

During setup initialization, Windows Vista's or Windows 7's User Account Control might ask whether the setup is allowed to run with administrative rights. On some of our test systems we noticed that the confirmation dialog did not appear full-screen, but only as a flashing icon on the task bar. So, if the progress dialog appears to be frozen, please examine your task bar for such an icon:

Entering the license key:

During the installation of GaBi you are asked to enter your GaBi license Key. This is a 30 digit alphanumeric code you received with your purchase of GaBi. Please enter the key with the correct case.



Figure: Installation of GaBi - step 1



Figure: Installation of GaBi - step 2 - accept license agreement

Figure: Installation of GaBi - step 3 - enter license key, Company name, your name, then click 'Next'

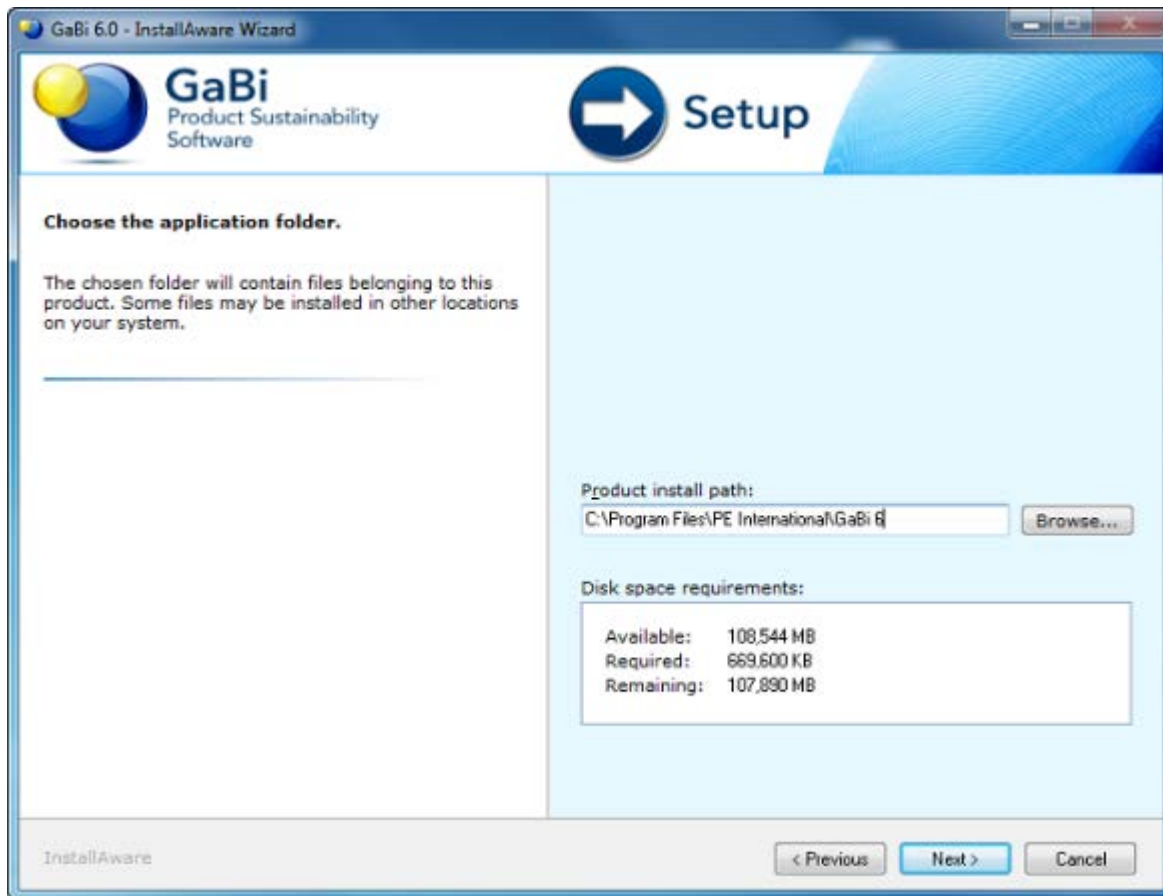


Figure: Installation of GaBi - step 4 - location of storage

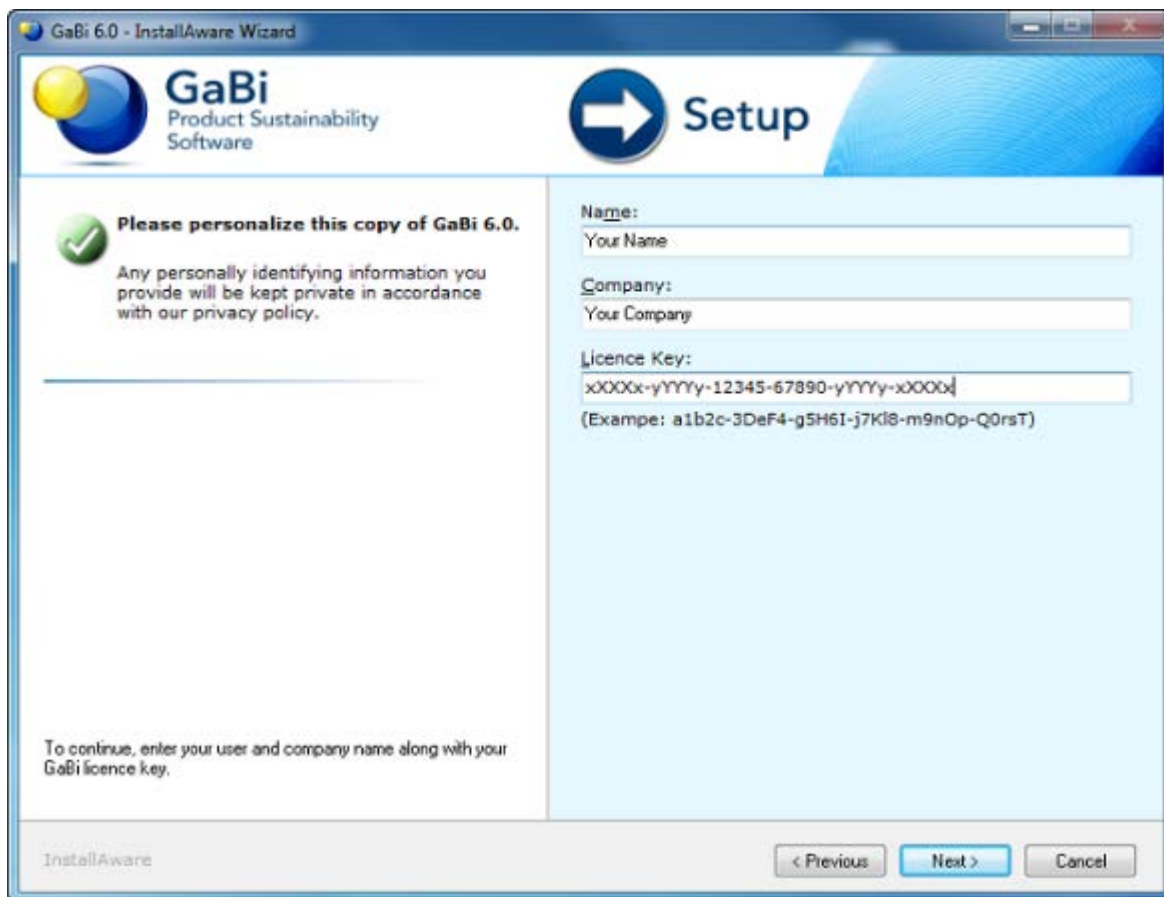


Figure: Installation of GaBi - step 5

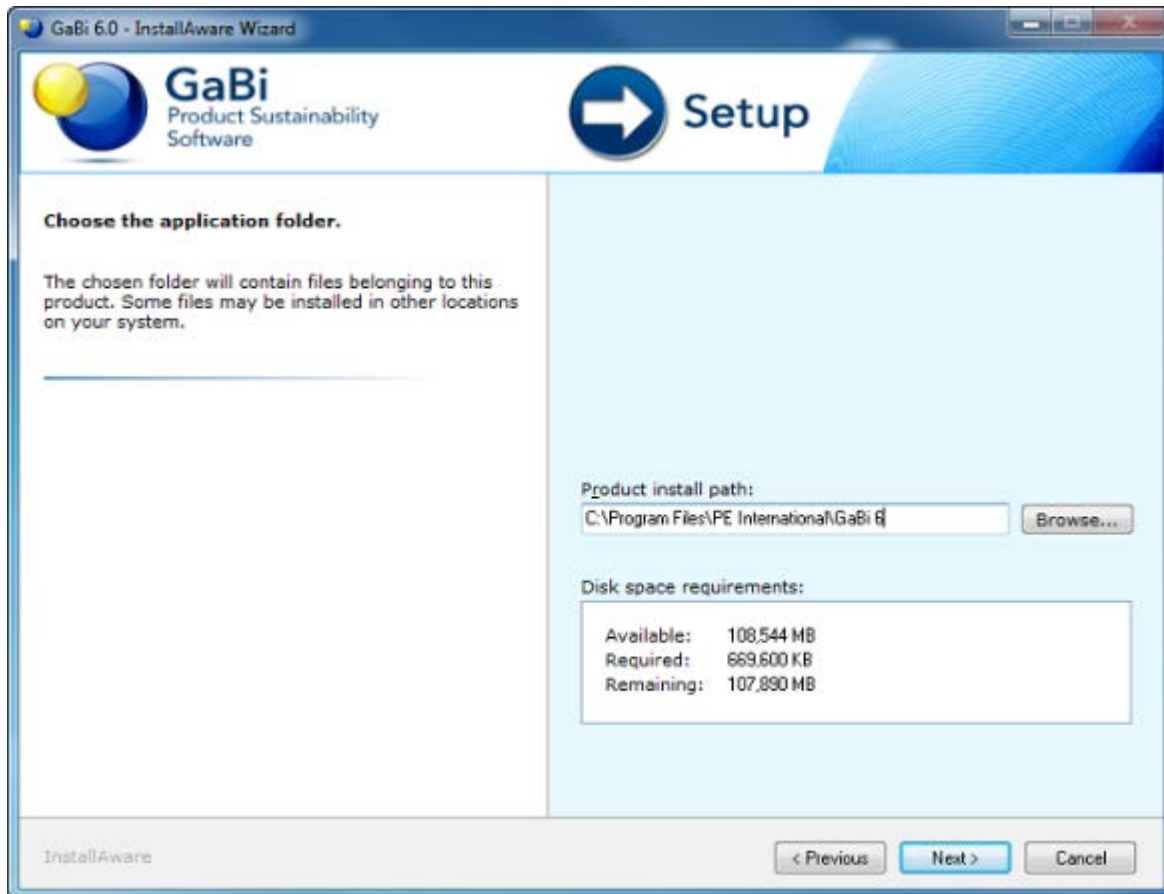


Figure: Installation of GaBi - step 6

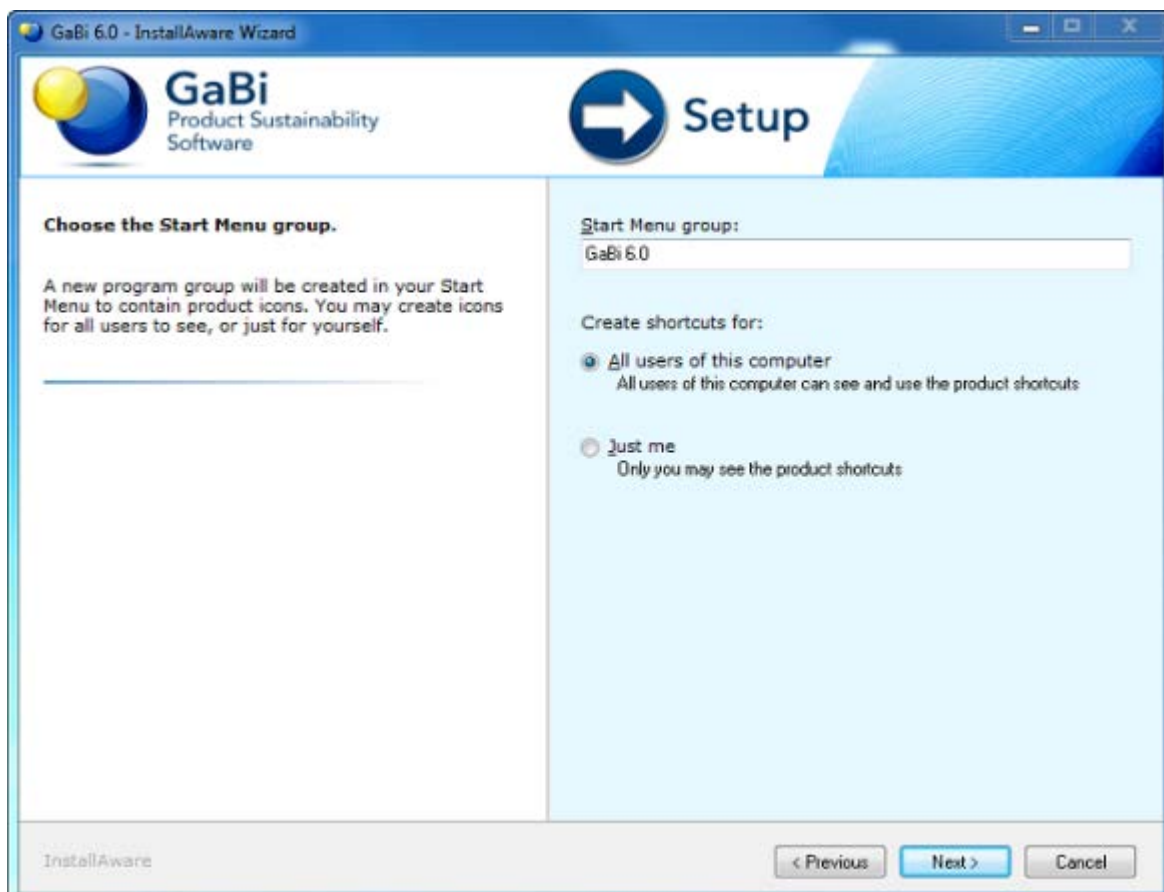


Figure: Installation of GaBi - step 7



Figure: Installation of GaBi, click 'Next'

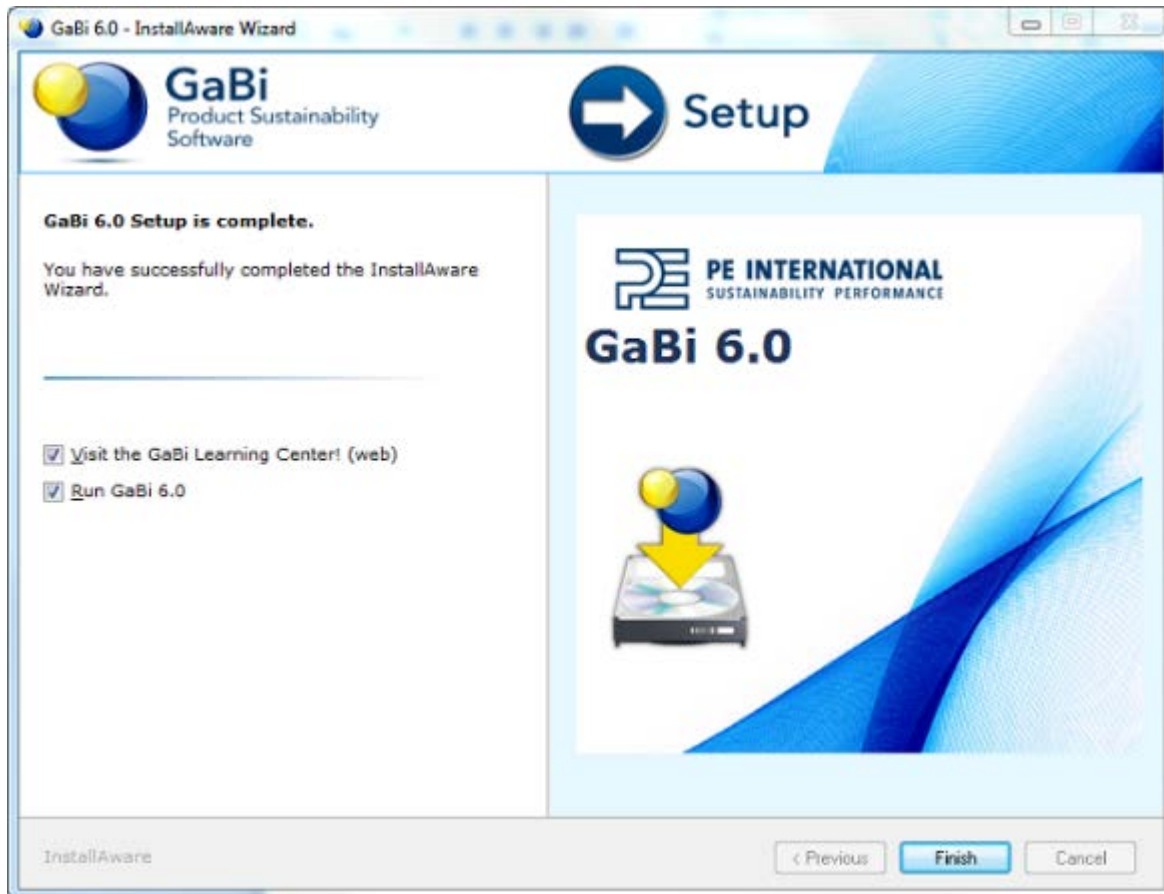


Figure: Installation of GaBi complete.

Note 1: The digit 1, the lowercase L and the uppercase I might easily be confused, so read carefully. If you received your license Key via email, you can of course use Copy & Paste.

Note 2: After clicking "Next >", the License Key is checked and is then used to download your individual license and database files. If the License Key is not recognized, you are asked whether you want to correct it, or otherwise install a default license file and database (which may not contain the databases you purchased).

After the installation of the GaBi software, the activation of the software license will start automatically. The following sub chapter describes the procedure how to do so.

5.3.2 License activation

Every new license file needs to be activated before it is fully operational.

When you start GaBi for the first time with a new license key, the following dialog appears:



Figure: Activation of GaBi - step 1

Activation of GaBi license

Please enter the activation data

Please enter all required information for the activation process.

Serial Number	ABCDE-12345-ABCDE-12345-ABCDE-12345
	Where do you find your Serial Number?
Customer Number	
Company	Anycompany Inc.
Salutation	Mr
First Name	John
Last Name	Smith
Country	United States
E-Mail Address	sample@anycompany.com

Back Next End

Figure: Activation of GaBi - step 2. Enter your license key into the field marked 'Serial Number' and enter in (at least) the mandatory fields in red.

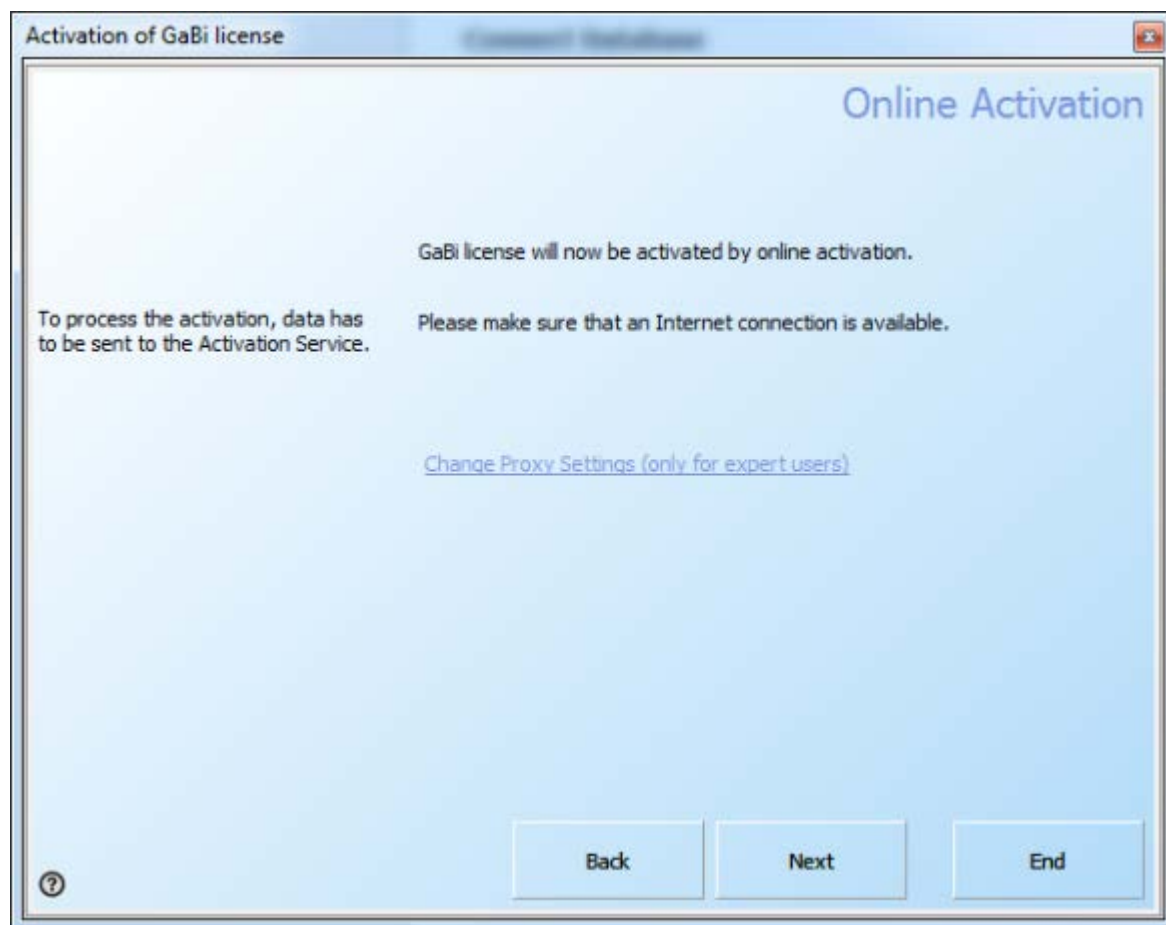


Figure: Activation of GaBi - step 3

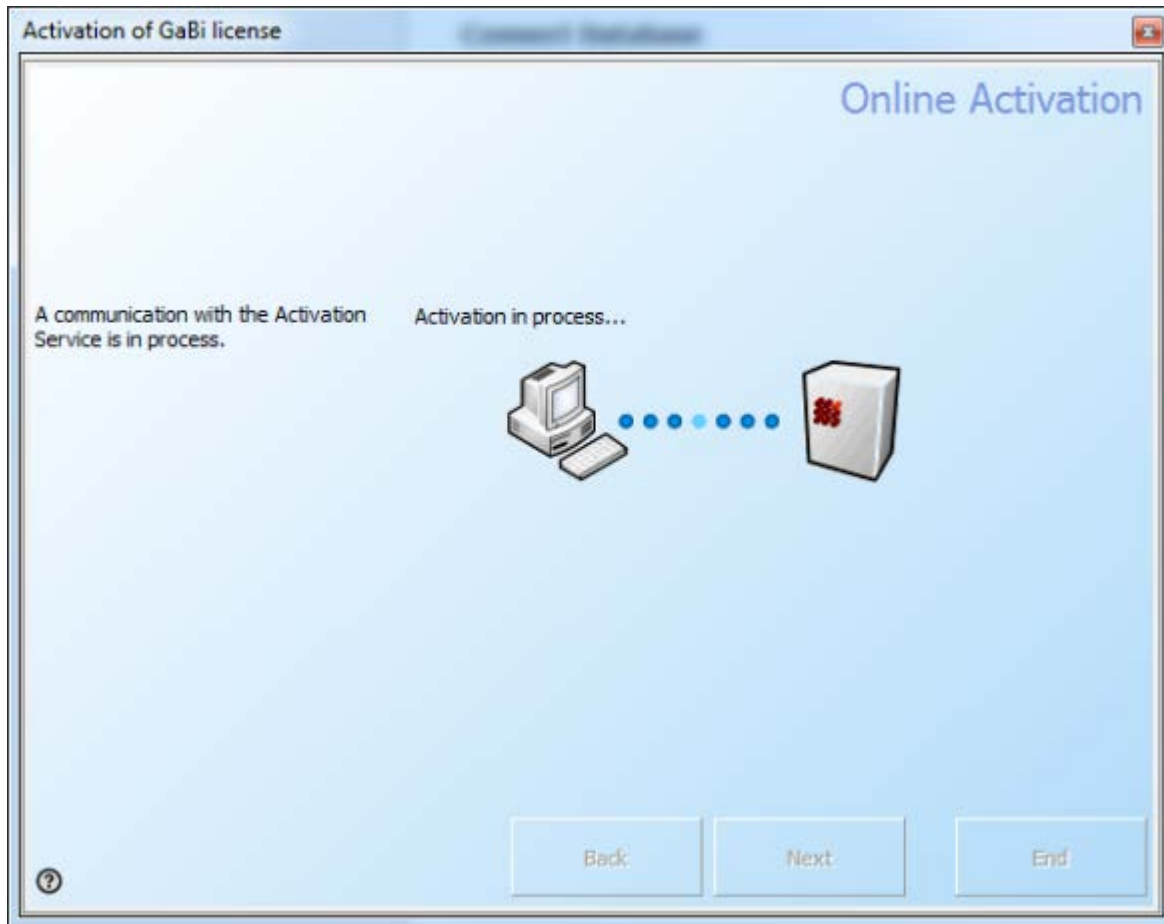


Figure: Activation of GaBi - step 4

Select "I have a Serial Number and I want to activate GaBi Professional" and click "Next".

Now you are asked to enter your registration information. Please fill out the form; the license key should already be entered into the field "Serial Number". **If not**, please enter it in six groups with five alphanumeric digits each, separated by hyphens.

Example: a1b2c-3DeF4-g5H6I-j7Kl8-m9nOp-QorsT.

You can of course, use Copy & Paste. Now click "Next" two times to execute the activation process.

When the activation process is finished, the following dialog should appear:

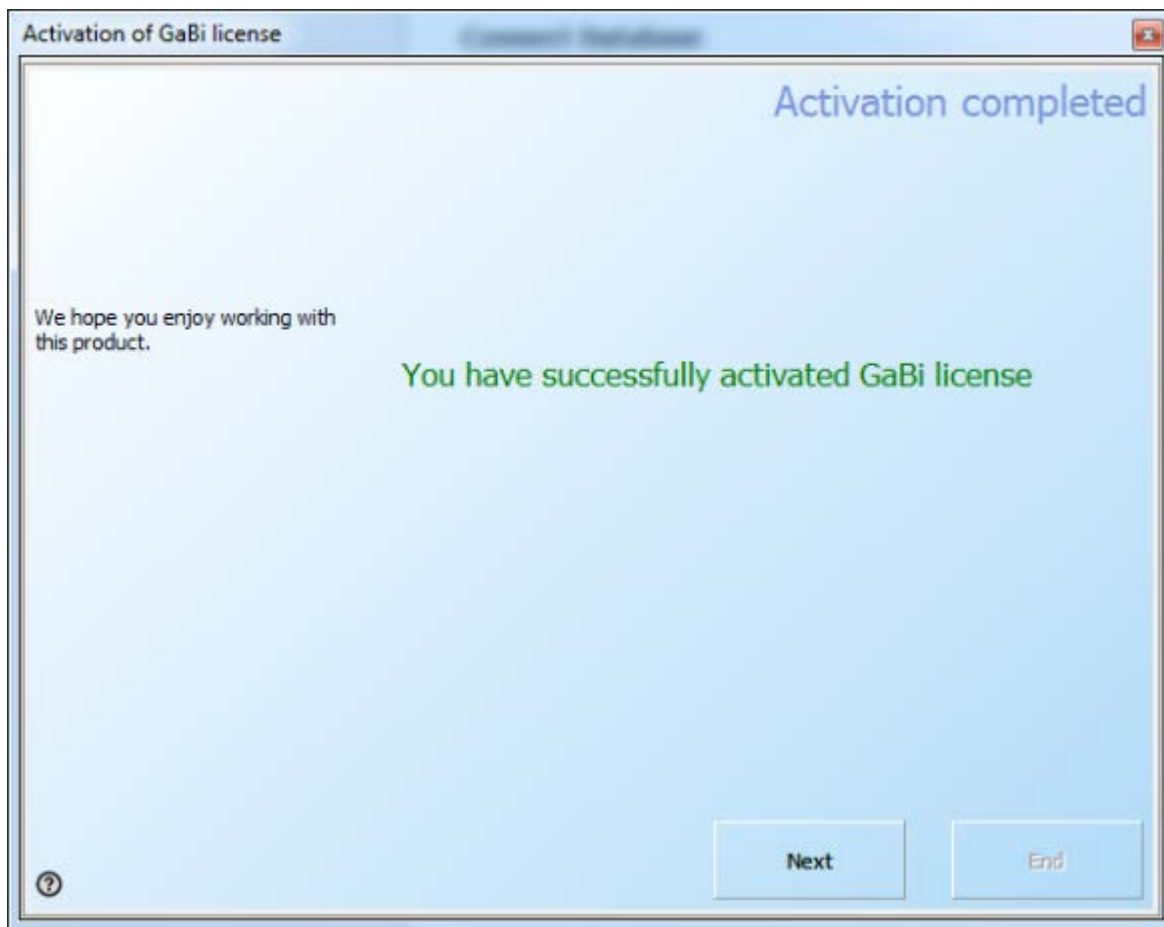


Figure: Activation of GaBi - step 5

The License File:

GaBi setup automatically installs your license file into the Windows folder which is intended for common program data files. The location of this folder is:

Windows XP	C:\Documents and Settings\All Users\Application Data\GaBi
Windows Vista and Windows 7	C:\ProgramData\GaBi Please note: the folder is not visible by default! (you may access it by typing or pasting the path into Explorer's location bar)

The default name of the license file is **GaBi6prof.lic**.

Multi-user ("network") license file:

In the usual single user scenario, each computer with GaBi installed has its individual license file in the folder stated above. For network environments with multiple users GaBi allows for a different setup, i.e. the license file can reside on a common network folder.

This requires the following steps (do not activate the license before!):

1. create a folder on a network drive
2. copy the license file into the created folder

3. grant all users which are intended to use GaBi read **and** write access to the folder and the license file
4. configure all installations of GaBi to use the license file on the network folder (see below)
5. start GaBi and activate the license

Advantages of a network GaBi license file:

the activation process only needs to be executed once for every installation of GaBi

"floating users", i.e. the license file allows a fixed maximum number of users to work with GaBi at a time. Yet the actual number of GaBi installations on user computers may be higher.

If you have questions regarding installation or license / license file issues of your GaBi in a network environment, please contact support, since if you made steps which were not really suitable for your individual environment it might require much more administrative effort to fix things afterwards than to clarify them beforehand.

5.3.3 How to Uninstall GaBi

To un-install GaBi from your PC call up the un-installation routine under Windows "Control Panel" -> "Add/Remove Software".

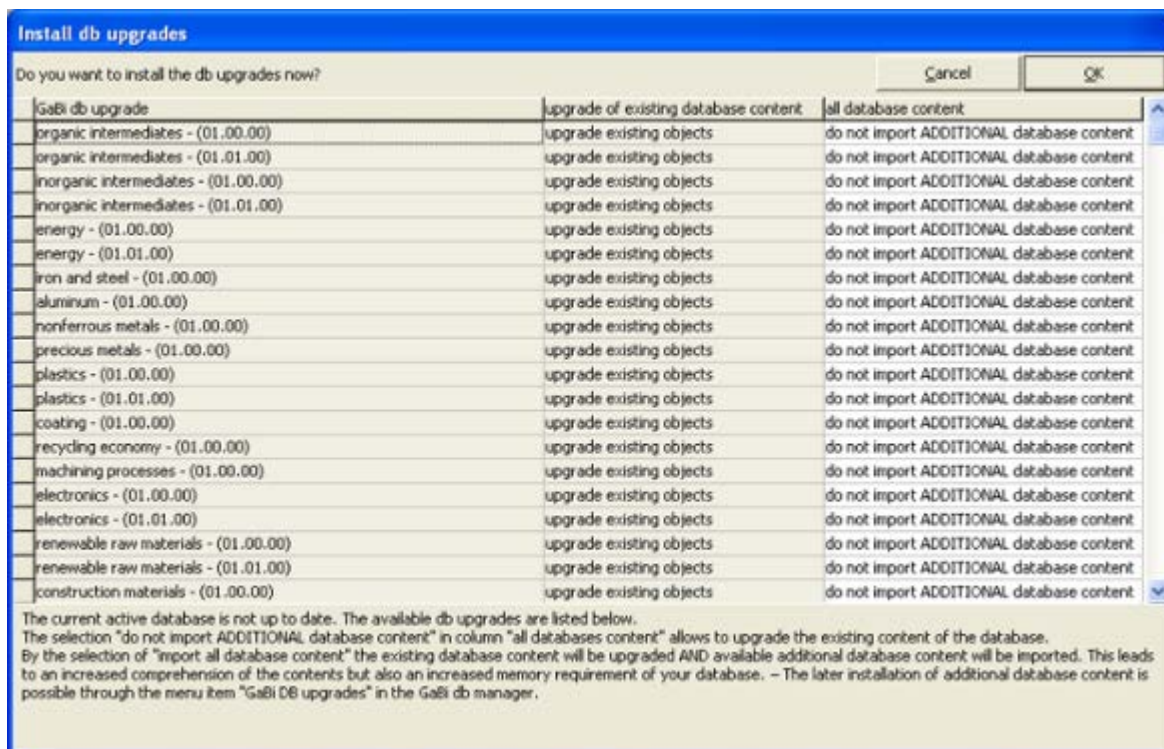
5.3.4 Installing GaBi database updates and service packs

The GaBi software includes a functionality to upgrade original objects (quantities, flows, processes, etc.) in databases. This feature enables advanced database management and offers great possibilities to maintain databases and keep them on the most state of the art level.

The files for maintenance operations are installed during an automatic update using the web based auto update functionality of GaBi or with a new CD delivered from PE INTERNATIONAL.

Once the new files have been installed in the GaBi directory, the status of each of your databases will be checked when they are opened in GaBi, giving you the choice to begin upgrading them. The upgrade occurs in two steps: installing service packs and installing GaBi database updates.

The DB Upgrade installation window will appear (see below)



In the third column, "all databases content", a drop-down menu allows you to select between two alternatives:

The default setting is **"Do not import ADDITIONAL database content"**. Selecting this means all existing processes will be updated, but no new processes will be added and no processes that you deleted will be restored.

Alternatively you can select **"Import all database contents"**. Here, the existing database content will be upgraded AND all available additions to the database will be imported. (To make use of any newly ordered extension databases, you should choose this option for the respective database!) The capacity of your database will thereby be increased but the database will naturally also have a higher memory demand.

After making your choice (for each database separately), click 'Ok' to begin the upgrade.

The upgrade process can take several hours depending on the size of the database and the capacity of your computer. Do not under any circumstances interrupt the upgrade process until a window appears listing the protocol. (During the upgrade the GaBi screen may go blank for some minutes.)

The upgrade is complete when you see the log file window. Please save this file.

- All PE/GaBi processes that were in the original delivery database will be replaced with an upgraded version; objects that you have created yourself will however not be changed, except for plans that have PE/GaBi processes on them.

- An automatic back-up of your database will be created in your current GaBi 6 database folder (..._DB backups\...)

5.4 Automatic Updates

Every time the GaBi software is started the automatic update mechanism checks for new updates online. In order to search for new updates, the software has to have access to the internet, in order to install the update, the user has to have administrator rights on the computer. If there are new updates available the dialog below appears and the update can be downloaded and installed automatically.

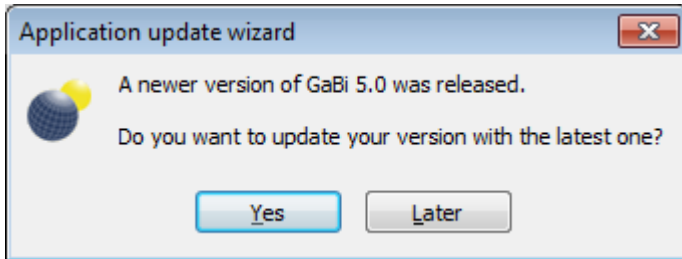


Figure: Update wizard.

If you chose to update, the necessary files are downloaded and installed. The GaBi Software is restarted after the update process.



Figure: Downloading update files

The check for updates can also be triggered manually. To do this select "Help"->"Check for updates" in the GaBi DB Manager. If the connection to the update server cannot be established an error message with the cause of the problem will appear. Note that no error message will appear if the check for new updates failed (e.g. due to a missing internet connection). As such, it is recommended that you intermittently start the update check manually.

5.5 System Start and Log-on

After starting GaBi, the start screen appears.



Figure: GaBi start screen

The GaBi start screen is divided into 2 segments: On the left side of the window you can see the databases that are currently connected.

On the right side, you can see hyperlinks to the GaBi user forum and learning center in the top right corner. From up to down databases can be connected and subsequently activated. Below this is a section to view the history of changes made to your most recently deactivated database.

5.5.1 Creating and Restoring gcd files

You can archive your databases as gcd-file (GaBi Compressed Database file).

Creating a gcd file from a database:

Deactivate the database. In the database manager, click on the database with the right-mouse button and choose 'Send DB to file...'. Select a filename for the archive and click 'Save'.

Restoring databases from a gcd-file:

1. To create a database from this gcd-file, open GaBi and in the Database menu, choose ‘Restore DB from file...’.

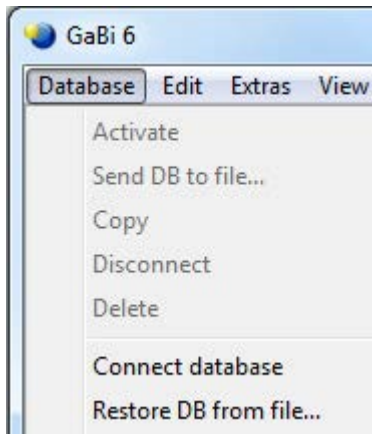


Figure: Restoring a database

2. Locate and open your gcd file.
3. Choose where you would like this database to be saved.

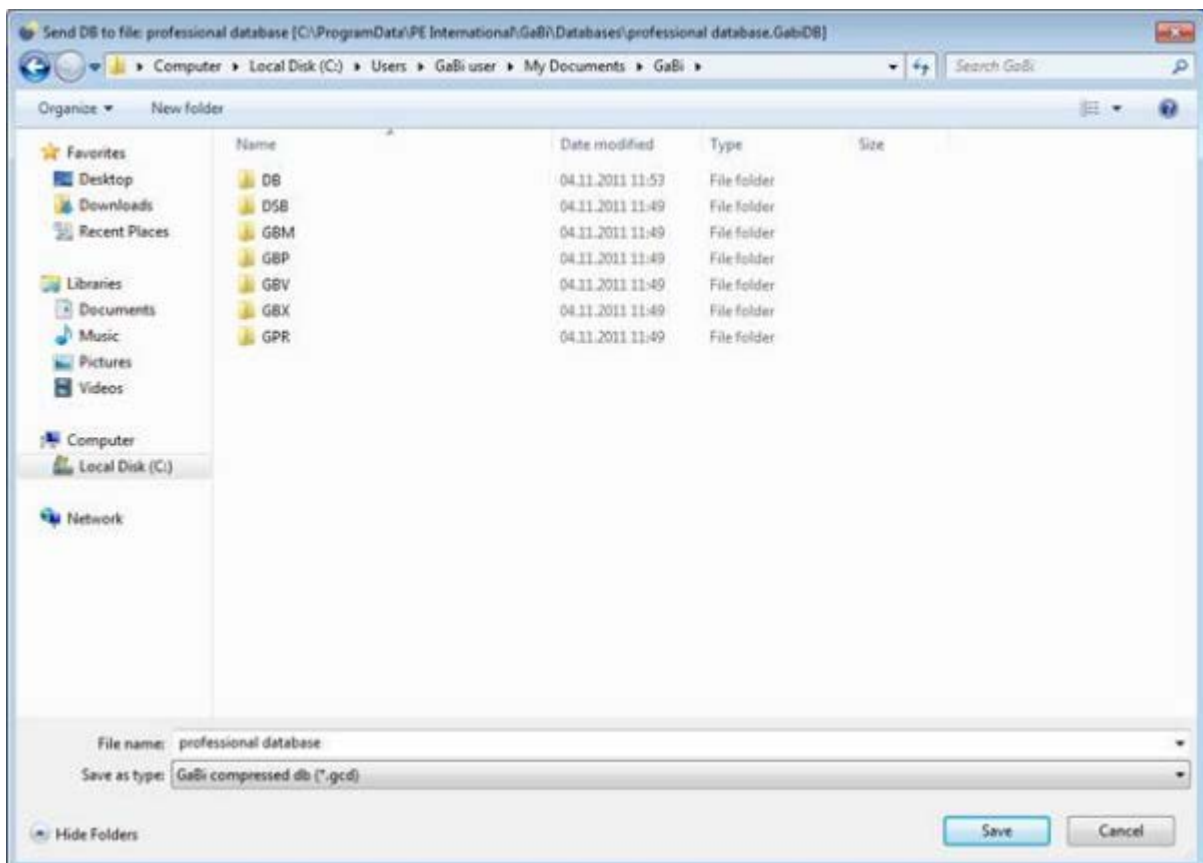


Figure: Restoring a database (2)

You will be asked to confirm the name of the subdirectory, click 'Yes'. Your new database is now connected and ready to be activated.

5.5.2 Log-in, Name, Password, Project

After the activation of the database you have to log in to open it. You must be an authorized user and use the appropriate password. By default the user is given the user name **System** and no password. Click on "OK" to log onto the copy machine database. **(A user name and password is not required to use GaBi. By default you can just click "OK" to open the database.)**

Additionally specific projects can be activated directly at database log-on. To do so, enter the project title into the

corresponding text field.

You can find additional details on **projects (Section 7.1)**.

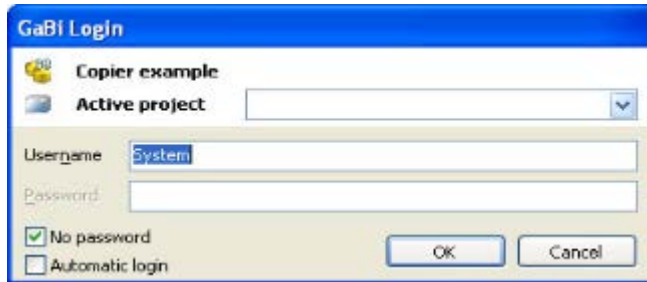


Figure: GaBi log-in

After log-in the view on the start screen changes to the GaBi Database Manager (from herein: DB Manager). GaBi software is controlled and managed using the DB Manager, from here you have access to all GaBi objects. You can create new objects (plan, process and flows) by left clicking on the straw yellow buttons under "Create New Object" in the right segment. All objects created with this function will be located in the corresponding root folders. If you create a plan, you will find it in root folder "Plans". By left clicking on the straw yellow buttons under "Edit Existing Object", you can choose from a list of existing objects in the activated database. You can even view results by left clicking on "Balance" under "View Results".

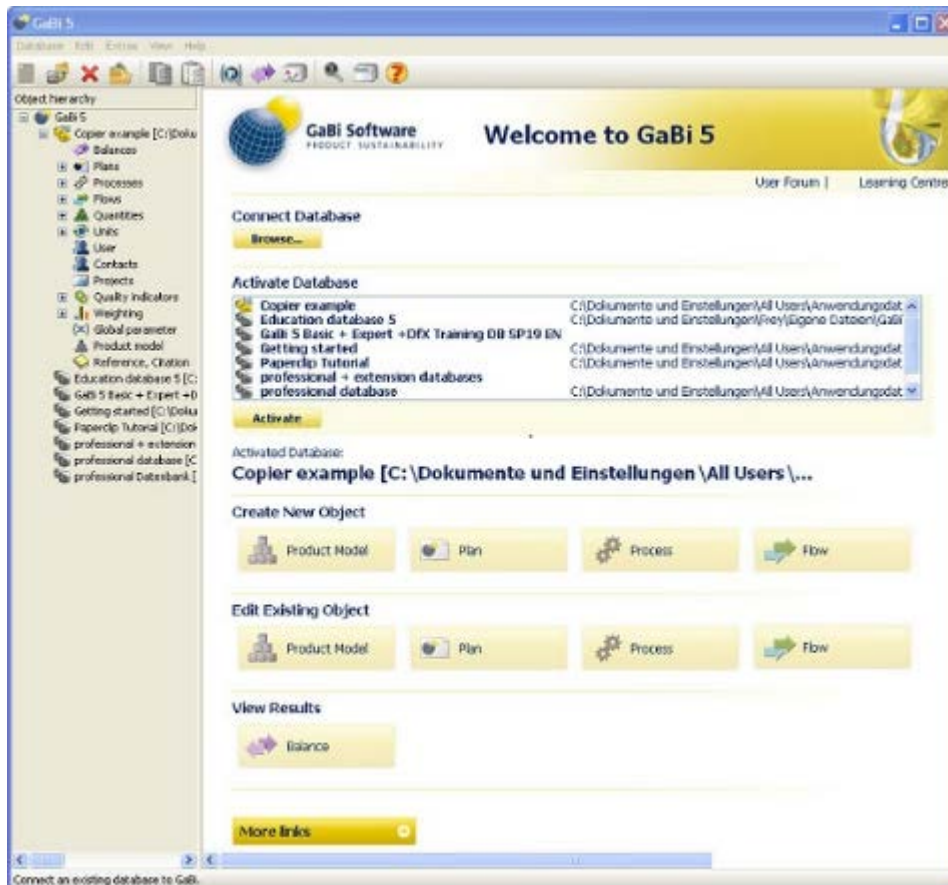


Figure: GaBi database manager

5.5.3 Activating, Connecting or Disconnecting a Database

After installation of the software, one or more databases are connected with GaBi. They are visible in the start window. In GaBi, you can only have an active database at a time. Non-active, but connected databases can be used for data exchange, for example. There is no limit to the number of databases you have connected at one time.

There are two ways to activate a database:

1. Select the corresponding database in the object hierarchy on the left side of the database manager with a mouse click, then right click the mouse and select "Activate" from the menu **or**
2. Select the appropriate database in the frame of activate database, single click on "Activate" under the frame or double-click on the database.



If you want to connect additional databases with GaBi, select "Connect Database" in the pull-down menu "Database". A selection dialog appears where you can select the database location. Select the database file and left click on "open" or double-click on the database file. The selected database is now added to the list of available databases and can be activated or used for data exchange.

On the other hand, you would like to remove a database from the list of the connected databases, you can select the database that you want to disconnect, then select "Disconnect" in the pull-down menu "Database". This will not delete the database from the hard disk. It simply disconnects it from the software until you reconnect it in the future.

Now activate the copy machine database.

6 Introduction to GaBi

The GaBi software system is a leading **tool for life cycle engineering, creating life cycle modeling and balances**. Life cycle engineering is a method for the assessment of the technical, economic and environment impacts of products, services and systems; GaBi additionally can evaluate socio-economic aspects. **Life cycle assessment** is a technique to assess the environmental impacts associated with all stages of a product's life from cradle to grave.

GaBi's visualization approach enables you to construct your products and system models in GaBi just as would sketch them on paper. You can perform simple or comprehensive balances. GaBi provides support when managing large data sets and modeling product life cycles. GaBi calculates different types of balances and helps you to analyze and interpret the results.

GaBi is not limited to just life cycle engineering and life cycle assessment. You may use it to: model and analyze process chain systems; conduct material and energy analyses; create a reference to study objectives; set boundary conditions and reference quantities.

The System: GaBi is a **modular system** made up of plans, processes and flows. As a result, the GaBi system has a clear and transparent structure. Data on the life cycle inventory, the life cycle impact assessment and the weighting models are carefully separated from each other; therefore, the individual modules remain easily manageable and are only combined during the calculation of your balance. The GaBi Balance view displays your Life Cycle Inventory and the Life Cycle Impact Assessment results in a table.

The transparency of balance results is another major advantage of GaBi. You can calculate the balances of different levels of detail, facilitating the identification of weak points. In addition, the balance results can be traced back to individual *processes* within the process chains.

GaBi also allows you to display the product life cycle or process chain in a modular fashion. Individual life cycle phases (manufacturing, use or disposal phases) can be grouped together and can be processed separately from each other.

Another feature of the modular structure is that the **software and databases are independent from each other**. All information related to a product (eco-profiles, material properties, etc.) is stored in the database. GaBi databases are predefined according to a basic structure. The software supplies the user interface and the ability to construct and analyze databases. The user may create or change a database and (re)insert it into the model.

The databases supplied with the system contain life cycle inventory data obtained by long-term research by the University of Stuttgart and PE INTERNATIONAL Ag. Please see the corresponding documentation for additional details for modeling using the database content included with each database in HTML format. In addition to the "professional" and "lean" core databases, 17 additional databases are available. More information is available at the software homepage www.gabi-software.com. PE International also offers a "Data-on-Demand" service, allowing us to create any client-specific dataset request.

The open architecture of GaBi makes the system flexible and transparent. GaBi can easily be expanded with the life cycle inventory data of new systems or the latest findings in life cycle impact categories or weighting models. This flexibility also makes it easier for you as a user.

The procedure for conducting life cycle assessments is standardized in the International Standards Organization (ISO) 14044 series. Read Chapter 4 for tips on how to use GaBi according to ISO 14044. The description is oriented toward the procedure in actual practice. Please note however, that using GaBi does not automatically result in the conformity of your balance with the ISO 14044 standards and other standards.

6.1 Short description of selected GaBi features

The versatile functionality of GaBi leads to new dimensions and an advanced standard in easy operation and flexibility. Some selected features which we want to introduce here are:

1. ergonomically designed user interface;
2. flexible modeling and graphic interface;
3. the GaBi Analyst;
4. assessment options within the balances;
5. life cycle costing;

6. incorporation of the life cycle working environment (LCWE) modeling functionality;
7. ILCD import & export;
8. EPD export;
9. Plan to process via grouping;
10. Updated dashboard templates;
11. Version history; and
12. Visualization of balance sheets and process windows

1. The user interface:

Key features include: directly switching between object types, implementation of multiple right mouse click menus, provision of information via scrolling text menus, expanded search functionality, the separation of LCA, LCC and LCWE using tabs and the ability to customize the color of *flows* on *plans* according to category.

2. Flexible modeling and visualization:

The **unlimited allocation possibilities (Section 7.7)** and **parameter functionality (Section 7.5)** significantly improve the modeling capability of GaBi. In addition to process parameters, plan level and global parameters can also be defined in GaBi. Plan parameters can be used in all *processes* and *plans* which are located on a *plan*. In addition, they can be carried from a *plan* to the directly connected *plans*. Global parameters are valid throughout the database (individual database instance on the left side of the screen) and can be used in each *plan* and each *process* within the database.

3. Parameter Explorer:

The **GaBi parameter explorer (Section 8.18)** enables the transparent use of multiple types of parameters in complex models. It can be started from the GaBi DB Manager, a *plan*, the balance window or the GaBi Analyst. The GaBi parameter explorer shows all of the *processes* and sub-plans on the *plan* and displays the location of parameters in a model in a hierarchy. *Processes*, where parameters are used, are marked in color. All parameters can be changed from a single location in a coordinated manner.

Graphical Interface:

The graphical interface includes reference quantities on plans such as optional display of flow quantities and names and the ability to display images instead of process boxes. The graphical interface is also improved in the balance and the GaBi Analyst.

Advanced modeling features:

This collapsible panel enables to define properties of object instances with a minimum of individual steps resulting a very efficient way to apply for example groupings.

Integration of LCIA results preview on plan level tells about the contribution of each object to the total result of the analysed plan in terms of %. Any impact category available in GaBi can be selected to be visualized on plan level.

More intuitive and more intelligent search engine which enables to search and link open flow inputs- and outputs by simply dragging from object instance to plan surface.

3. GaBi Analyst:

You may evaluate your results in a number of ways when using parameters. Use GaBi Analyst to check the robustness of your results, conduct basic and advanced statistical analyses and evaluate different scenarios.

Scenario analysis:

The **Scenario Analyst (Section 7.6.1)** allows you to compare the impact of different system configurations/conditions. Any number of parameters can be selected to create a scenario and this can be compared directly with other scenarios. (Discrete scenarios can be done in a balance window- this is for more advanced scenarios).

Parameter variation:

Parameter variation (Section 7.6.2) enables you to perform gradual variation of key variables, enabling an understanding of how a system will perform under changing conditions.

Sensitivity analysis:

In a **Sensitivity analysis (Section 7.6.3)**, a change in result is determined in relation to change in input values. The results of a sensitivity analysis are broken down according to the "most sensitive" input variables. This enables you to identify key parameters influencing the system and how they change under different systems conditions.

Monte Carlo analysis:

In a **Monte Carlo analysis (Section 7.6.4)**, random results of a distribution for the selected parameters and flow data (including the characterization factors) of a model are applied to determine the stochastic distribution of potential balance results. The Monte Carlo analysis also serves as a tool to determine the significance of results.

Batch mode of the GaBi Analyst,

Analyses in GaBi can also be calculated in **Batch mode (Section 7.6.5)**. This means that you can perform multiple, complex scenarios, parameter variations, sensitivity analysis or Monte Carlo analyses when your PC is not in use. However, this will only be necessary in rare cases.

4. Expanded balances:

The GaBi balance window has been developed to enable analysis and interpretation of LCC and LCWE, as well as more flexible and easier access to results overall.

Categorization filter:

GaBi 5 allows you to assess process chains in terms of four different **category filters (Section 7.4.2.13)**. These categories are defined on unit processes on plans. Process categories are nation, type, operation or user-defined. This makes it possible, for example, to separate the percentages of internal and external *processes* in a balance. Additionally, the percentage contribution of all transport processes can be determined or the percentage of internal company emissions vs. total emissions can be identified.

Balance views:

GaBi 5 provides the ability to define and save **customized views (Section 7.4.2.12)** of the balance. If, for example, you are only interested in the primary energy consumption, and global warming potential (GWP), acidification potential (AP) and eutrophication potential (EP), a balance view can be defined which only includes the desired *flows* or *quantities* and hides the others. This facilitates the targeted export of results into spreadsheet programs.

Weak point analysis:

Using **weak point analysis (Section 7.4.2.11)**, results can be hidden or emphasized in color in the balance window. This feature enables threshold values to be defined for exclusion from balance results. In addition, empty cells and columns can be hidden to improve clarity.

GaBi dashboard:

GaBi Dashboards may be configured by users to show your most important results using graphical drill-down functionality. This allows you to standardize your company-specific LCA/LCIA results presentation. The GaBi Insights Library provides a broad selection of analysis tools designed to visualize LCA outcomes and deliver insights into hotspots and opportunities for improvement

GaBi i-report creator:

GaBi i-report creator is now part of GaBi Professional licenses, allowing you to configure single- or multi-page result report templates which can be applied to any GaBi LCA model. You can standardize your organization specific reporting needs such as corporate identity requirements.

GaBi i-report scenario view allows you to understand the effect of different scenarios describing product alternatives immediately resulting in defined standard i-report templates which you can transfer into a pdf file with one click. GaBi i-report allows you to visualize improve and report on sustainability. To share your results with multiple stakeholders, ask about GaBi Envision web!

5. LCC (Life Cycle Costing):

With GaBi 6 process related cost categories can be analyzed related to the life cycle of a product or a system. GaBi 6 automatically calculates process and flow-related costs based on cost factors. In combination with categorization filters, the costs of different life cycle phases can be modeled. Internal or external company costs can be displayed separately and analyzed in the balance. Cost information must be entered by the user.

6. LCWE (Life Cycle Working Environment):

You can record and assess human work time and additional aspects in terms of their quality over a complete life cycle. It is therefore possible for the first time to analyze not only environmental and economic but also socio-economic aspects for sustainable product development.

6.1.1 [7. ILCD Import & Export](#)

GaBi now has an interface to import and export LCI datasets which have been created following the requirements of the ILCD (International Life Cycle Database) format. The ILCD format is the official format of the EUROPEAN COMMISSION, developed within the scope of the ELCD (European Reference Life Cycle Database) database project. This import and export function maps a flow's nomenclature from ILCD with the flow nomenclature from the GaBi software wherever necessary to maintain consistency.

6.1.2 [8. EPD Export](#)

Now, you have access to the official format for Environmental Product Declarations (EPDs) according to the EN 15804 directive (European EPD format). This allows exporting EPD results from GaBi and sharing them with others

6.1.3 [9. Plan to process via grouping](#)

Users may apply filters to analyze results from different viewpoints. This new function allows users to save specific filter results as processes for further use in LCA work. For example, you may apply the scope emissions model on a cradle-to-gate LCA result and obtain results broken down according to scope 1, 2 and 3 emissions and immediately save it as a process.

6.1.4 [10 Updates dashboard templates](#)

With GaBi, PE introduced graphical drill-down dashboards for additional result analysis. Now, with GaBi, even easier to define user-specific dashboards on the basis of existing "themes" are available- with a larger number of predefined dashboards. Make your result analyses as user-specific as necessary.

6.1.5 [11. Version history](#)

Knowing which changes have been made to a database or model help with the auditability of your projects. This functionality allows you to see the changes which have been made over time. By allowing users to track changes and additions to project databases, consistency of results can be improved and better explained.

6.1.6 [12. Visualization of balance sheets and process windows](#)

The new version of GaBi has more contrast rich windows and easier to read tables on quantity, flow, process and as well as on balance level this will make the work with GaBi even more user-friendly and enjoyable for your eyes!

6.2 Basic principles of GaBi

A detailed description of each object type is provided in the chapter **Working with GaBi (Section 7)**. At this point we will only give a brief overview in order to make the next chapter more understandable. A balance (i.e. the results of a life cycle inventory) primarily consists of a list of all inputs and outputs which result from the life cycle of a product. The inputs and outputs in the balance are defined in GaBi as **flows**.

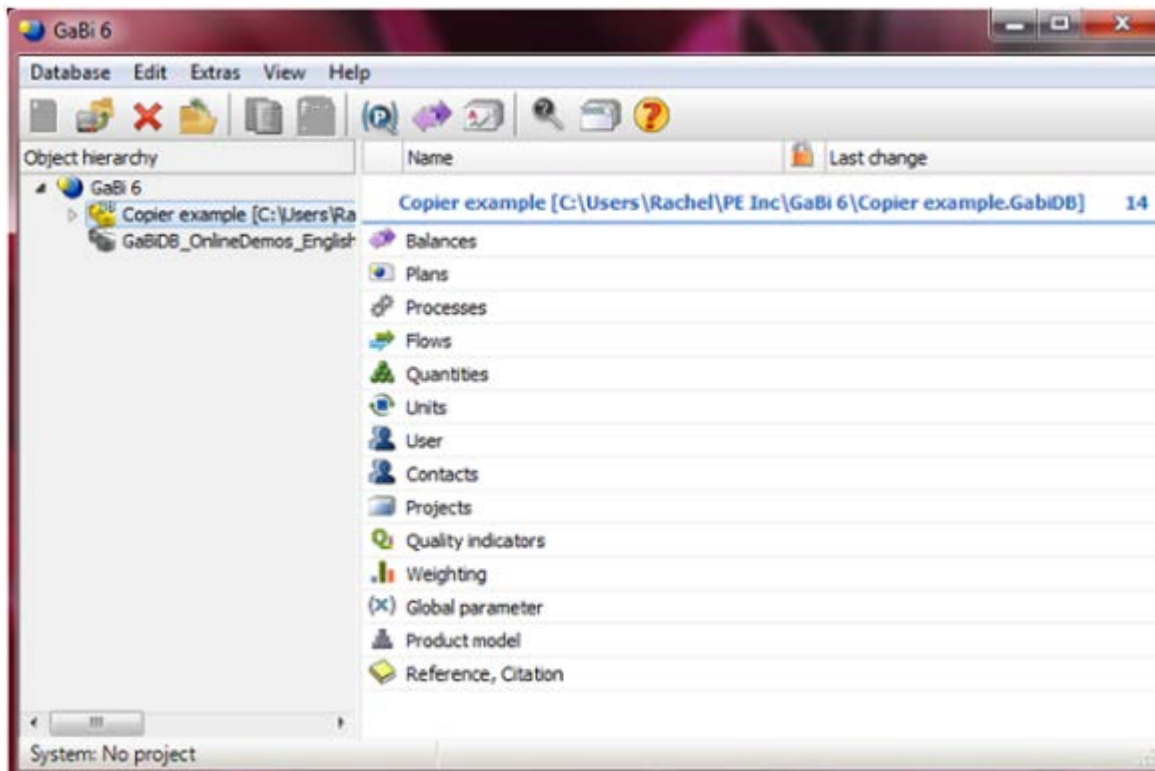


Figure: GaBi database structure

In GaBi, plans are used to combine the individual processes into various stages of a product's life-cycle. The creation of a life cycle balance is completed as follows: The processes necessary to manufacture a product are determined using their associated flows. The individual processes are connected on plans to produce a product. The balance (i.e. the results of a life cycle inventory) result shows a list of the input and output flows of all processes over the life cycle. Flows are defined in GaBi using quantities. Quantities can be understood as the "properties" of a flow.

Example: A gold washer which washes out river sand with a sieve. River sand and water are **input flows** and gold, earth and waste water are **output flows**. In GaBi terminology, washing the gold is considered a **process**. GaBi processes are therefore lists which consist of input and output flows representing the manufacture of a product, the procurement of a raw material, transport, service etc. The socio-economic characteristics are also flows.

Since life cycle modeling is generally more complex than the gold-washing example, generally more than one *process* is required to manufacture a product. Raw materials must be obtained and processed. They are transported from the place they are obtained to a processing location, and from there to a production facility. Here, for example, diesel is used as an energy source which, in turn, must be obtained and processed. In production, a number of materials are combined into a product as part of an often complex processing procedure. For example this product consumes energy in the use phase and is slowly combusted in a waste incineration plant to obtain energy.

The **reference unit** of many *flows* is "mass". However, each quantity of a flow is assigned its own unit.

Several *quantities* can be assigned to a *flow*. For example, the *flow* "gasoline" has the reference quantity "mass". It can also be assigned the *quantity* "volume" because it has a heat value or it can be defined with a price. All of these properties can be defined in GaBi using *quantities*. The *flow* can then be converted to different units. Diesel, for example, has a volume of 1.36 l and a heat value of 43.5 MJ per kg. You can determine its current daily price at your gas station and enter it yourself.

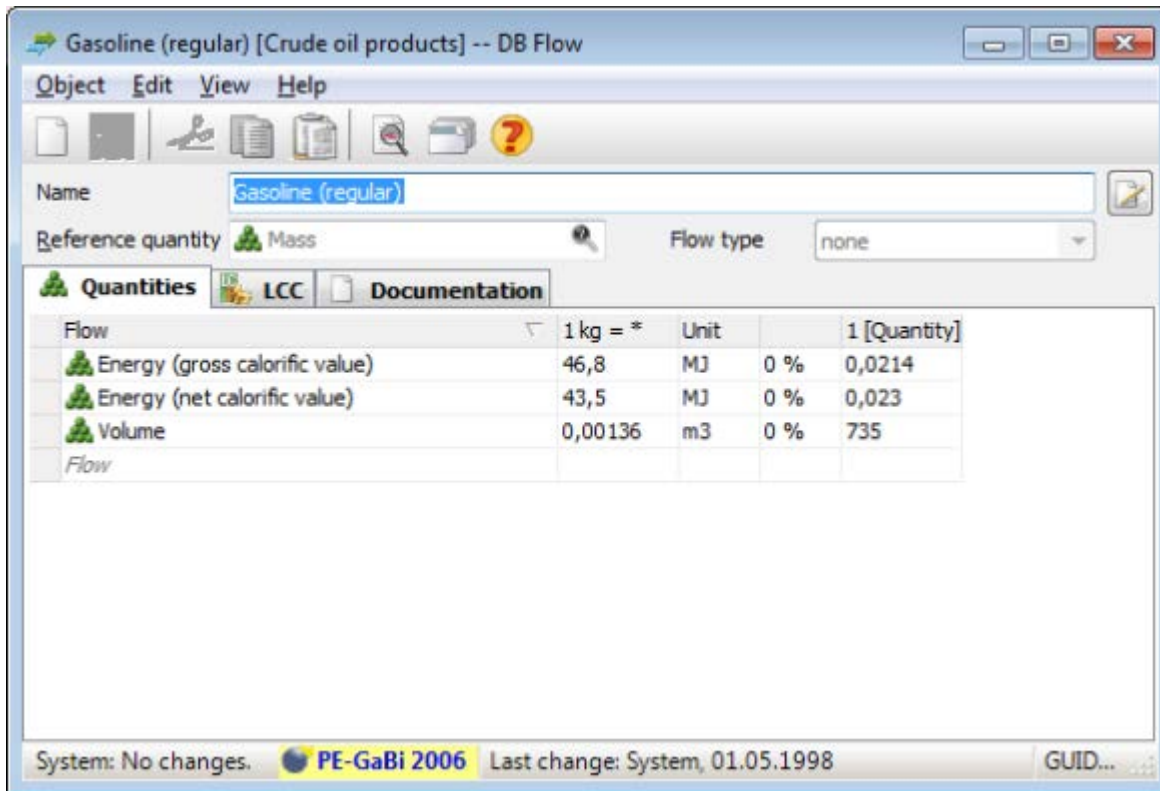


Figure: Quantities of a flow

Often viewing balances as life cycle inventories or according to their characterization as environmental life cycle impact categories it is not enough. The results can also be referenced to the emissions of a certain region (*evaluation*). Or they can be normalized to one indicator value (e.g., after the CML model or EcoIndicator) through the weighting of individual environmental burdens. The conversion factors necessary for normalization and evaluation can be found under the GaBi object **weighting**.

All additional GaBi database objects are not essential parts of a comprehensive balance, but rather are used for:

- increasing the flexibility of modeling (**Global parameter**),
- recording the data quality of a study (**Quality indicators**),
- organization of a database (**Projects**),
- the administration of GaBi users (**Users**),
- referring to contact persons (**Contacts**),
- referring to information sources (**Reference, Citation**).

6.3 Modeling and Analyzing Systems with GaBi

This section discusses the key ways to begin modeling your process, beginning with some fundamentals of life cycle assessment.

6.3.1 Goal and Scope Definition

The International Standards Organization (ISO) has created a set of internationally recognized standards for conducting a life cycle assessment. These include the goal and scope definition, inventory analysis, impact assessment and recurring interpretation. The goal of an LCA study shall state the intended application, reason(s) for carrying out the study, and the intended audience of the results. The scope shall be defined to consider the functions of the product system(s); the functional unit; the product system(s) to be studied; the product system boundaries;

allocation procedures; types of methodology and impact assessment; data requirements and subsequent interpretations; assumptions; limitations; data quality requirements; type of critical review, if any; and the type and format of the final results. As LCA is an iterative process, you may need to redefine your scope as additional information is collected.

GaBi makes it easy to integrate ISO 14044 requirements into your assessment. Within the projects object type, you can document the goal and scope of your balance in written form. GaBi allows you to process several different projects. The flows, processes, plans and balances created during a session are automatically assigned to the currently activated GaBi project.

When feasible, other ISO 14044 requirements were also taken into account when designing GaBi, including:

The allocation method used is indicated in the relevant GaBi process window (if the process is allocated), the allocation procedure is transparent and permits allocations according to *variables* which are defined by the user.

The requirements for data quality were taken into account by GaBi quality indicators and time, geographical and technological entries within the GaBi process.

The life cycle impact categories used and the method for life cycle impact assessment are transparent due to the object structure and are expandable through user definition.

- Weightings (evaluations and normalizations) are transparent due to the object structure and can be expanded through user definitions.

-

6.3.2 Life Cycle Inventory

LCI is a phase of life cycle assessment involving the compilation and quantification of inputs and outputs for a product throughout its life cycle. GaBi helps users with this phase by providing:

1. A transparent database structure for the input, management and use of life cycle assessment data.
2. Access to fundamental LCI data so that projects can be done rapidly without limiting the ability of the user to add and modify new LCI data for specific applications.
3. The automated calculation of result values.

Data input and management are vastly improved and accelerated by using the GaBi system. In order to manage and use the balance data efficiently, you should first become more familiar with the object types *flows* and *processes*.

6.3.2.1 Flows

The basis of modeling using GaBi is the *flow* object type. A GaBi flow is a representative of an actual material or energy (and in further analysis also money) flow. *Flows* are used by processes (in ISO nomenclature: "modules" as in- and outputs) and represent the link between *processes* within a life cycle. The GaBi database has a comprehensive hierarchical division of flow definitions called the "flow group hierarchy". The hierarchy provides a pre-defined set of flows categorized by type. However, you can create new flows.

During the development of a model, energy or material flows are assigned to processes. Values assigned to flows of the same name are totaled during the balance calculation by GaBi. The procedure is the same for flow groups. In the GaBi balance view, different detail levels can be displayed. For example you may view the total resource consumption of two balance systems in comparison. Further you may analyze the individual flow contribution in detail.

Example of flow group hierarchy advantages: Let's model the generation of power from hard coal in two steps. Feed coal is obtained in a mining process and is the initial material for a power plant process which generates electrical power. (Auxiliary materials and emissions are neglected here.) Hard coal is located in the "non-renewable energy resources" flow group. It must be included as an input in the hard coal mining process. A "hard coal" flow must be entered as an output of this process which is located in another flow group, specifically the "Fuels" flow group. By using flows from different flow groups, you will also retain information on how the hard coal mining

process transforms the hard coal used as a resource into a fuel material. The “hard coal“ fuel is then added to the power plant process as an input. The output of this power plant process is the electrical energy flow, “power”. Therefore, you will notice that your process chain does not go all the way upstream, or “back to earth”. Thus, a major advantage of the flow group hierarchy is that it allows you to identify incomplete modeling.

6.3.2.2 Processes

GaBi processes are representative of actual processes, technical procedures or groups of procedures. They roughly correspond to the term “unit process“ in ISO 14044. Like flows, *processes* in the GaBi system are hierarchically grouped. The process hierarchy enables you to save your own processes and use *processes multiple* times. In addition, a set of processes is provided with your database to support your modeling. In particular upstream data, such as energy generation, basic material generation, etc., does not have to be specially collected by the user since these are already available in the database.

6.3.2.3 Allocations

If *processes* have several product outputs (co-products), all other *flows* assigned to a process can be distributed among the product outputs. In ISO 14044 this is called an “Allocation”. GaBi 6 makes it possible to perform allocations easily. It also allows allocations to be performed without changing the *process* in the database.

Allocated processes (i.e. processes where an allocation has been performed) are only dealt with and saved on the plan level. The non-allocated process as it exists in the database will not be altered. The allocation process is completely transparent.

6.3.2.4 Plans

Plans are used in GaBi to assemble processes in the product system. Essentially, plans are the process maps which visually depict a stage or sub-stage in the system.

GaBi plans can be nested in order to display complex balance systems. Thus you can nest a *plan* within another *plan* in the same way that you use *processes on a plan*. For example, you can develop a process plan for a manufacturing system and use it in several places in your model. The nesting level of process plans is unlimited, however circular references are not allowed in the software.

6.3.2.5 Balances

The GaBi object type “balances” compares all inputs of one or several balance systems with their outputs. *Balances* are calculated based on the system model. GaBi balances therefore contain the results of the life cycle inventory. Balances can be viewed multiple ways, using different units, category filters, impact categories, etc. Thus the balance window can be used to perform life cycle inventory analysis, impact analysis and interpretation.

6.3.3 Life Cycle Impact Assessment

According to ISO 14044, the goal of balancing the system is the assessment of the potential environmental impacts. The assessment is divided into two sub-steps which must be performed (according to ISO) as a minimum:

- Assigning life cycle inventory data to life cycle impact categories (classification).
- Modeling the life cycle inventory data within the life cycle impact categories (characterization).

GaBi performs these two sub-steps in the *Balances* window simultaneously. You can very easily toggle between life cycle inventory variables such as “mass” or “energy” and life cycle impact categories such as “global warming potential – GWP” or “ozone depletion potential – ODP” in the GaBi balance window.

The object oriented structure enables you to view the classification (assignment of material flows to environmental impacts) and equivalency factors (quantification of material flows relative to the environmental impact of a standard material flow) and to make changes at any time using current scientific findings via the database manager. The data supplied in the GaBi database for classification and characterization are published by ISO, SETAC, WMO and IPCC, and the resulting characterization are sets provided by CML, EDIP, EcoIndicator, TRACI, EPFL 2002+, UseTox, ReCiPE.

In order to summarize balances to aid decision-making, weighting can be performed from the balance window. This procedure is not required by the ISO 14040 series. With GaBi you can perform single score calculations such as EI99. In this case, you can make use of the weightings supplied or define your own weighting key(s) and apply them to the balance results. GaBi allows you to use weightings on life cycle inventory results or life cycle impact assessment results. Please note, however, that the respective standard characterisation factors, normalisation factors and weighting sets from CML, Ecoindicator, etc., should be used together and not mixed.

6.3.4 Life Cycle Interpretation

In this step of an LCA, the results of the life cycle balance and the life cycle impact assessment are summarized and analyzed to aid decision-making.

This can include critical tests of the system data according to ISO 14044. GaBi ensures that important factors that serve as the basis for a critical test can be documented correctly. This includes the goal of the study, the reference area, the system boundaries and the basis for data collection. Definitions of the objects **Projects (Section 7.1)** and **Quality Indicators ('General Information about DQIs' in the on-line documentation)** should be read to familiarize yourself with the capability to integrate documentation for each GaBi object.

In addition, GaBi provides methods for the interpretation of data quality as well as **sensitivity analysis (Section 7.6.3)**, **scenario calculation (Section 7.6.1)** and stochastic error calculation using **Monte Carlo simulation (Section 7.6.4)**.

7 Working with GaBi

This chapter will illustrate GaBi based on an example. We have selected the life cycle analysis of a copy machine.



Among the example steps, there is some useful information on other GaBi features and functionalities that need not necessarily be followed for the copy machine example.

This information is written in boxes like this.

The corresponding sample database is available with the name "Advanced" or "Copier" following the installation of GaBi.

The example with the copy machine will give you an introduction to the entire functionality of GaBi. An overview of the model structure of this example is given in Appendix II: Structure of the Copying Machine Example.

7.1 Working with Projects

Projects are used to document the project goal and scope. When a project is active, GaBi automatically documents all saved or changed database objects. Additionally, projects are very useful for data exchange between different GaBi databases. You should never work without an active project.

7.1.1 Creating a New Project

Select "Projects" in the Object hierarchy. and by right-clicking, select "New". GaBi will open an empty project window. Alternatively you can use the following procedure: Select "Projects" in the database manager and click on "New" on the database manager tool bar.

You can now enter a name in the empty project window, such as "Example" (see Figure below).

The screenshot shows a software window titled "New [Projects] -- DB Projects". It has a menu bar with "Object", "Edit", "View", and "Help". Below the menu is a toolbar with icons for file operations (new, open, save, delete, copy, paste, undo, redo, print, help) and a search icon. The main content area is divided into two tabs: "Project administration" and "ISO documentation". The "Project administration" tab is active and contains a "Name" field with the text "Example", an "Activate project" button, and a status indicator "--- inactive ---". The "ISO documentation" tab is also visible and contains a list of project details under the heading "Object list". These details include: "Goal of project" (Creating an example model), "Function and functional unit" (1 piece of functional unit), "System boundaries" (Balancing the entire life cycle), "Data quality requirements" (Low, since for use as an example), "Comparisons between systems" (Not planned), and "Critical review considerations" (...). At the bottom of the window, there is a status bar with the text "System: Changed." and "Last change: System, 20.11.2013 15:38:26".

Figure: GaBi project window

7.1.2 Project Properties

To document the project goal, system boundaries etc., you can use the registration page "ISO documentation" tab which is based on the ISO 14040 series. All modified or newly created GaBi objects are displayed on the page with the heading "object list". Objects can also be added to the object list from the GaBi database manager at any time with copy & paste or drag & drop.

7.1.3 Activating the Project

Click on the "Activate project" button. "Active" appears on the display next to the button. The project can be deactivated by clicking the button again.

If a project is active you will see a text in the bottom bar of the GaBi database manager e.g.: "System: Example". This is an indication that you are currently logged on as the user "System" and are working with the project "Example".

Note: When activating a project it will be saved automatically.

7.1.4 Manual Assignment of Objects to the Project



If you would like to assign individual objects such as plans or processes etc. to a GaBi project, you can do this using drag-and-drop. Proceed as follows:

1. Select the desired objects from the database manager or another open window with a mouse click. You can select several objects simultaneously if you hold down the Ctrl key. The selection you make is however lost when you change folders or object types.
2. Drag the selected objects onto the Object list (hold down the left mouse button). GaBi assigns the objects to the corresponding project.
3. Click on the "Save" button or save the project with "Yes" when closing.

7.2 Modeling a Product

This chapter will illustrate how the modeling of a *product* works based on the above example with the copy machine.

7.2.1 Modeling Systems Using Plans and Processes

Folders in the GaBi database manager can be identified by the small triangle folder symbol on the left side of an icon. In addition, folders are only shown on the left side of the GaBi database manager, individual objects per folder are shown only on the right side of the GaBi database manager.

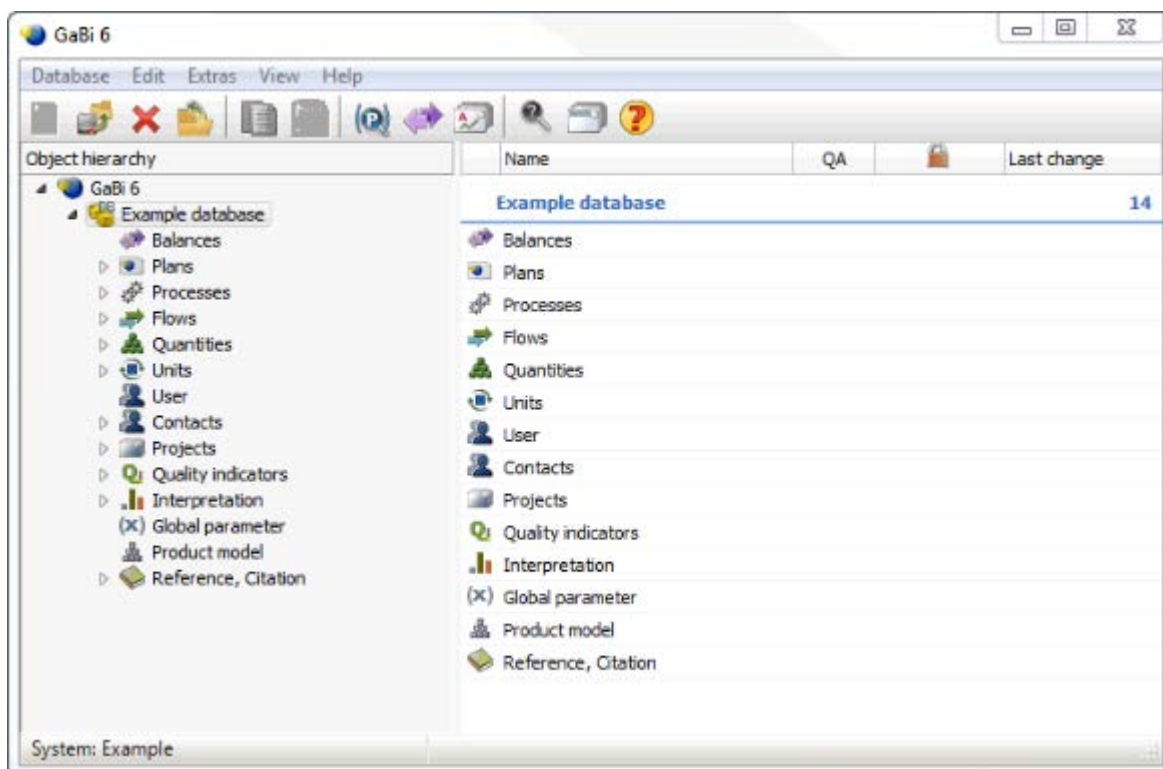


Figure: GaBi database manager

To gain some perspective on how to work with plans and processes, you need to open the plan which illustrates use of the copy machine. Select "Plans" in the Object hierarchy. In the right part of the database manager you will find the objects which are included in "Plans". Here, in the folder called "Utilization" is the plan: DE: Utilization

SuperCopy XR-2. Now open the plan "DE: Utilization SuperCopy XR-2" by double-clicking or using the right mouse button. It should look like the one in the Figure below.

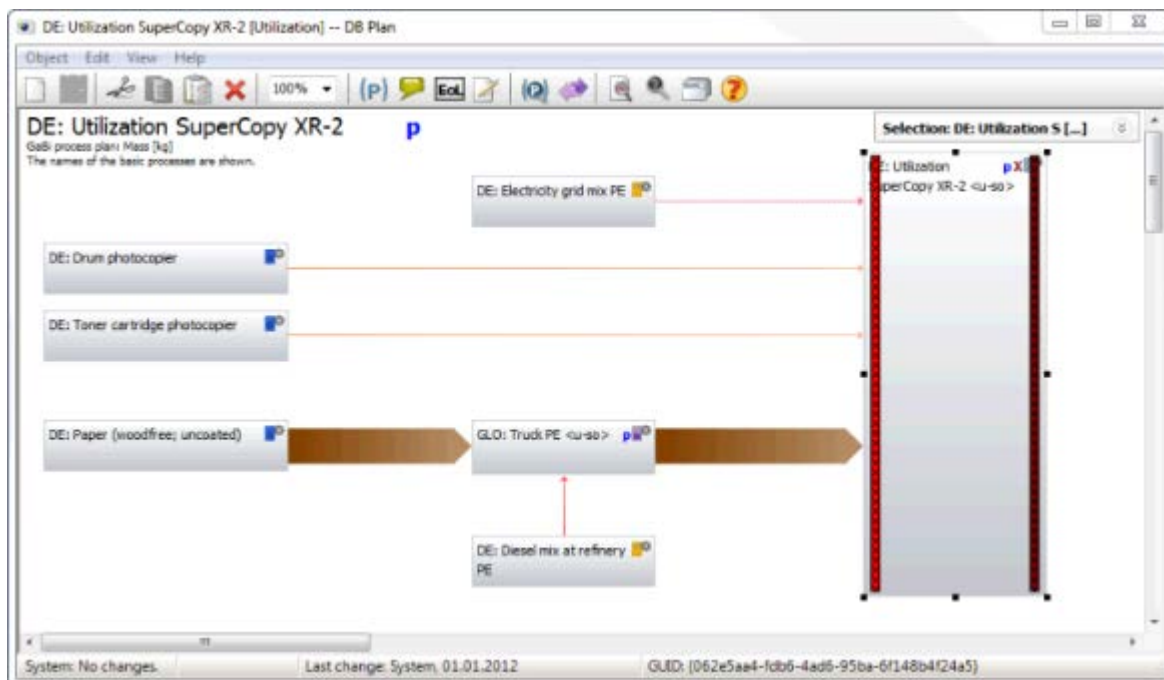


Figure: GaBi plan

On GaBi plans, individual elements of a product or the product life cycle are combined into an overall model using unit processes. The individual processes are represented by grey boxes. They represent the underlying process and procedural steps. The arrows between the boxes form the material and energy flows that are exchanged between the individual process steps. Look at the process "GLO: Truck", for example. This process has two inputs:

1. The truck requires diesel which is supplied from the process "DE: Diesel free refinery",
2. The item to be transported, (paper), is added from the process "DE: Paper (woodfree; uncoated)".

Now click on the arrow between the process "DE: Diesel free refinery" and the process "GLO: Truck". The arrow can be selected with a simple mouse click. Then you can see that the text in the collapsible panel, which is located in the upper right corner of the plan window, is changed to "Selection: Diesel". You can open the panel by double-clicking on the flow or by clicking on the double downward arrow symbol in the panel area.

The screenshot shows a software window titled "Selection: Diesel". It contains several sections:

- Broken:** A checkbox that is currently unchecked.
- Colour:** A red color swatch followed by a "Change..." button.
- Quantity:** A dropdown menu currently set to "Mass".
- Sources:** A list box containing one entry: "DE: Diesel n 14.3 kg".
- Sinks:** A list box containing one entry: "Transport p 14.3 kg".
- Difference:** A label showing "0 kg".
- Instance Colour:** A label followed by an "Edit..." button and a dropdown menu currently set to "-- none --".

Figure: GaBi flow instance

The properties panel shows the amount of diesel that “flows” from the source (diesel) to the sink (truck). In the Figure you see that the amount is shown in kg (mass). In the “Quantity” drop-down menu you can switch to energy, volume or any other quantity defined for the “diesel” flow.

Note: The flows themselves do not contain any information on the subsequent material and energy flows that occur upstream as part of their creation. All information on the generation of these materials or energy can be found in the corresponding aggregated production processes.

GaBi differentiates between two kinds of flows: Valuable flows and elementary flows. Valuable material flows, i.e., flows of materials that can be recovered, and waste material flows can be designated as “Tracked flows”. Only flows that have been marked as “Tracked flows” in the corresponding processes can connect processes with one another and therefore be sent to another processing step. Elementary flows on the other hand are flows which originate from or go outside of the limits of the technical system (e.g. resources or emissions). Elementary flows do not visually appear on plans.

A GaBi process instance shows the properties of the process on this particular plan. As an illustration, open the process “DE: Diesel at refinery” by double clicking. This window only displays valuable flows (as only they are relevant for the modelling procedure).

DE: Diesel free refinery -- Process instance

Local name: DE: Diesel free refinery

Local settings: VF, LCC

Scaling factor: 13.6 ☐ Fixed Allocation: (no allocation)

Free parameters

Parameter	Formula	Value	Minimum	Maximum	Standard	Comment

Fixed parameters

Parameter	Formula	Value	Minimum	Maximum	Standard	Comment

Inputs Show only values

Parameter	Flow	Quantity	Amount	Unit	Tree

Outputs Show only values

Parameter	Flow	Quantity	Amount	Unit	Tree
Diesel [Crude oil products]	Mass	13.6	kg	X	

Data quality

Technique: Completely representative Location: Completely representative Time: Partly representative

Grouping

Nation: DE Type: Energy conversion Enterprise: external User defined

Cancel OK

Figure: GaBi process instance

Products can be compiled module by module from individual processes. Therefore, once a process has been created in the database, it can be used any number of times on plans (this is also true for every other GaBi object, such as flows or plans). The use of an object from the database in a model is called an “instance”. Double-clicking an object to open its instance, which displays the properties for its current use. In contrast, right-clicking and choosing “Details” displays the definition of the unit process as it exists in the database. You can also open the instance of the process in the properties panel by clicking on the process, then clicking on the double downward arrow symbol.

Selection: DE: Diesel mix at [...] 

Scaling factor: 14.346970696168

Fixed: ☐

Grouping

Nation: DE ▼

Type: Energy conversion ▼

Enterprise: external ▼

User defined: ▼

Data Quality

Technique: Completely representative ▼

Location: Completely representative ▼

Time: Partly representative ▼

Instance Colour Edit...

-- none -- ▼

Figure: Process properties panel

This panel provides quick access to the most frequently used properties of the process (e.g., "fixed" and "groupings"...).

Let's look at the process "DE: Diesel free refinery" in greater detail. The window shows a list with the "Inputs" on the left side and a list of the "Outputs" on the right side. Since this process represents the entire upstream production chain, all inputs are elementary flows (i.e. not marked with an "X" in the "Tracked flows" column). The diesel output of the process has been specified as a valuable material flow, identifiable by the large "X" in the "Tracked flow" column. Only valuable substances and waste materials, i.e. "Tracked flows", can be used to link objects on GaBi plans.

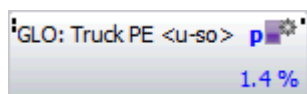


Figure: LCIA preview

The percentage value in the lower right corner of the plan and process boxes represent their own contribution to the impacts in this level (result of the plan system). This values, which are called LCIA preview can be defined in the plan properties. At the plan level, without a process selected, go to "Edit", select "Properties..." and click the box next to "LCIA preview".

Figure: Plan properties panel

Plan color, illustrated quantities and maximum flow width as well as details about the plan's completeness can be changed here. In the lower part of the plan properties panel, you can define which impact category should be used for the LCIA preview.

7.2.2 Constructing a Plan

In order to demonstrate the modeling of a system step by step, we will guide you through a simple example. Look at the entire use phase of our copy machine. For simplicity's sake we will assume that only paper and electricity are required. The production of the copy machine and the paper etc. is not taken into account.

- total energy consumption of 4.498.2 MJ (1249.5 kWh)
- and a paper requirement of 3.744 kg

The first step is to create a new plan. To do this, switch to the GaBi database manager and select the “Utilization” sub-folder under “Plans”. Then click on the “New” option in the right mouse button menu.

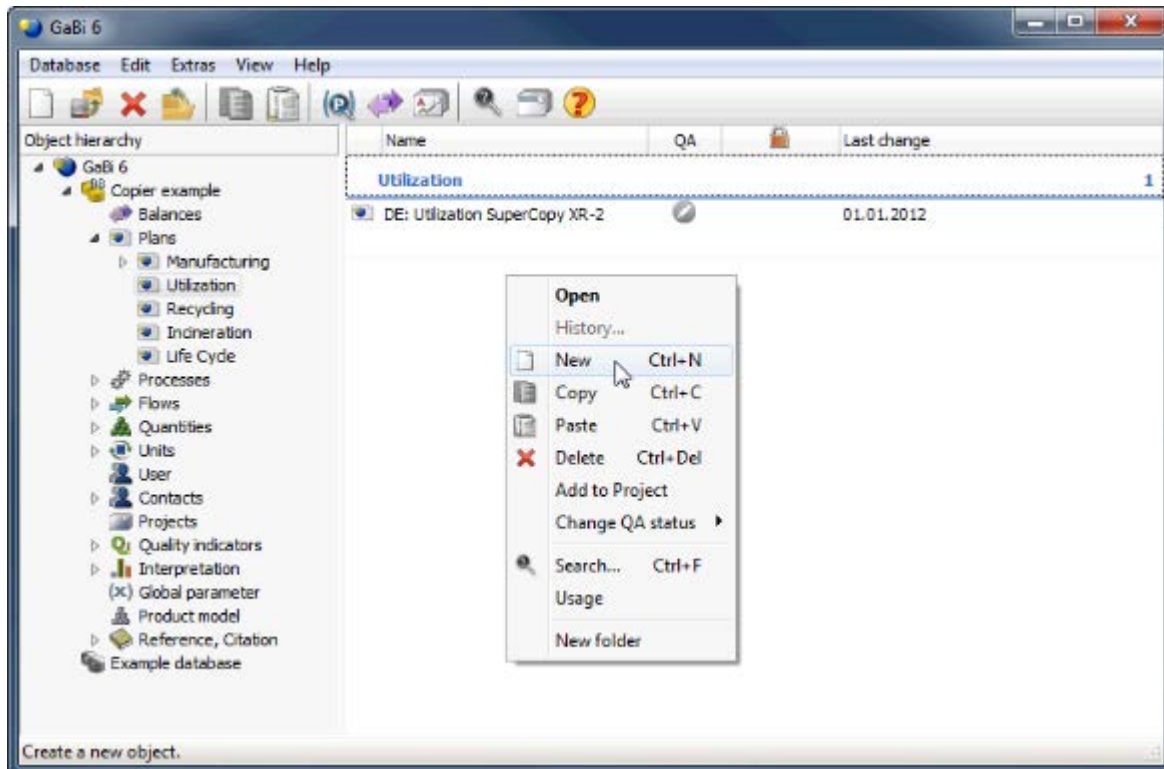


Figure: Creating a new plan

GaBi opens a new, empty plan window.

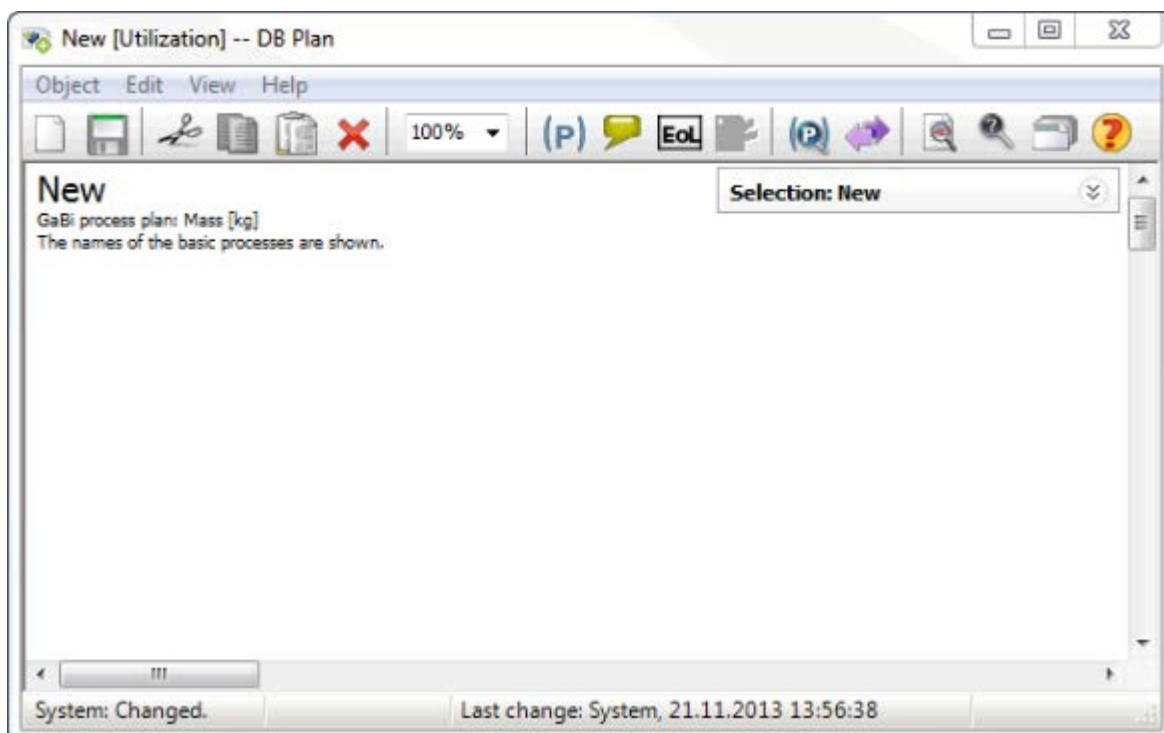


Fig: New GaBi plan window

Rename the new plan and save it by clicking on the diskette symbol.

7.2.3 Plan Nesting

At the top hierarchy level of plans in the DB Manager you will find the plan "Life Cycle photocopier SuperCopy XR-

2". Open this plan by double clicking on it.

Additional plans are nested on this plan (e.g. "DE: Utilization SuperCopy XR-2", etc.). Double click the plan "Manufacturing SuperCopy XR-2".

GaBi opens a window with the input and output flows of the plan instance. Close the window. Then click with the right mouse button on the same plan instance. From the menu select "DB Object". GaBi will now open a plan window that shows the manufacturing plan of the copy machine. This means: A pre-modeled plan is used on another plan analogous to a process. This is called **plan nesting**.

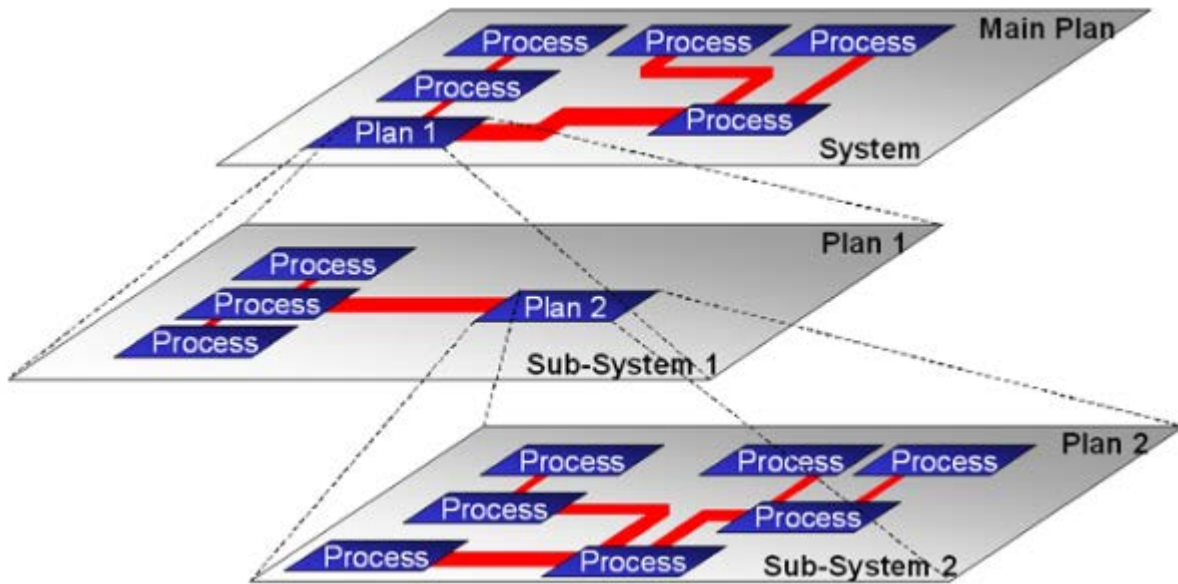


Figure: Plan nesting diagram

Close the plan you just opened and return to the initial plan. Different symbols can be seen on the grey boxes that represent the process and plan instances. Nested plans are always identified with the following symbol in the upper right-hand corner representing a process map:



Figure: GaBi plan icon

All other symbols represent processes in certain application fields. Click on "Processes" in the GaBi Object hierarchy to see the different icons for the different application fields.



Note: Each GaBi object currently open can be brought to the front of the window list to facilitate navigation. The list of currently open windows is located in the GaBi menu under "View" and "Windows". Click on the object in the list to switch to it. Alternatively, you can access the open windows by clicking this button in the

toolbar:



The modeling of a product on GaBi plans is a modular process. Once a *process* or *plan* has been created in a database, it can be used any number of times on another plan. Processes or plans which are on another plan are linked to the current plan by means of input and output flows.

7.2.4 Creating New Processes



There are three ways for creating a new process:

1. Click on "New Process" on the plan in the right mouse button menu. Your process will then be saved in the upper-most hierarchy level of the processes group in the DB Manager.
2. Select the respective sub-folder in the "Processes" object folder in the GaBi object hierarchy and

then select “New” in the right mouse button menu.

3. Select the respective sub-folder in the “Processes” object folder in GaBi object hierarchy and then click the “New” button in the toolbar.

Following options 2 and 3 means that your new process will be located in the appropriate process group in the DB Manager

Create a new process. GaBi now opens a new process window, as shown in the next Figure.

First rename the process. Select the abbreviation of the appropriate nation in the “Nation” field; in the “Type” field you should select “u-so” for “unit process, single operation”.

Note: Unit processes are single gate-to-gate process steps. They are unlike cradle-to-gate processes which include the entire upstream material and energy supply etc. Most existing datasets in your GaBi databases are cradle-to-gate processes.

Figure: New GaBi process

7.2.5 Adding Flows to a Process

The following chapter explains how to insert flows to a new process.

7.2.5.1 Inserting Flows Using the Function "Auto Complete"

In the “Inputs” field, click on the cell with “Flow” in italics. The table field is now marked with a grey frame.

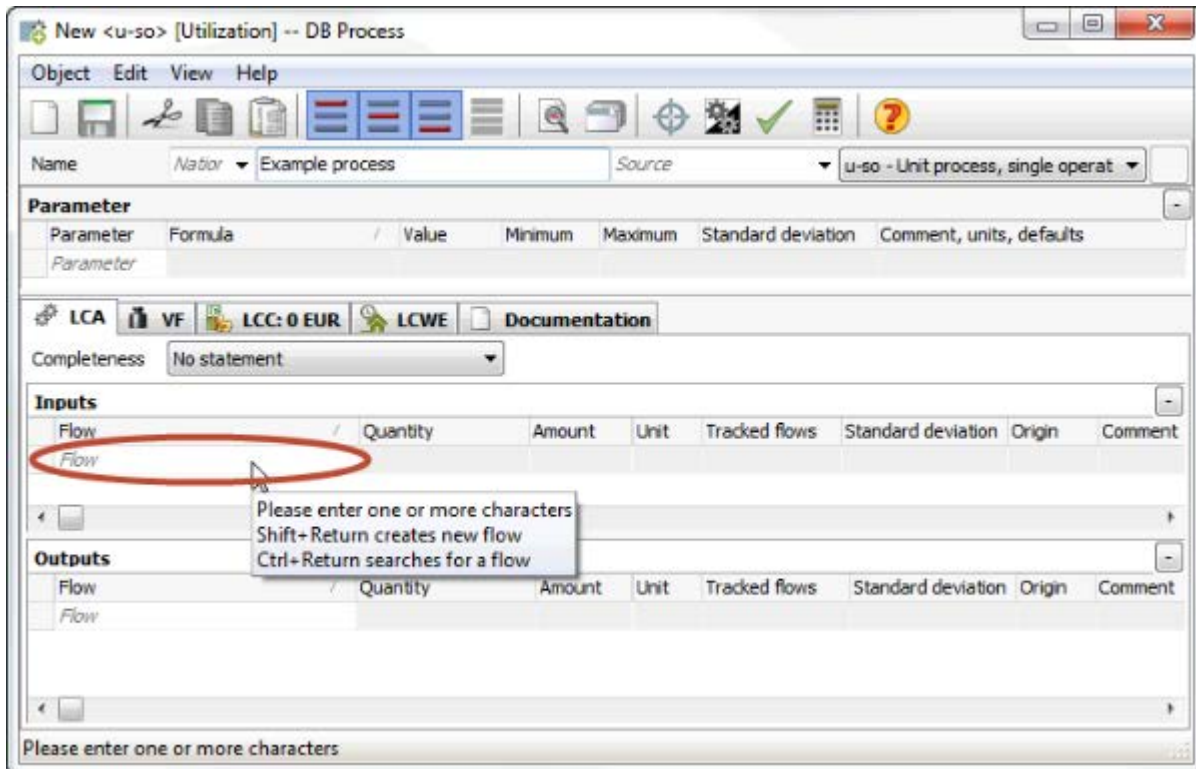


Figure: Inserting a flow into a process

Using the keyboard, enter a name into the field marked "Flow" and press "return" on your keyboard. If no matches are found the dialogue below appears.

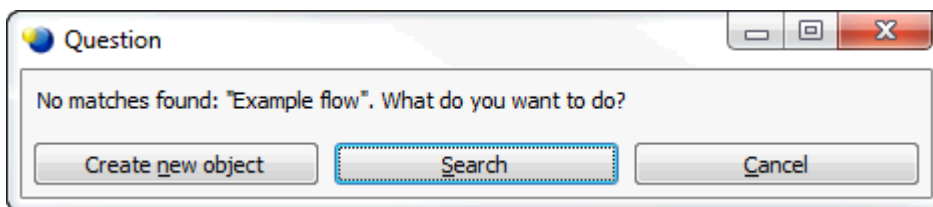


Figure: No matching flows found

If however you start typing e.g. "Paper wood-free uncoated (t94)" you will see that GaBi already suggests several other options with auto complete. The auto complete function simply follows the alphabetical order of the flows that are still applicable.

Now enter the quantity "3744" in the "Amount" field. The "MJ" unit is already suggested as a standard unit in the unit column. Furthermore, mark it as a Tracked flow by clicking into the respective field until an "X" appears. Other attributes of this flow may be selected at this time, including the quantity type, factor and origin of the data.

7.2.5.2 Flows: Valuable and Waste Materials and Elementary Flows

GaBi distinguishes between three types of flows.

1. Valuable material flows (i.e., flows for recoverable materials) describe materials or energy carriers that will be used in another process. Valuable material flows are identified with an 'X' in the "Tracked Flow" column of the process.
2. Elementary flows are the flows that are taken directly from the environment or released into it, e.g., resources or emissions. Elementary flows are not marked in the "Tracked Flow" column of the process.
3. Waste flows include waste that is handled in additional processing steps and decomposes into elementary flows in this state. Waste flows have to be identified with a "*" in the "Tracked Flow"

column of the process.

Please note that it is absolutely essential that valuable materials are identified with an “X”. Flows without a tracked flow “X” (or waste “*”) cannot serve as linkage flows on GaBi plans, i.e., they cannot be used as a means of connecting two processes.

7.2.5.3 Inserting with the GaBi Object Search

You can also add flows via the search window. Select the field with “Flow“ written in *italics* in the process, type in “Electricity” and press “return” on your keyboard. As GaBi recognizes several electricity flows, a search window opens automatically and presents you with all electricity flows contained in the database.

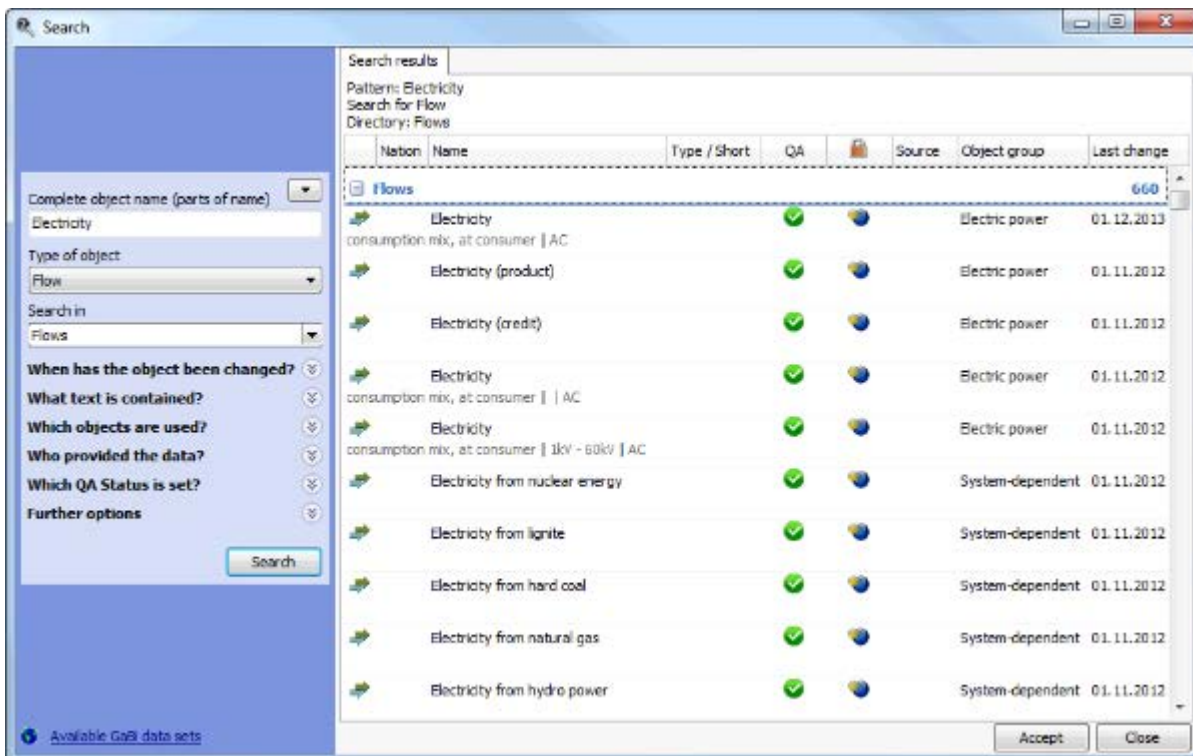


Figure: GaBi search window

Select the flow that fits best with a double click. It will now appear in the process window.

Note: The GaBi search window can be used for processes, plans or any other GaBi object. Thus, when searching for a flow from the search window, always be sure that you have selected a flow (as opposed to a process or plan) and that it is from the correct/logical flow object group!

Note: In front of some object names are the two-letter country codes indicating the country of origin of the underlying data. For example, 'CH' stands for Switzerland, 'DE' for Germany, and 'US' for the United States of America.

Enter "4498.2 MJ" for this flow. Mark this as a Tracked flow by clicking into the respective field until an "X" appears. Other attributes of this flow may be selected at this time, including the quantity type, factor and origin of the data.

7.2.5.4 Inserting with Drag-and-Drop

Flows can also be added to a process by using GaBi's drag-and-drop functionality. Switch to the GaBi DB manager and position the window in such a way that you can still partially see the new process. In the Object hierarchy navigate to a folder that contains flows. On the right side of the DB manager you will find all flows contained in that folder. Select one of them with a simple mouse click and drag it using drag-and-drop with the mouse button held down to the input or output list of a process. As soon as you let it “drop” in the process window, it is added to the output list.

For the copier navigate to "Emissions to air", then "Other emissions to air" and select "Waste heat". Switch back to the new process window and specify the quantity "4498.2 MJ". Do not mark it as a tracked flow.

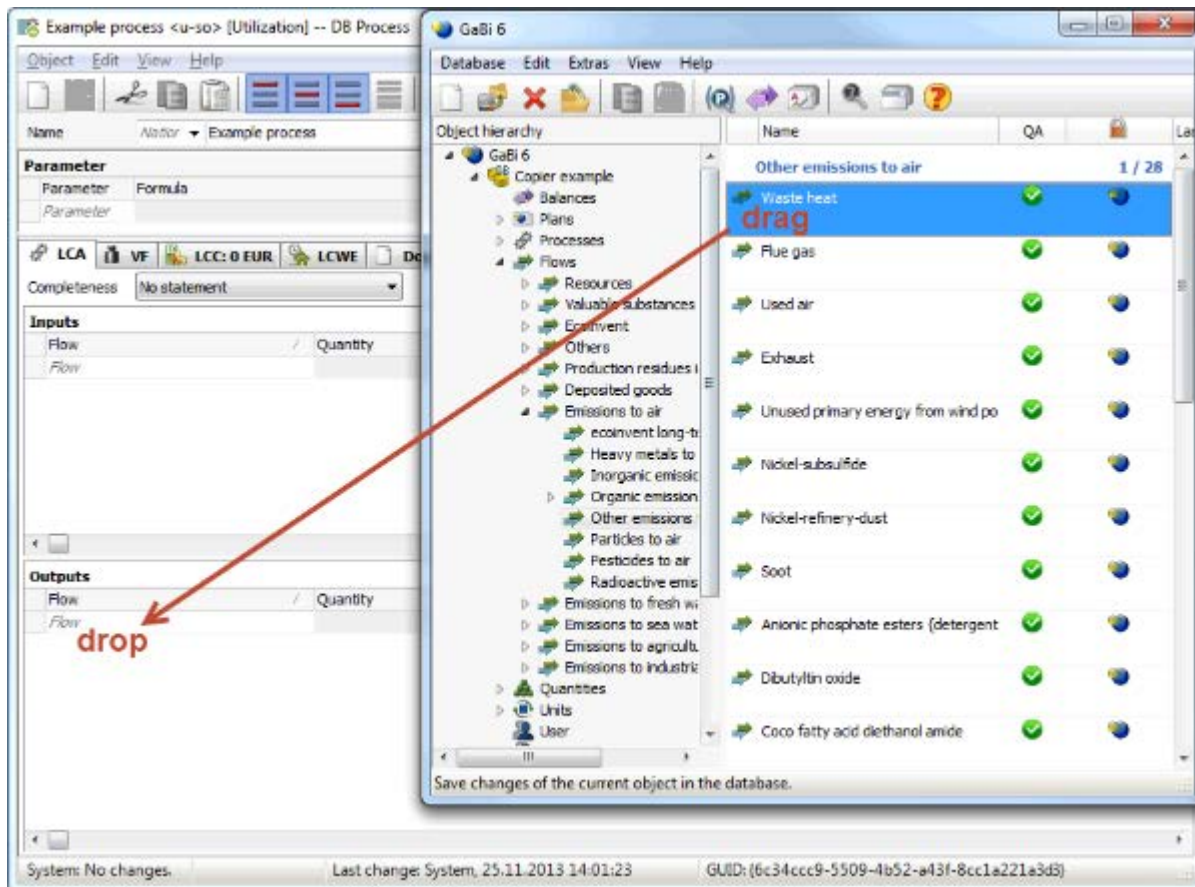


Figure: Dragging and dropping objects

7.2.6 Creating New Flows

To create a new flow, select the cell with "Flow" in italics in the outputs section and type in "Example flow". Confirm your entry by pressing "return" on your keyboard. Since GaBi does not find a comparable object in the database, a dialog window appears asking what you would like to do. Click "Create new object". A window to select the flow category opens. Select a reasonable category from the tree view and click "OK".

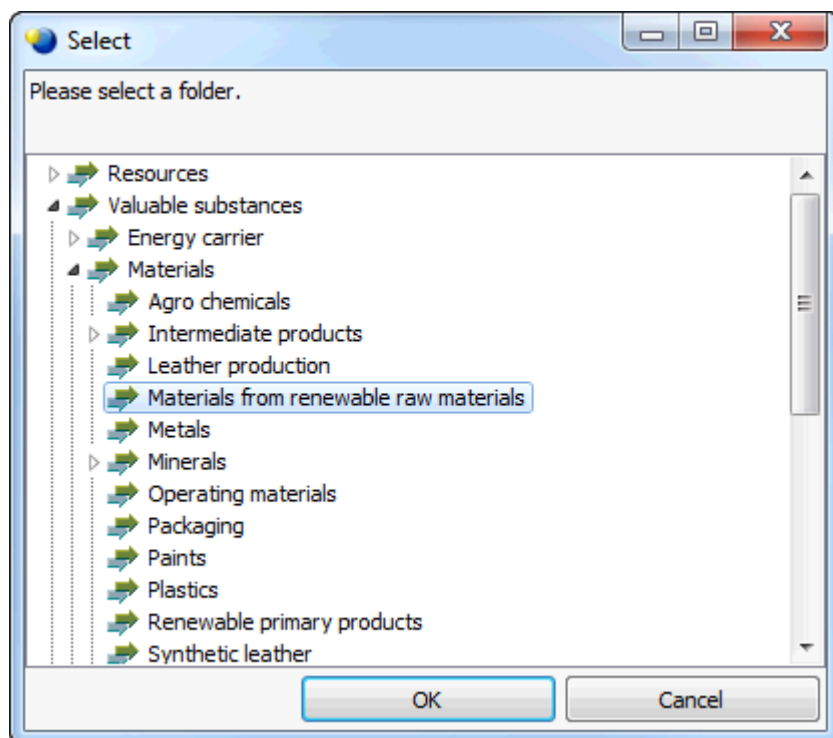


Figure: Flow category selection

Now a new flow window opens.

"Mass" is suggested as the reference quantity for the new flow. If this is not what you wanted, you can overwrite the field, e.g. with "Number of pieces". In our example, "Mass" should remain the reference quantity. You can define a conversion of the reference quantity to another quantity. Adding quantities to a flow can happen the same ways as adding flows to a process: Using auto complete, using the GaBi object search, using drag-and-drop or creating a new object.

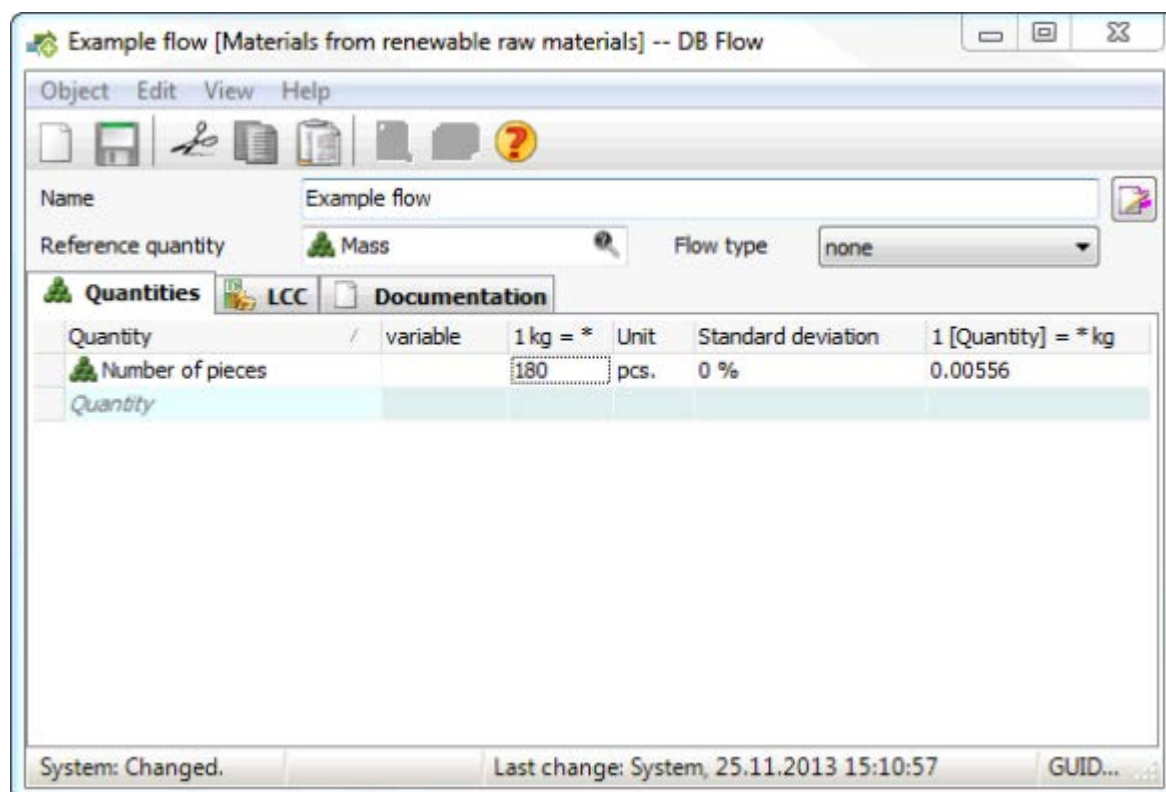


Fig: Conversion between quantities



To change the reference quantity of the flow to your newly defined quantity, select the new quantity with the mouse and in the right mouse button menu select the function “Set as a reference quantity”.

Now save your new flow.



When creating new objects in GaBi, unless you create them by going to the appropriate folder in the DB Manager, they will always be saved on the highest hierarchy level for the particular object group. For example, if you created a new process via the right-hand mouse menu on the plan, you will find that it has been saved on the top level under the processes object group in the object hierarchy. If, on the other hand, you went to another folder under processes in the object hierarchy and created it new from there it will be saved there.

Flows are an exception here. They can't be created or saved in the highest hierarchy level; you are forced to select a category where the flow is saved. This helps to define flows as resources, emissions or valuable substances in balances.

7.2.7 Adapting Process Chains and Broken Flows



In GaBi, adapting a process chain means referencing all values within a balance system to one reference flow. A plan serves as the tangible boundary conditions of the balance. Moreover, the results in a balance calculation are not dependent on the processes as they are in the database, but rather on their process instances on the plan.

When connecting several “fixed” sink processes, the process chain must not be over-specified. Each process chain may only have one fixed process. GaBi displays a warning message in the event of an over-specified process chain. The flow between the over-specified processes is broken. For example, you have created a source process which supplies 1 kg of steel. You have fixed this process on the plan to “1”. The sink requires 2 kg of steel; the sink process is also fixed. When connecting the two processes, the masses can not be adjusted because you have fixed two points. The source “supplies” only 1 kg, but the sink “consumes” 2 kg. The connecting flow is broken since the difference between the source and the sink can result in erroneous balances.

To resolve a broken flow, unfix one of the processes. Then double-click on the broken flow. (Broken flows can be recognized by the arrow head which will be displayed in the complementary colour of the rest of the arrow). You can then remove the tick which appears next to “Broken” in the flow instance window. Alternatively, you can delete the flow and reconnect it once you have un-fixed one of the two processes.

7.3 Further Plan Features

7.3.1 Show Tracked Inputs/Outputs



When modeling complex plans with multiple processes it can be unclear which inputs and outputs are still not linked. The remaining unlinked flows can be seen on the plan by selecting the option “Show tracked in/outputs” from the “View” menu. The tracked flows (inputs and outputs) are shown with red or black dots on the left or right edge of each process instance. Red dots denote unlinked tracked flows, black for connected tracked flows. Unlinked waste flows are not displayed to avoid complicating the view.

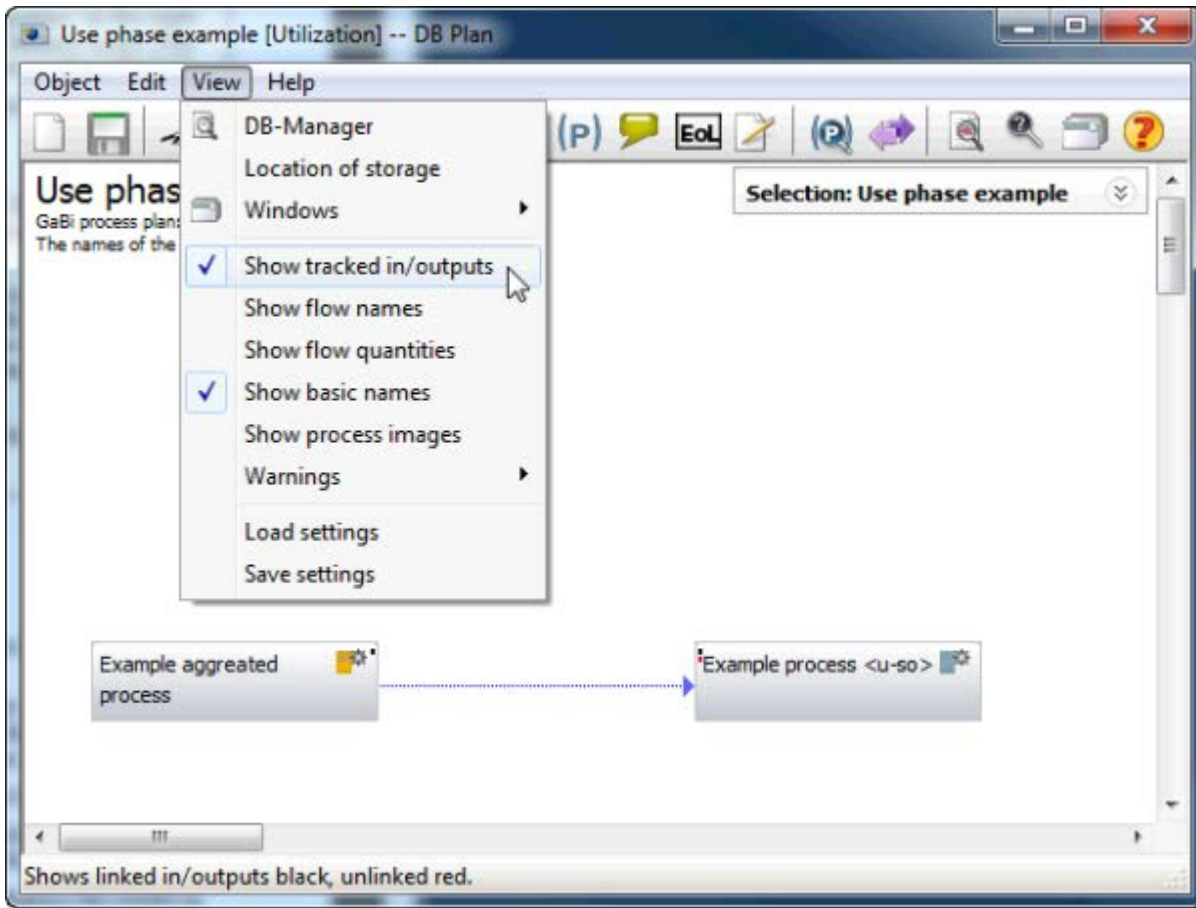


Figure:How to show tracked inputs and outputs

7.3.2 Show Flow Names/ Quantities

 The names and/or the quantities of flows can be displayed on the plan by selecting options under the “View” menu.

7.3.3 Grouping of Processes

 GaBi allows you to group process instances on plans into categories. For example, you can mark all processes from a specific country, or group internal and external processes separately.

To group a process:

Open a process instance by double-clicking, or using the right click menu and selecting “Properties”. In the bottom of the window you will see four pre-defined criteria lists to group process instances. Select the desired groups using the drop-down lists. If you would like to add an option to a list, just enter the new criteria into the “user-defined” drop-down field. It will be automatically added to the list and will now be available for all other process instances. The grouping function can be used to help analyze the balance.

In GaBi, you may use the collapsable panel to select from the four different grouping fields and simply use a predefined grouping or define your own grouping.

Note: If you would like to edit grouping options from a central location you can select “Grouping” in the “Edit” menu of the DB Manager.

7.3.4 Local Process Names/Process Images



Process instances can be given different names on their plans as opposed to the DB object. This is helpful, for example, when using several identical transport processes on a plan and you would like to clearly identify them later in the balance.

To rename a process, open the process instance by double-clicking or selecting “Properties” in the right mouse button menu. Overwrite the process name in the “Local name” field with the desired name (The name of the object as it is in the DB Manager is always maintained in the process instance window title bar).

Return to the GaBi plan by clicking "OK". To display the local name on the plan, deactivate the option “Show basic names” from the “View” menu.

Note: The local process names used on plans will be displayed in the balance.

GaBi allows you to display processes with customized graphics such as clip art. These graphics can either be created directly for processes in the database or can be specified or overwritten for process instances on plans.

To change a graphic centrally in the DB Manager open the process properties with the right mouse button and click on the “Add image” button next to the input field for the local process name. Now a data selection menu opens and you can select the desired graphic file. This process will now always be displayed with the chosen image. To use an image just for the local process instance, open the process instance on a plan, click on the “Add image” button there and follow the instructions as above.

Return to the plan and activate the process image from the “View” menu by selecting “Show process images”.

7.4 Dashboard

The GaBi dashboard is the default view that appears when calculating the balance of a plan or a process. It shows the results of the balance in chart form, for easy analysis.

The default dashboard shows the results of the balance for the most commonly used impact categories as charts. These charts can be displayed or hidden by ticking or unticking the box to the left of the impact category on the dashboard tool bar.

The chart can be duplicated by double clicking on the title of the impact category under which the chart is located.

The number of charts shown in the rows and columns of the dashboard can be altered by clicking on the desired number in the "Number of charts in rows" and "Number of charts in columns" sections in the dashboard tool bar.

The charts are interactive and have drill-down capabilities. Clicking on the bars of the chart displays the results in more or less detail. For example, clicking on the bar of a plan within a model will show the break-down of this plan. This can also be achieved by clicking on the arrows to the right of the plan names displayed in the white bar at the top of each chart.

Chart animation can be turned on or off by selecting the "Chart animation" option in the dashboard tool bar. The option to show the total results in the charts or only the breakdown, can also be selected here ("Show totals").

To keep the number of visualized result details to a reasonable lever, a threshold describing the relevance for the total result can be defined. Every contribution lower than the defined threshold will be summarized in "Rest". The threshold level can be defined by the user by selecting "Extras", then "Options" in the DB manager and finally tab "Balance" in the new window.

Right clicking on charts and selecting "Copy to clipboard" allows the image to be pasted into external documents or worksheets.

In addition to the default "ILCD recommendations" dashboard view, additional dashboard views can also be created, and loaded, by clicking on the dashboard tab with the "plus" sign, and then selecting a pre-defined dashboard view, or selecting "New Dashboard".

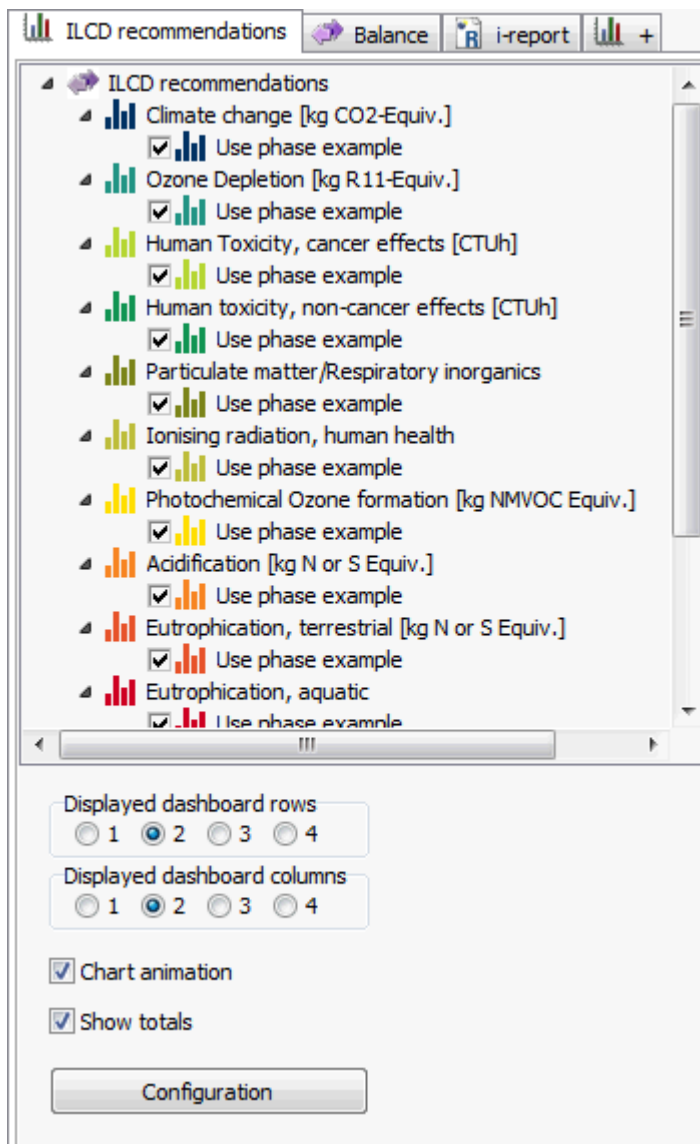


Figure: GaBi dashboard tool bar

Creating new dashboard views, or modifying existing views, is done by clicking on the "Configuration" button in the dashboard tool bar. It brings up the screen shown below.

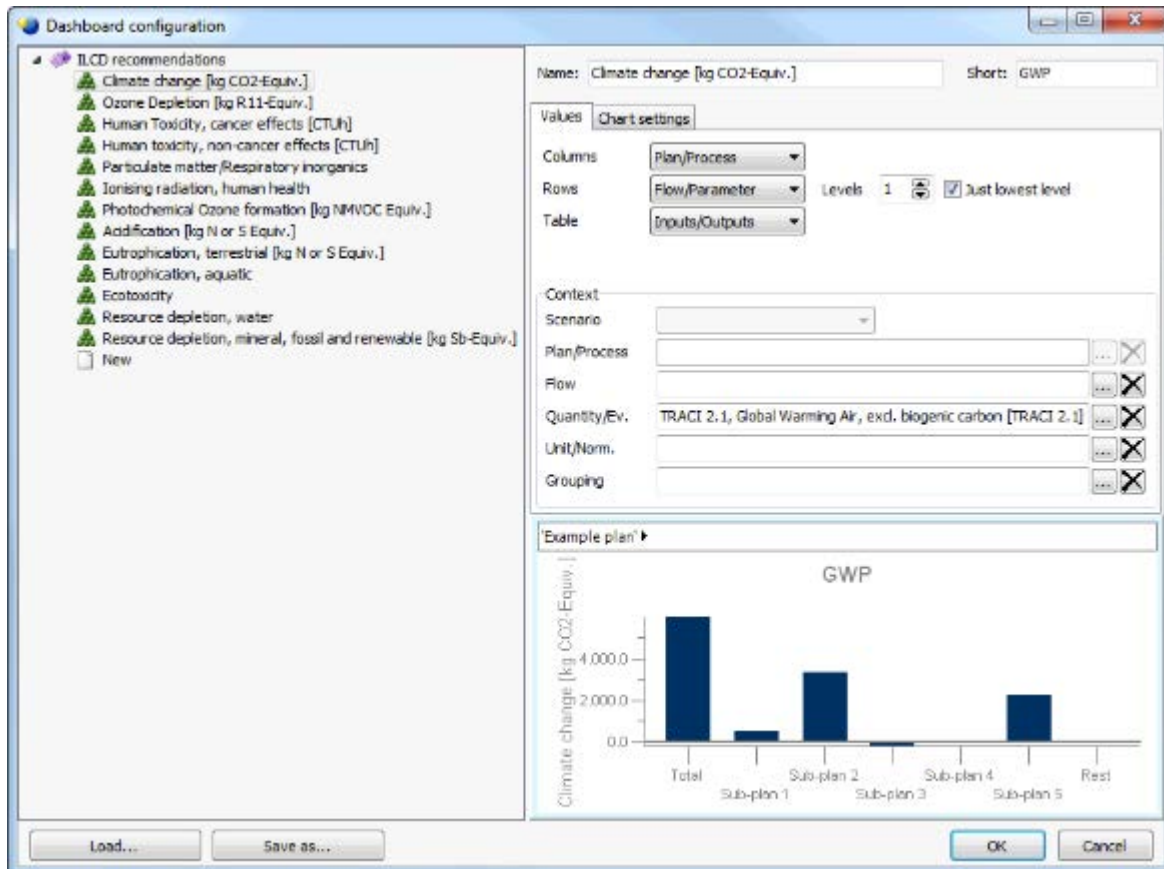


Figure: GaBi Dashboard configuration

The list of charts already existing in the dashboard view is visible on the left hand side of the window. New charts can be added to the dashboard by clicking on "New" at the end of the charts list.

The title of the y-axis of the chart can be changed using the "Name" field. The "short" field gives the start of the name of the chart above it.

In the "Values" tab, the content of the columns and rows of the chart can be changed by clicking on the "Columns" and "Rows" drop down menus. Increasing the number of "Levels" allows the chart to show more details (drill-down). The tick box "Just lowest level" shows just the lowest level of the chart, when selected. The table from the balance on which the chart is based (i.e. Inputs, Outputs, Inputs/Outputs, or tables from LCC and LCWT (economic and social aspects)) can be selected in the "Table" drop down menu.

The exact plans/processes, flows, quantities, units and grouping displayed in the charts can be selected by clicking on the right hand side of the corresponding fields. Note that the field that corresponds to that defined in the "Columns" drop down list above is grayed-out and cannot be altered. This is because this can be altered directly in the chart, by clicking on the bars of the chart to "drill down" into the details of the aspect contained in the "Columns" field.

When defining the "Plan/Process", "Flow", "Quantity/Ev.", "Unit/Norm." and "Grouping" fields the below window will appear. It will vary depending on the field selected.

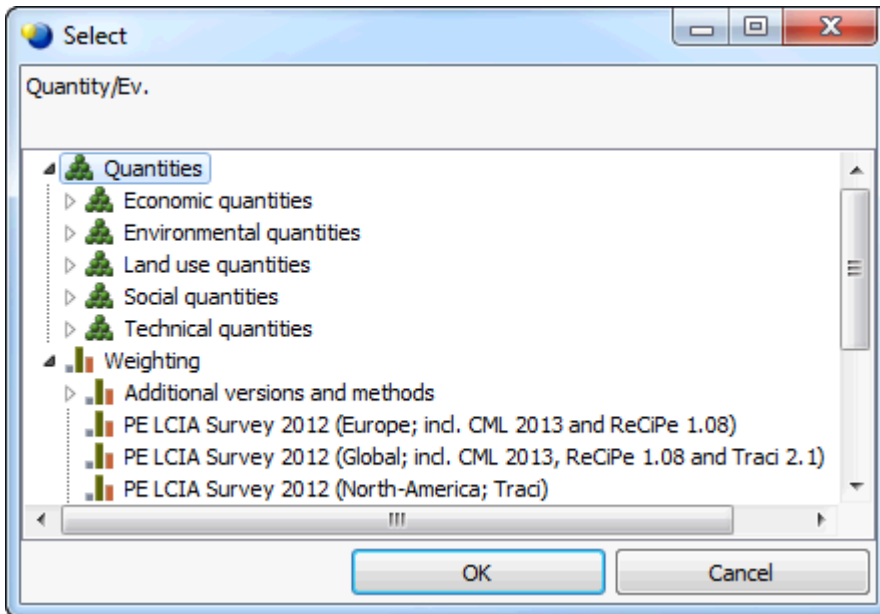


Figure: Object selection for dashboard

The desired item can be selected by clicking on the arrows to the left of the headings, to expand folders until the appropriate flow, quantity, etc. is found. Multiple items can be selected by holding down the Ctrl-key and clicking on the items. The items selected will then be shown in the chart. The "X" button to the right of these fields can be used to removed these items.

The appearance of the chart can be altered by clicking on the "Chart settings" tab, of the window.

The drop down list "Style" changes the chart type (i.e. bar, line, pie, etc). The drop down list "Arrangement" changes how the bars, lines etc appear relative to each other. If not applicable to the selected style or underground model, certain options here may not effect the chart appearance. The drop down list "Themes" provides a number of pre-defined themes. The drop down list "x-Axis labels" gives options as to how the x-axis labels are displayed.

The tick boxes to the right of these drop down lists allow the user to select:

- If the chart is 2D or 3D ("3D")
- If the chart is one colour or has a colour gradient ("Gradient")
- If the grid lines are turned on or off ("Grid")
- If the points of the chart have labels showing the quantity of the bar, line, etc ("Marker")
- If the chart is arranged from highest result to lowest, or in the default order ("Pareto")

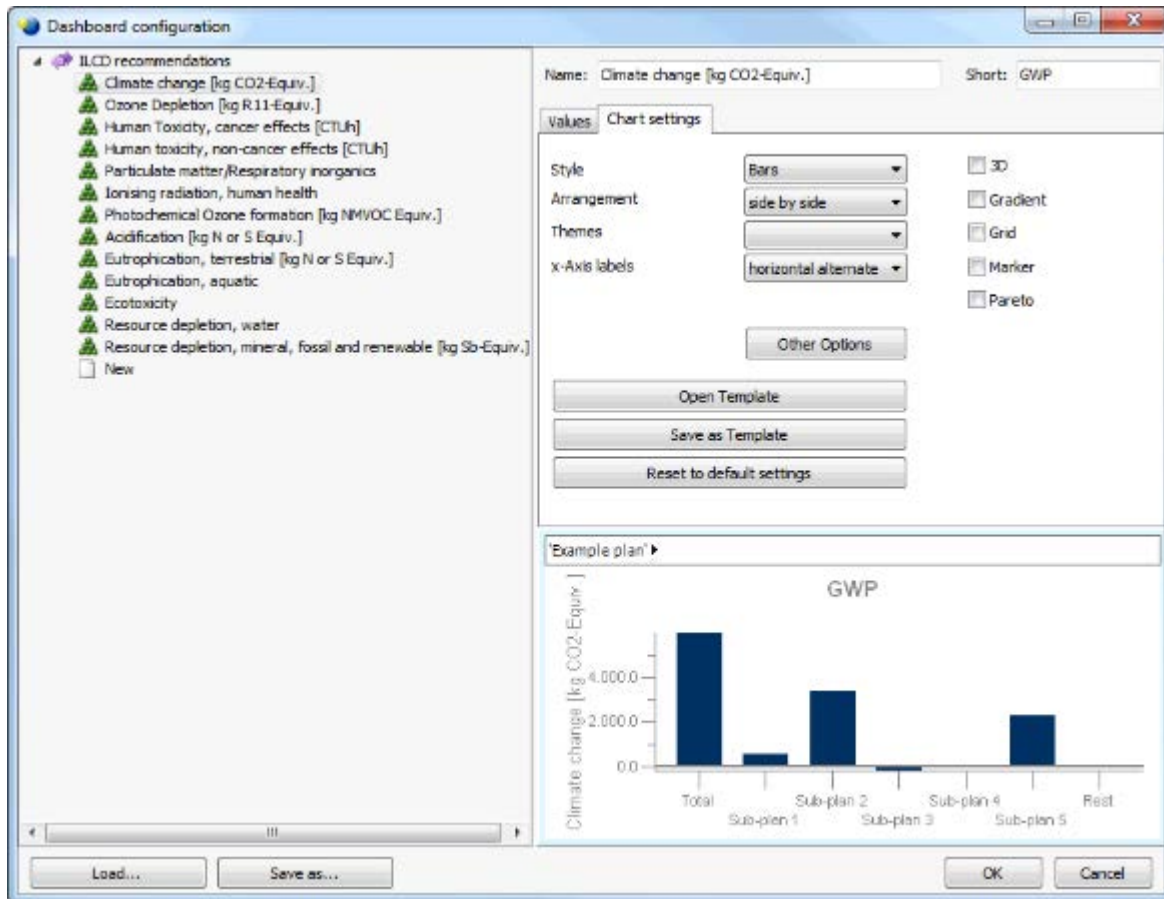


Figure: Chart settings in dashboard

User specific charts can be saved as template (DSB file) using the button "Save as...". If you want to reset a modified chart to the original settings you can use the "Reset to default settings" button.

Templates defined by PE or by the user can be applied to any additional dashboard defined in the future. This allows that all dashboards have the same configured layout or allow that new templates can be created using one of the saved chart templates as a starting point.

7.4.1 Charts in the Dashboards

The charts in the Dashboards illustrate the visual results of the GaBi balance calculation. For example, the figure below shows the GWP resulting from the a number of sub-plans, which belong to a joint top-plan. Not all of the plans and processes in the highest level are shown automatically in the chart, but can be accessed by clicking on the bar entitled "Rest". Similarly, clicking on the other bars in the chart shows the breakdown of those bars. Clicking on the "Total" bar returns the chart to the higher level.

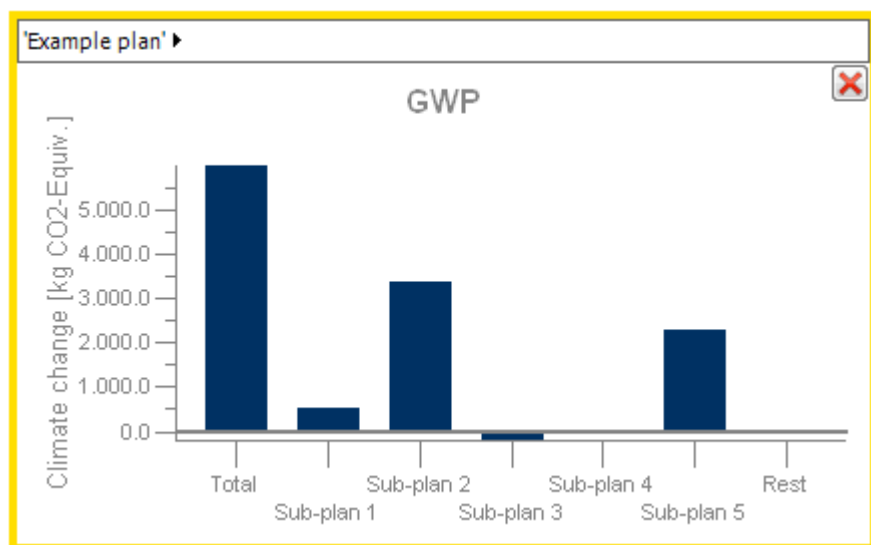


Figure: Chart in dashboard

The appearance of the chart can be altered by clicking on the "Chart settings" tab, of the "Configuration" window.

The button "Other options" opens an extended editor with additional chart options. Some key features of these additional chart options are described in this chapter.

Highlighting "Flow" and selecting the "General" tab allows to change the number of decimal places for the numbers that appear in the chart. The location of the x-axis and y-axis can be changed in this tab as well.

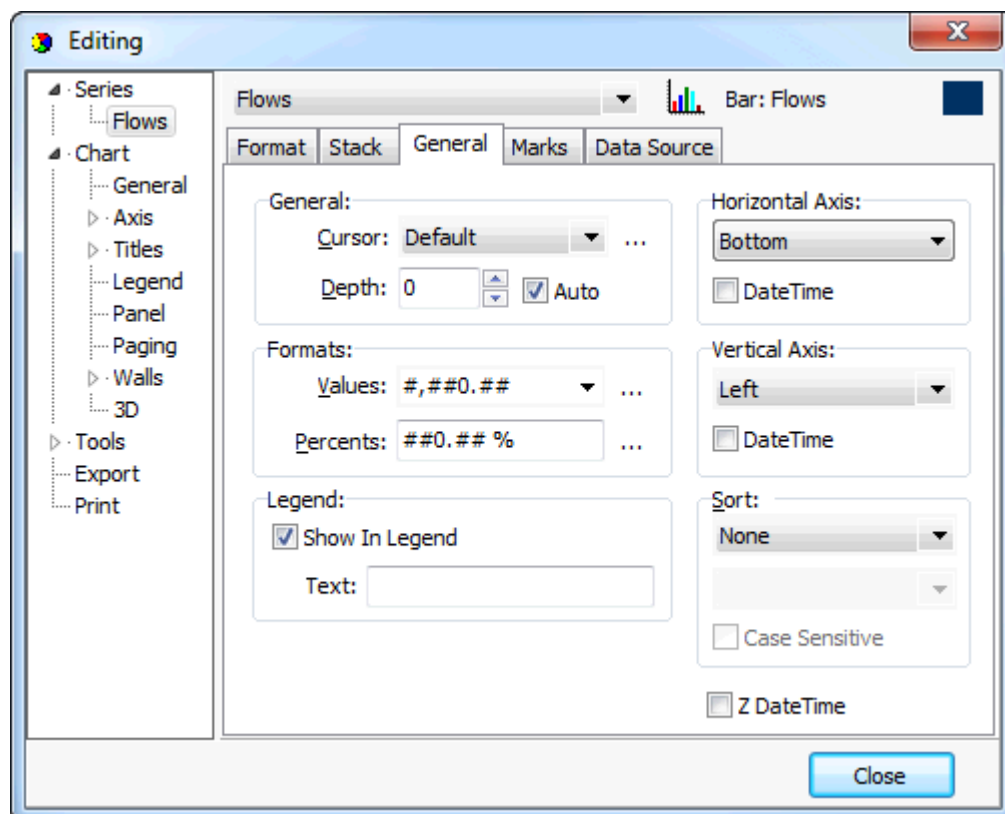


Figure: Chart editing 1

Highlighting "Axis" and selecting the "Title", "Format", "Text" and "Font" tabs allow the change of the font size and style of the text describing chart axes.

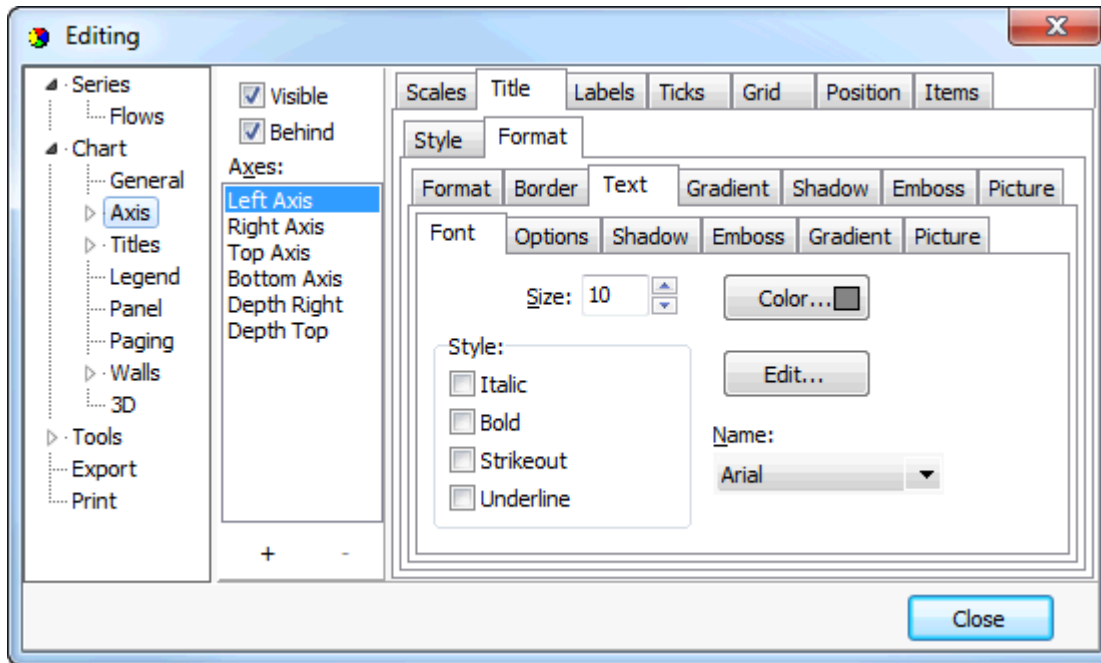


Figure: Chart editing 2

Highlighting "Titles" and selecting the "Text" and "Font" tabs allow the change of the font size and style of the chart title.

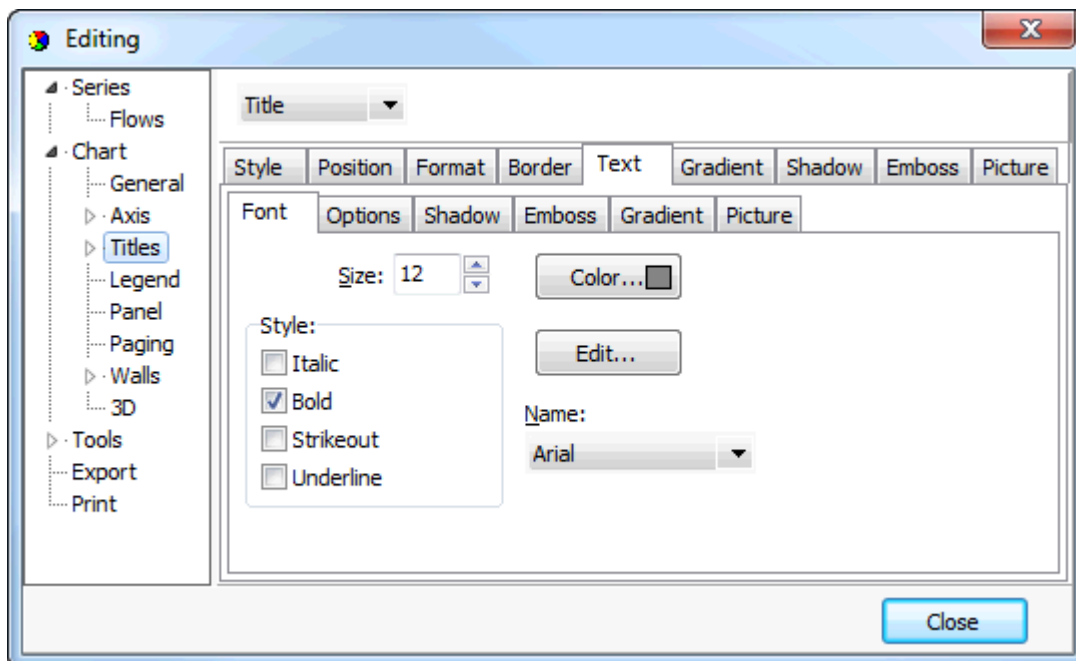


Figure: Chart editing 3

Highlighting "Flows" then selecting the "Marks", "Text" and "Font" tabs allows the font size and style of the numbers in the chart to be modified.

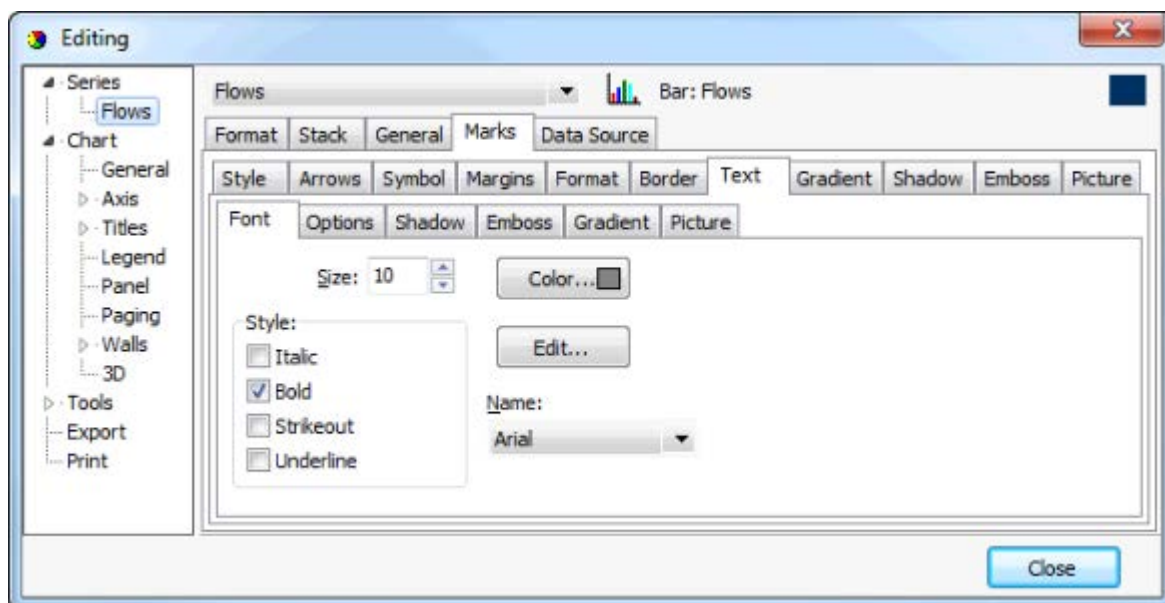


Figure: Chart editing 4

Highlighting "Axis" and selecting the "Labels" and "Format" tabs allow the change of the number format of the numbers in the axes.

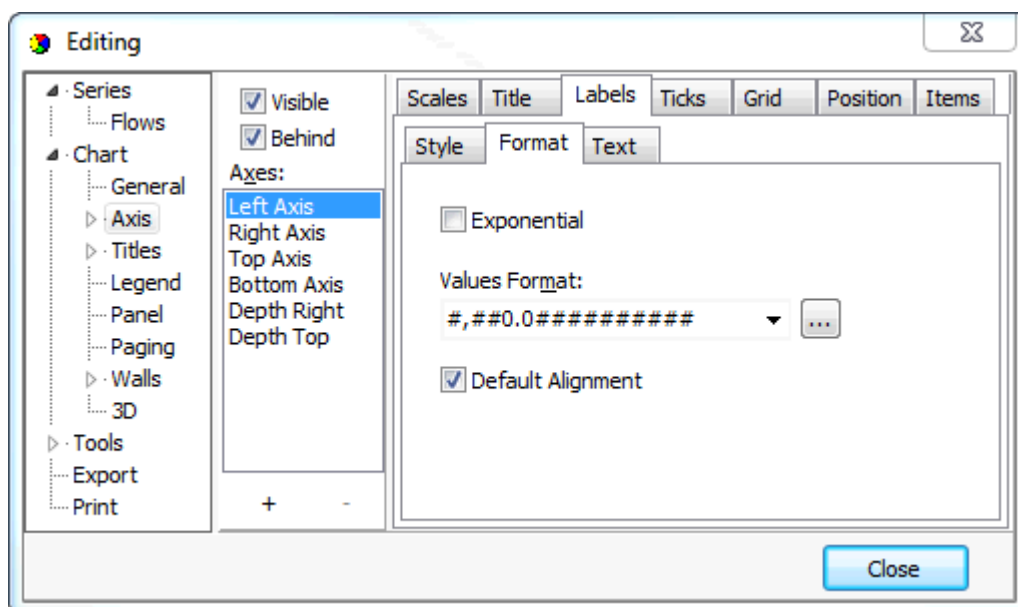


Figure: Chart editing 5

7.4.2 Balance

7.4.2.1 Assess a Balance

GaBi balances capture all inputs and outputs of a balanced life cycle and can show results in terms of environmental impacts based on the Life Cycle Inventory results. Balances are calculated based on single or multiple processes and plans. The possibilities extend from a collection of a few individual processes to complete life cycles.

Balances reinforce the distinction between a Life Cycle Inventory (balance of the energy and material flows) and Life Cycle Impact Assessment (balance of energy and material flows by impact). In GaBi's balance window, you can switch between Life Cycle Inventory figures and Impact Assessment potentials. This is possible since all quantities defined in GaBi are handled consistently and are balanced all in one operation.

Balances can be weighted by means of normalization and evaluation, for example, to carry out an aggregation for various impacts. This makes it possible to use single score methods, i.e., a single value, to display the results. Examples of weightings are normalizations based on the output of the impact potentials for a certain region, monetary assessment, environmental stress points, or by means of other assessment systems. To achieve this, the appropriate normalization/evaluation 'key' is selected in the GaBi balance window.

New weighting methods can be created and saved in the GaBi object type "Weighting" in the DB Manager. This object type is sub-divided into "Normalization" and "Evaluation".

Balance assessment and interpretation are steps outlined and standardized in the ISO series standards. GaBi also provides other tools for analyzing balances such as: "Data Quality Assessment", "Scenario Analysis" and "Parameter Variation".

7.4.2.2 Calculate a Balance

You can calculate a balance as follows:

1. Select one or more plans or processes with a click of the mouse in the DB Manager. For multiple selections, hold down the Ctrl key until you have completed your selection.
2. Click on the balance button on the database manager tool bar. (You can perform the same action using the "Balance Calculation..." function in the right mouse click menu.) When the calculation is complete the GaBi balance section appears represented by the GaBi dashboard as a default.
3. Save your balance. Then give a name in the "Name" field and click on the save button on the balance window tool bar.

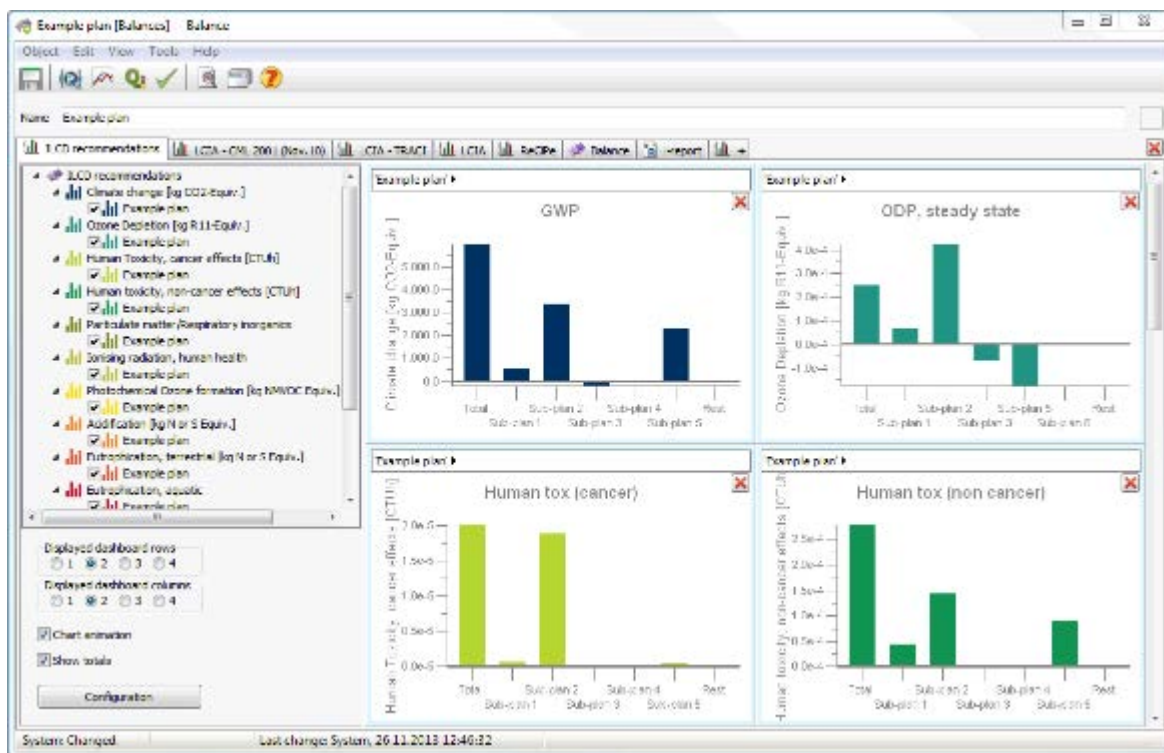


Figure: Default dashboard view

The GaBi balance window provides dashboard tabs to help you visualize LCA outcomes and drill down to find opportunities for improvement. You may configure, add and delete tabs. You still have access to the traditional GaBi balance table in the "Balance" tab and the interactive report editor in the "i-report" tab.

7.4.2.3 Balance Views

The fundamental basis of the balance in the "Balance" tab is the input/output table. Flows and quantities (in the quantity view) are shown in rows while processes and plans are shown in the columns. You can modify the

quantity or unit displayed in the “Quantity” and “Unit” fields.

Note: If individual lines for flows and flow groups are empty, this is because these flows or flow groups do not contribute to the selected quantity.

By default, the quantity displayed is "Mass". You can select other quantities (technical or environmental) from the “Quantity/Weight.” menu. The balance shows a value all flows which contribute to/are characterized that particular quantity (e.g. global warming potential).

To determine the extent to which individual plans or processes contribute to the global warming potential of a top-plan, double click on the column header with the plan name. This is how to expand and collapse both columns and rows. All processes on this plan and its sub-plans in the balance can be displayed by expanding. The column can be closed again with another double click.

All columns which contain cumulative values (representing plan), are displayed in grey while processes are displayed in white. This enables you to recognize the relevance of individual plans or processes in terms of how they contribute to a quantity. This analysis can be simplified by viewing the balance relatively, i.e. in percentage. Select “Relative contributions” from the drop-down menu currently displaying “Absolute values”.

Note: With a single table balance the values of the input and the output table are aggregated. This allows you to calculate single score balance results. To activate the single table balance display, uncheck the "Separate IO tables" check box in the top line of the balance tables.

Note: With the  buttons you can show or hide the input or the output table when the "Separate IO tables" function is enabled.

The GaBi flow group hierarchy is shown collapsed. You can immediately see that 100% of the global warming potential relevant emissions can be found in the “Emissions to air” flow group. You can get more details on this by double clicking on the row. Now the balance should look like in the Figure below.

If you would like to get a quick overview of the balance for several quantities, you can tick the “Quantity view” check box. In this way, you can display all quantities in a clear list.

Note: The “Relative contributions” (percentage) display of the balance can not be active for the “Quantity View” option. Select the “Absolute values” option from the drop-down field to display the “Quantity view”.

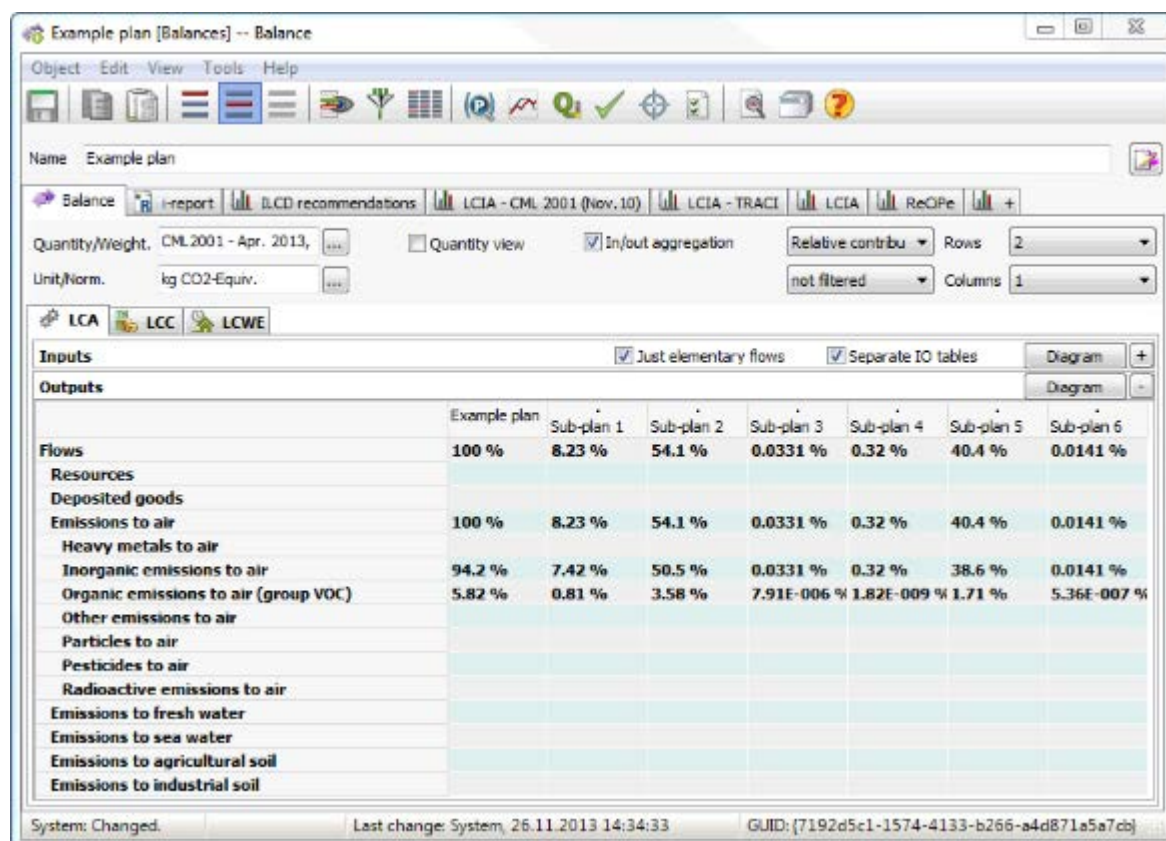


Figure: Basic GaBi balance window

7.4.2.4 Single Table Balance

The **single-table balance** display is an addition to the normal balance display where the input and output sections are separated into two tables. The check box "Separate IO tables" above the balance table is used to switch between the two balance displays, for inputs and outputs.

The aim of the single-table balance is to provide an even easier way to generate single score balance results within a Life Cycle Impact Assessment (LCIA).

A prerequisite for the single-table display is that elementary flows **must** be classified as being input or output relevant by having them stored in a respective folder in the GaBi object hierarchy.

Since the single-table balance view aggregates inputs and outputs, minus [-] is now present in the balance for negative values. Please note the following when using the GaBi single-table balance:

1. All non-elementary flow categories are not classified as being input or output relevant. These categories can have positive values (if used on the input side of a process) or negative values (if used on the output side of a process).
2. GaBi enables you to switch off non-elementary flows in the balance (by checking the "Just elementary flows" check box). If the non-elementary flows are shown in the single table display, they have a colored background.
3. Interpretation of positive and negative values:
 - a. Elementary flows with positive values describe an environmental burden from the system. Non-elementary flows with positive values represent a consumed flow, e.g., the consumption of a valuable substance.
 - b. Elementary flows with negative values are environmental credits. Non-elementary flows with negative values indicate the generation of product or a waste.

In summary:

	Elementary flow	Non-elementary flow
Plus (+)	Environmental burden	Consumed flow
Minus (-)	Environmental credit	Produced flow Waste flow

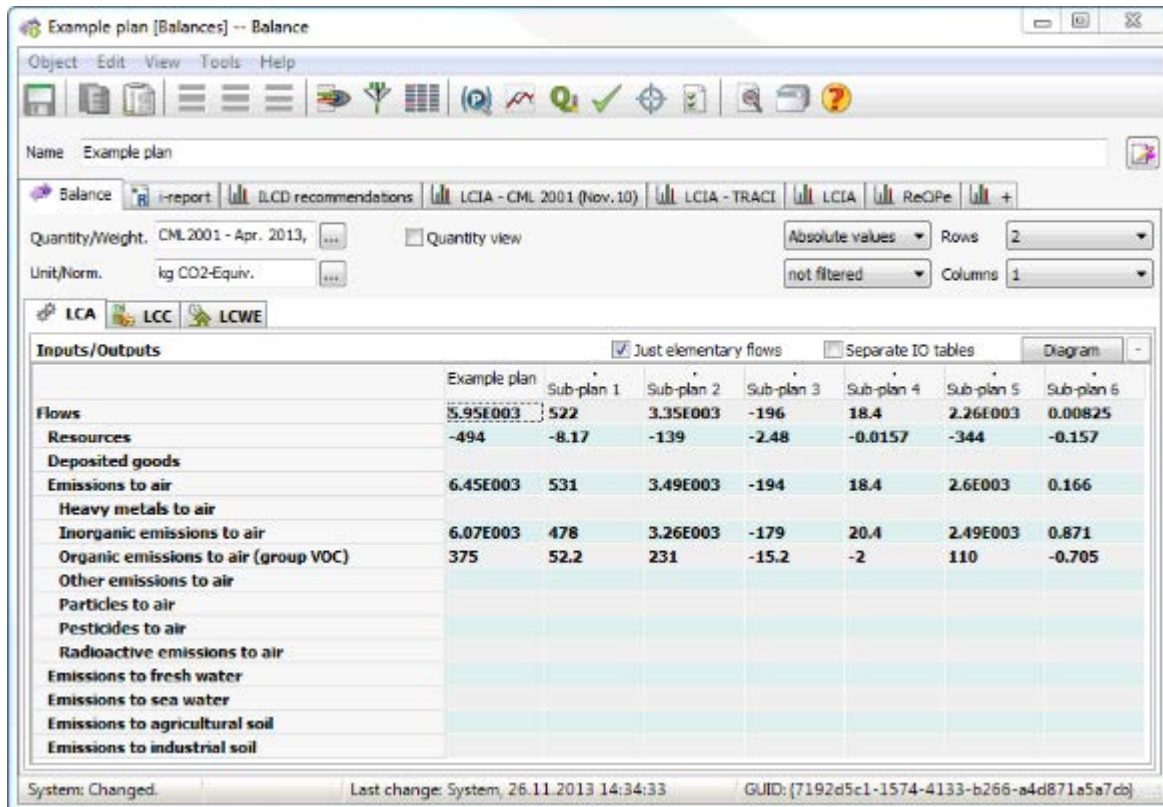


Figure: Single table balance

7.4.2.5 Single Table Balance Example

The following example illustrates how the single table balance display is used with a credit system.

To keep it simple there are only two processes in the example. Process 1 consumes 2kg of hard coal (Germany). Process 2 generates 1kg of hard coal (France), which can be interpreted as credit.

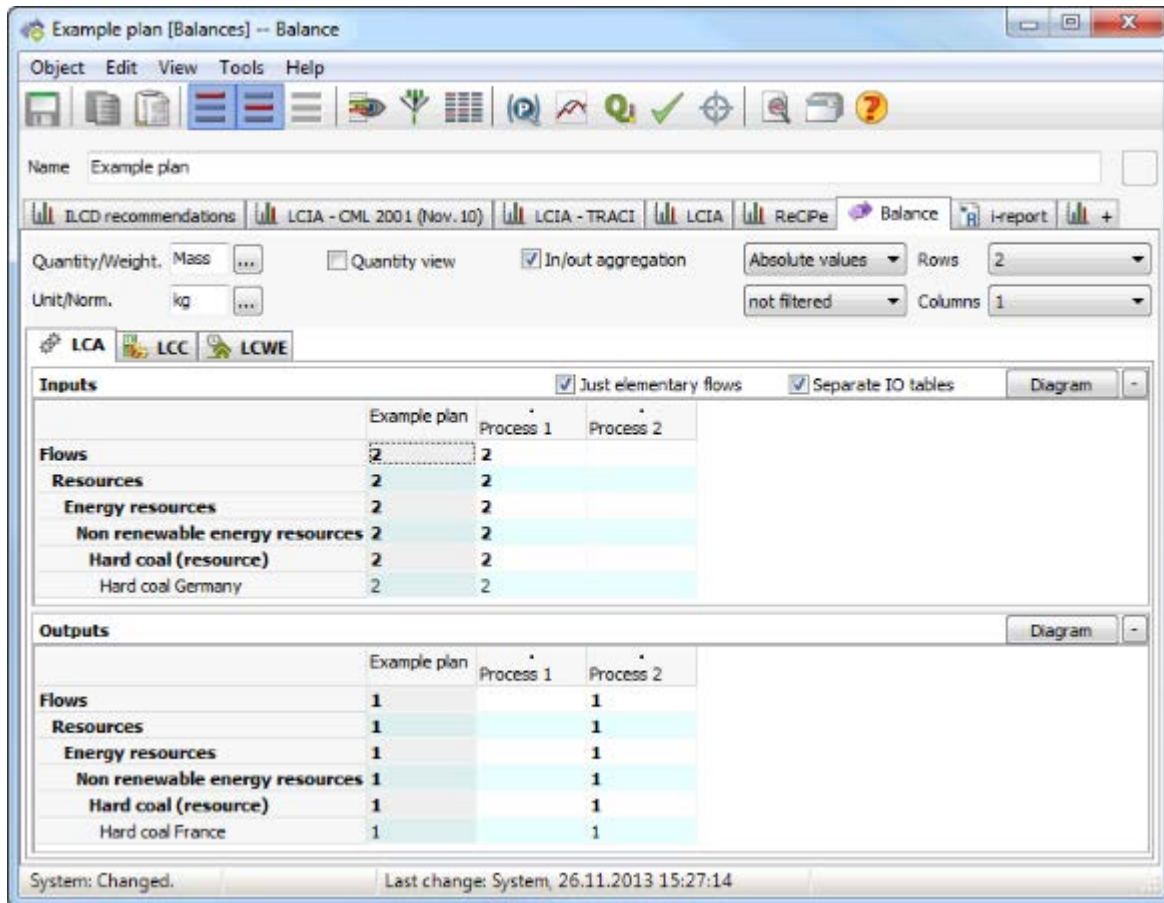


Figure: Separate table balance display

The figure above shows the balance with the separate table balance display. The in/out aggregation is conducted on the flow level; the values of different flows are not aggregated. An aggregated value has to be calculated manually.

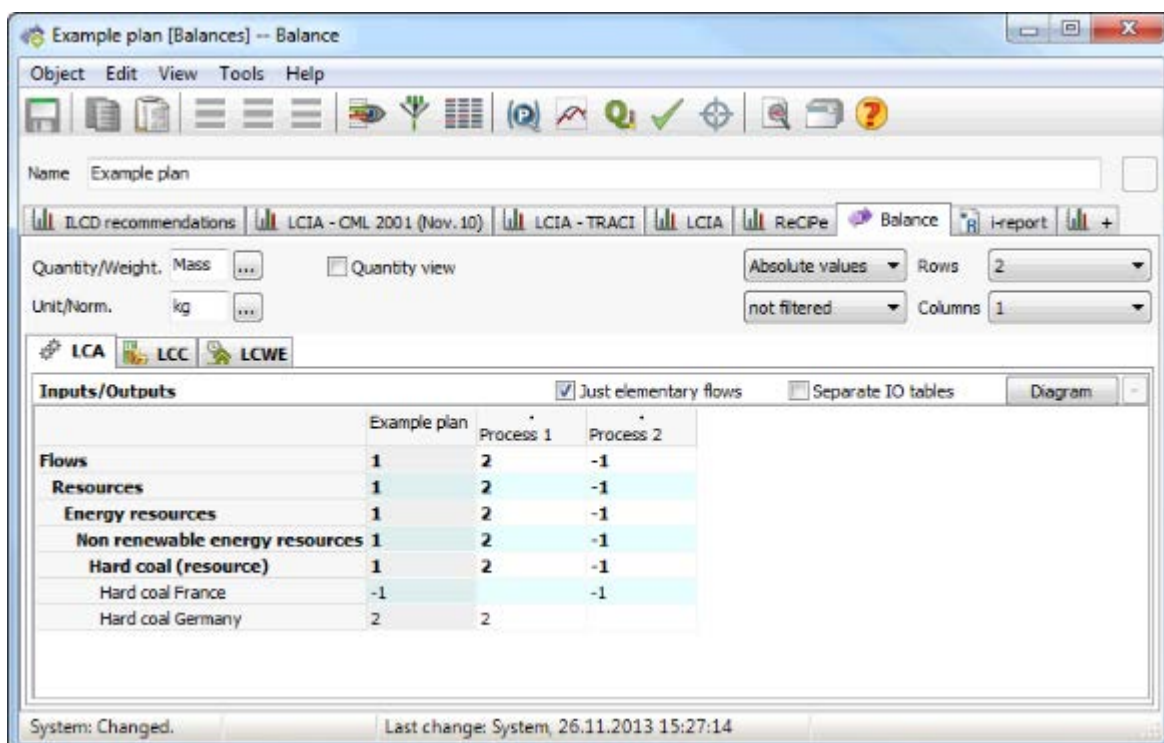


Figure: Single table balance display

With the single table balance display, LCI and LCIA results can be fully aggregated to a single score result. In general, environmental burdens appear as positive values in the balance. Environmental credits appear as negative values since they have to be subtracted from the overall environmental burden.

All flows have to be classified as input relevant or output relevant to use the single table balance. In the above example, a consumption of resources is an environmental burden, therefore the resource flows are classified as input relevant. That means inputs of resources appear as positive values in the single table balance.

Emissions, for example, are classified as output relevant, since a generation of emissions is an environmental burden.

7.4.2.6 The GaBi Balance Navigator

For the analysis of complex products, the balance is extensive and can contain a large number of columns. You can use the GaBi balance navigator to target certain plans or processes. Open the Balance navigator by clicking on the button  in the balance window tool bar.



Figure: Balance window tool bar

The balance navigator shows the plan structure behind the balance. Select a process or plan, right click and choose "Find in Balance". The respective column will then be highlighted in balance window.

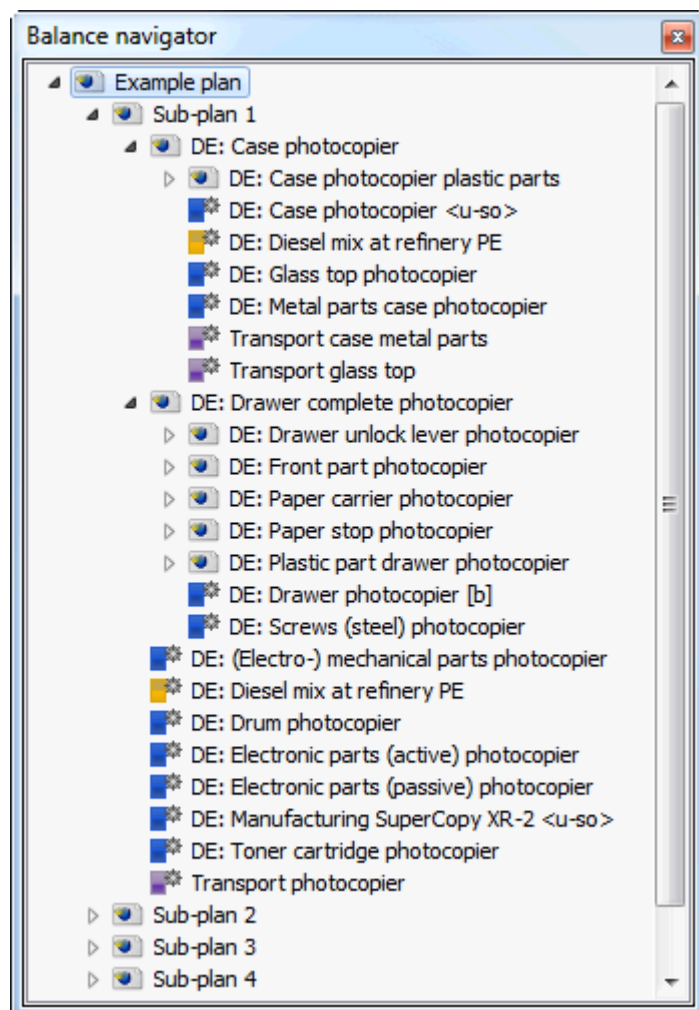


Figure: Balance navigator

7.4.2.7 Balance Diagrams

In GaBi, you can generate different diagram types (bar, column, pie chart or linear diagrams) from the balance. The diagram displays the current content in the balance table (or cells that are selected). Thus you can choose to create diagrams of life cycle inventories with different units; of Life Cycle Impact Assessments of normalized balances; or of evaluated balances.

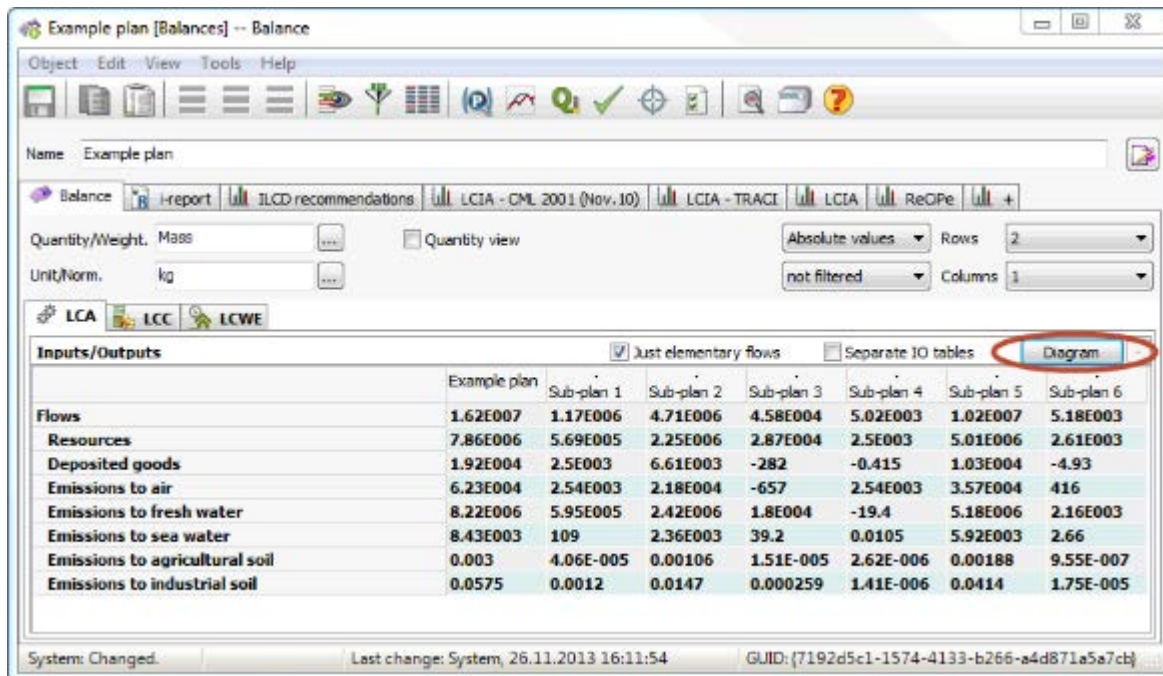


Figure: Diagram button in balance view

Click on the "Diagram" button as shown above to display a diagram of the combined inputs and outputs. To see an input or output table, click on the corresponding "Diagram" button on the upper right corner of the input or output table. If you only want to show a selected part of a balance table in a diagram, then select it with the mouse and click on the corresponding button. By selecting different fields you can display numerous results.

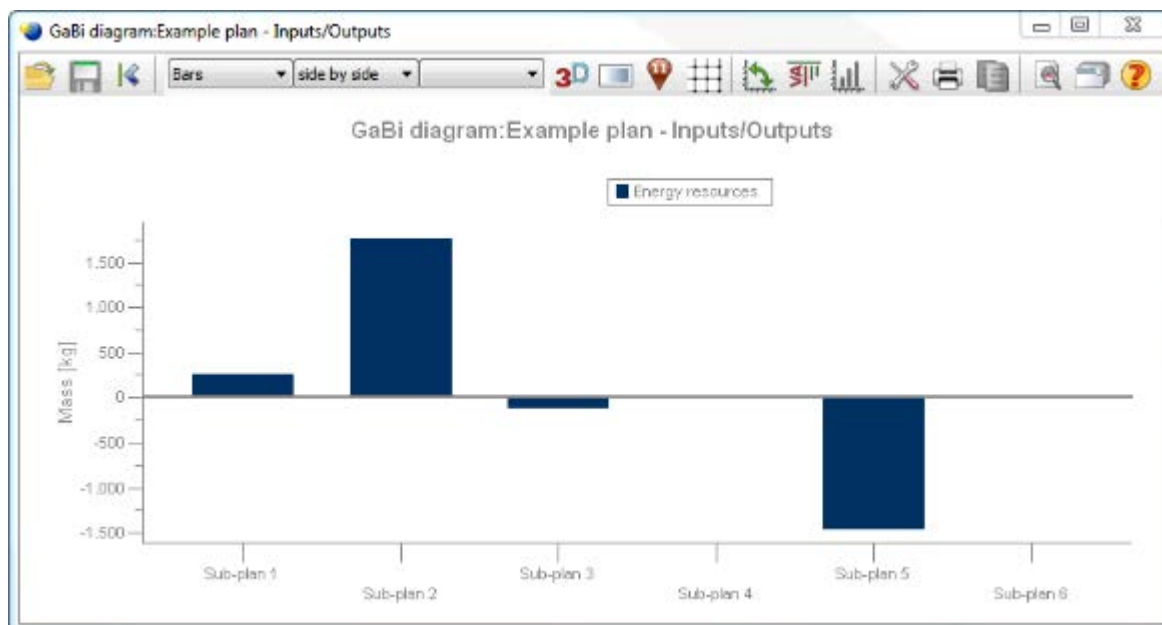


Figure: Bar diagram

7.4.2.8 In-Out Aggregation in the classic balance display

The "In/out aggregation" hides flows from the plan columns in the balance view, or more specifically, hides those flows which do not exceed the balance limits, as defined by the plan (i.e., flows that lie between processes within the modeled life cycle).

Using this function, you can identify un-connected tracked flows or un-connected production residues in the life cycle (i.e., flows that exceed the system limits) on the balance level.

Note: Only resources which come from outside the balance limits are allowed on the input side and only emissions are allowed on the output side.

There are only exceptions to this rule in special cases. Important: to maintain a "concrete" balance result for the entire system, you **must** tick the "In-Out Aggregation" box when evaluating an LCA.

In the single table balance display, the in/out aggregation is always activated.

7.4.2.9 Balance Interpretation

7.4.2.9.1 General Information about Balance Interpretation

In accordance with ISO standards, the interpretation of a balance is defined as follows: During the interpretation, the results of the life cycle inventory or the impact assessment (or both) are combined with the stipulated goal and the test framework. Conclusions can be drawn based on the results, and recommendations can be given for decision-making.

To gain a better understanding of your results, use the GaBi Analyst , a tool for conducting scenario analysis, parameter variation, sensitivity analysis and Monte Carlo analysis, can be used.

7.4.2.9.2 Assessment of the Data Quality of Balances

With the calculation of the balance, the information on data quality is automatically assessed. The data quality level is presented in a simple way. Using the data quality tool enables you to ensure:

- Symmetry between different levels of the balance
- Balances which are going to be compared will exhibit the same or similar data quality
- Weak points data quality can be identified and remedied in a targeted way
- A balance that is complete and error free.

For each balance, it is important to check and document the data quality. If this is done consistently, the value of a balance can be categorized more efficiently and is easier to compare with other balances.

A prerequisite for the assessment of data quality is consistent and transparent entry of data quality indicators (DQIs) on all levels by the modeler. If DQIs are not entered consistently, their assessment is of little informational value. DQIs can be entered on the following levels:

- Data origin in processes
- Integrity of processes
- Representativeness of processes on the plan level
- Integrity of plans

To assess the data quality of a balance, click on the button  in the balance window tool bar. GaBi opens a window showing the number of occurrences of the evaluation level of a DQI for the model. This assessment forms a matrix that displays the data quality of the calculated balance, whereby the top section shows the properties of plans and the bottom section shows the properties of processes.

Balance name: Example plan

Plan: Integrity

	All processes linked	All relevant process	Individual relevant	Some relevant proc	No statement
	12 %	72 %	16 %	0 %	0 %

Plan: application of processes

	Completely represent	Partly representative	Not representative	No statement
Technique	66.8 %	30.5 %	0.909 %	1.82 %
Location	66.8 %	29.5 %	1.82 %	1.82 %
Time	25.5 %	70.9 %	1.82 %	1.82 %

Process: Integrity

	All flows captured	All relevant flows re	Individual relevant f	Some relevant flows	No statement
	5.1 %	91.3 %	3.57 %	0 %	0 %

Process: inputs/outputs

	Measured	Calculated	Literature	Estimated	No statement
	4.46 %	20.1 %	65.2 %	5.53 %	4.74 %

OK

Figure: Data quality in balances

7.4.2.10 Analysis of the Underlying Process Chain

The complete underlying plans and processes which comprise a model are saved with each balance. Once a balance is created, it is then completely independent from the database objects from which it was created. This ensures that a balance's transparency is maintained even after a modification to the database.

You can analyze the entire underlying plan and process structure from the balance using the GaBi parameter explorer. This assists you in accessing individual parameters of the process network and thus determining the impact of parameter changes to the balance. If you make changes, these only affect the balance and not the database from which the balance was created.

Note: By opening the GaBi parameter explorer from the plan tool bar, any changes you make will occur in the plan (DB object). By opening the GaBi parameter explorer from the balance window tool bar, any changes you make will occur in the balance only.

In the grey bar at the top of the GaBi parameter explorer there is a note telling you where the changes will occur.

7.4.2.11 Weak Point Analysis in Balances

Weak-point analyses can be performed in the balance window.

This feature emphasizes (in color) all values which result in a contribution of > x % or < y %. Threshold values can be defined by the user. In addition, empty balance columns or lines can be completely hidden making the balances easier to read.

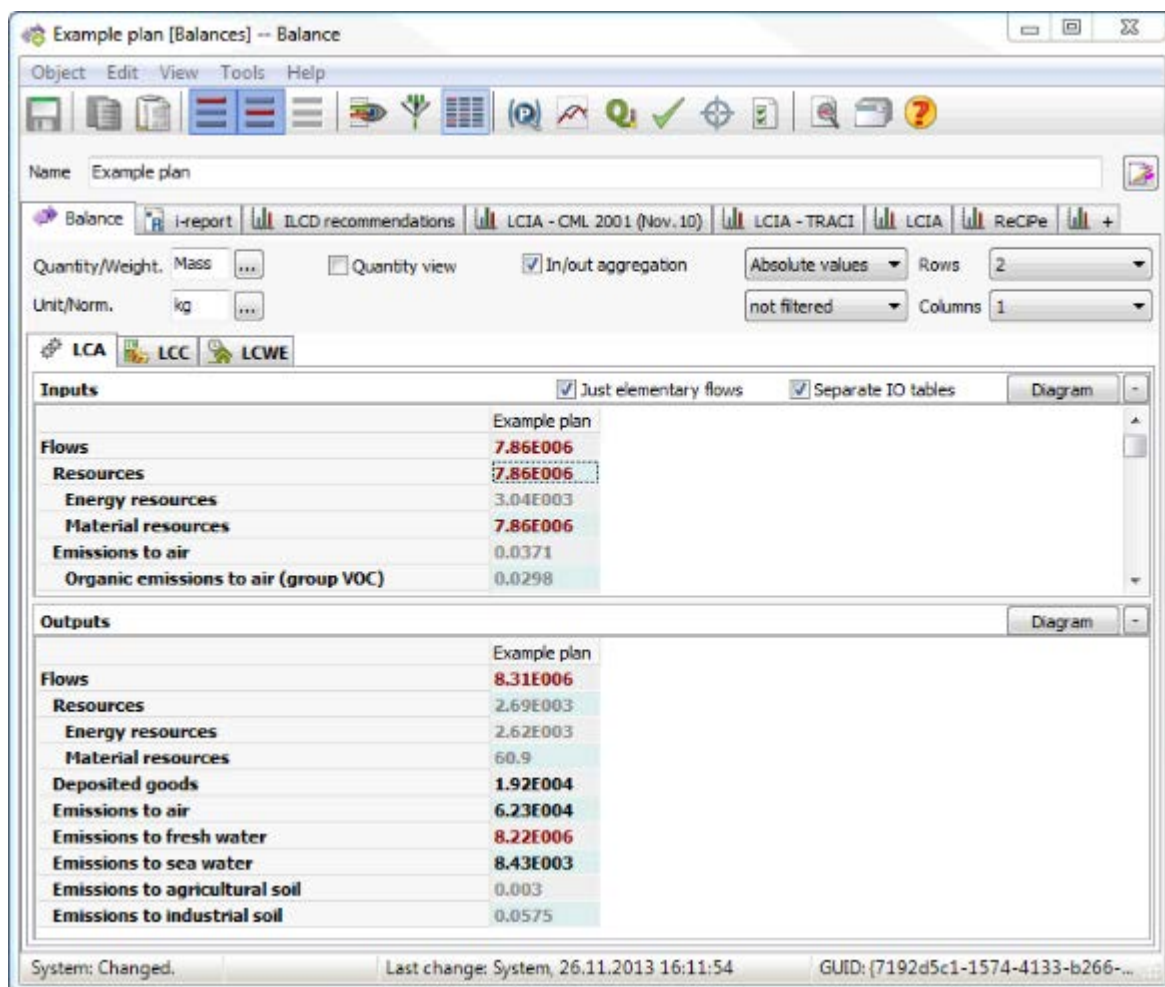


Figure: Weak point analysis

This can be done by selecting "Extras", then "Options" in the DB Manager and then the "Balance" tab in the new window.

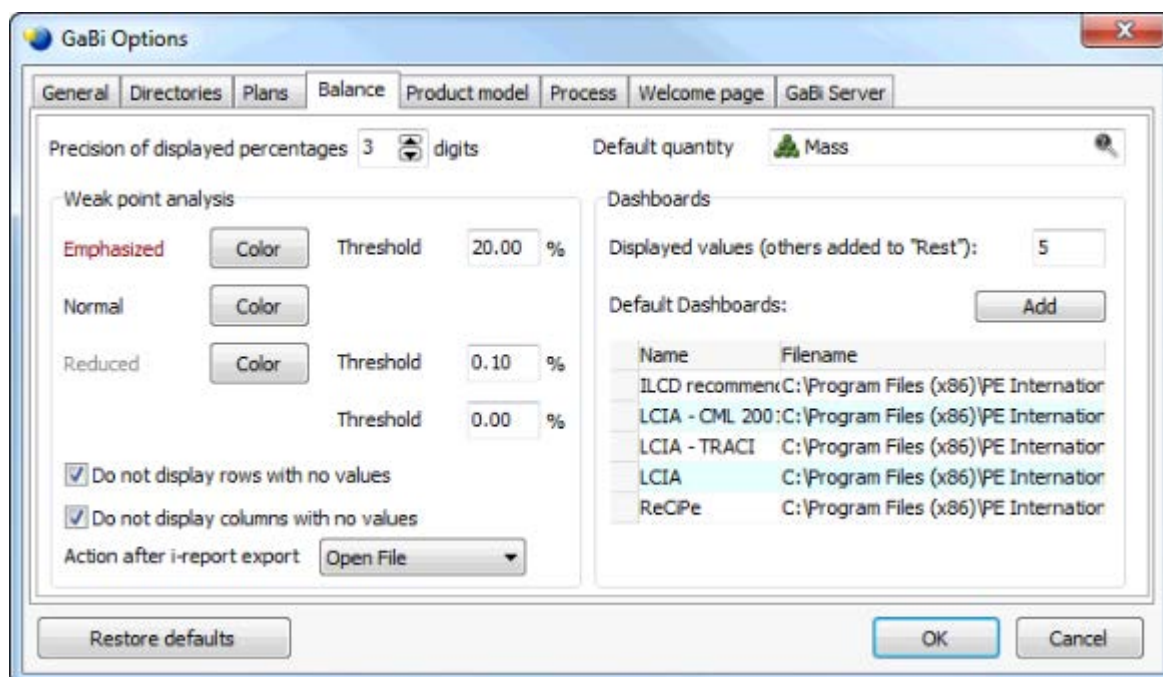


Figure: Options for weak point analysis

7.4.2.12 Defining Balance Views

GaBi enables you to define and save certain settings of the balance view. If you are interested in particular flows or quantities (when using the quantity view), then you can define a balance view which contains only these desired flows or quantities.

To define a balance view, click in  the balance tool bar.

Now a window appears where you can select those flows (inputs or outputs) or quantities that you would like to hide. You can navigate between the lists of inputs, outputs and input quantities "Q IN" and output quantities "Q Out" by clicking the buttons at the top of the left frame. Once you have selected flows or quantities to hide, click the arrow buttons in the center of the window to remove them from the balance. Now the flows or quantities hidden in the balance view turn grey in the left window frame and appear in grey in the right window frame. Save and close the balance view. Now only the selected flows are shown in the default balance window. Only the selected quantities will be shown in the quantity view (Switch to the quantity view by ticking the check box "Quantity View" in the balance window).

If you wish to return to the full balance view, select the option "Reset defaults" from the "View – Balance view" menu.

You can also save a balance view that you may want to use again later on for another balance. Simply click on the "Save" button and select a location for your GBV file. These files can then be loaded again by clicking on the "Load" button to apply the balance view on another balance. In order to save a balance view in a balance you have to click on the  button in the GaBi balance toolbar.

The button "Create hierarchy" opens a drop-down menu which allows to include only used or all flows or quantities (in accordance to the categories on the top of the left frame) in a balance view.

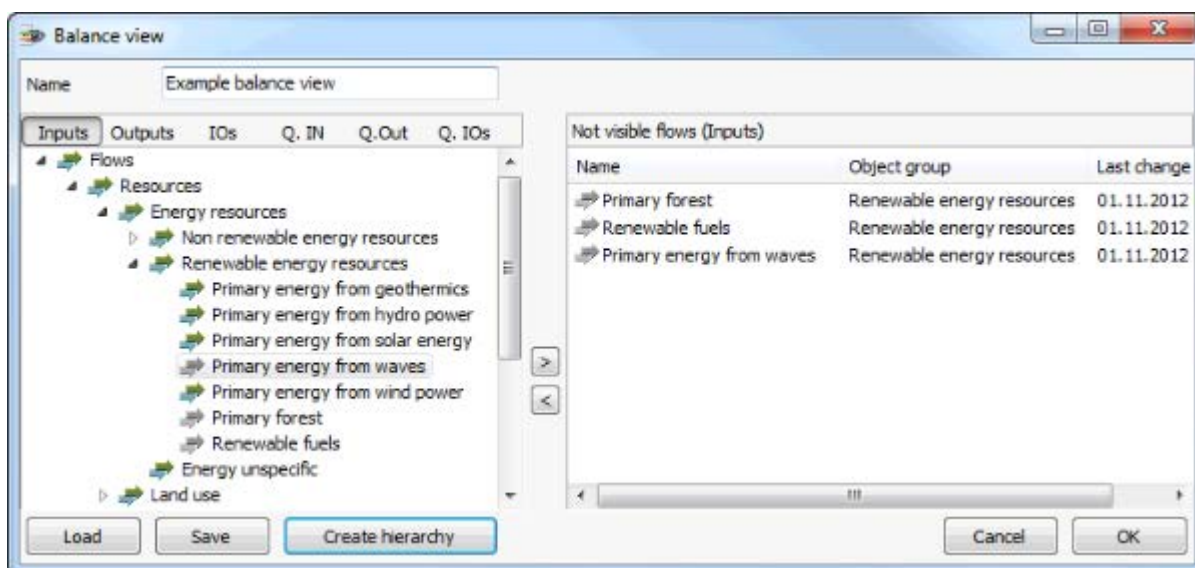


Figure: Definition of balance views

7.4.2.13 Viewing the Balance by Group

In addition to weak point analysis and the balance views, GaBi also allows you to assess the process chains by groups, or categories. These groups must be defined for each of the process instances during the modeling of the system. GaBi offers four independent grouping categorizations:

- Nation: (DE, GB, US, etc.) Categorization by default according to the source nation of the process.
- Type: (Production, transport, auxiliary processes etc.) Categorization by default according to the process type.
- Enterprise: (Internal, external etc.) Categorization of company-internal or external processes. Default = external.
- User-defined: Categories defined by the user.

When the balance is grouped, processes are summarized in groups in the balance columns. To do so, select "group hierarchy" in the drop-down menu which is showing "not filtered" by default. A new window will open. In this window you may select which groups you would like to sort your data by. You can also select more than one grouping and sort their hierarchy by using the arrows on the right. The window can also be opened with the button that will newly appear called "Order of groups".

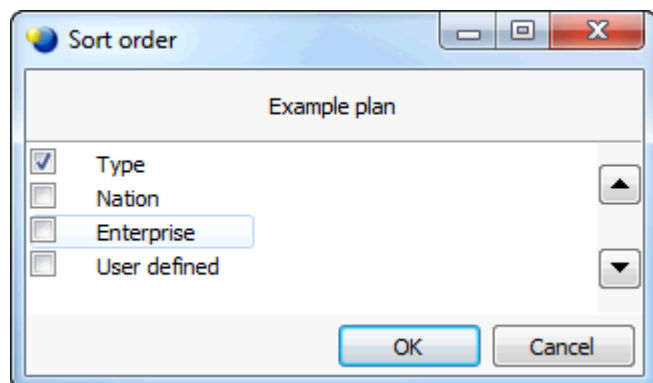


Figure: Order of groups

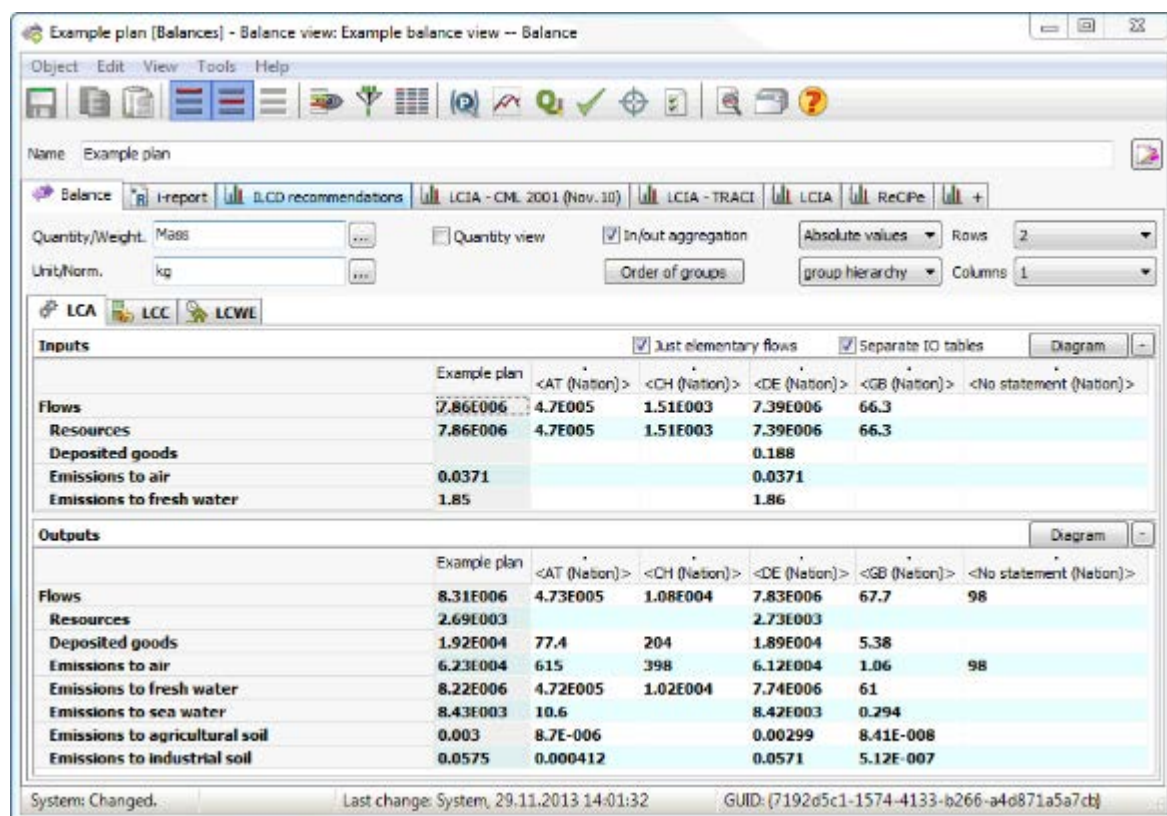


Figure: Balance sorted by nation

Here the processes are grouped by nation. The groups are nested, i.e., the processes can be sub-divided into transport processes, energy conversion etc.

7.4.2.14 Filtering the Grouped Balance

Grouping filters make it possible to filter the balance's processes or plans according to groupings selected independently by the user. All flows, quantities which do not contribute to the selected groupings are hidden. To select grouping filter, select the drop-down option "filtered" in the menu which is showing "not filtered" as default.

You can also click on the  button.

When defining the filter you can choose between "AND" and "OR" commands. All filters within a row are linked with

"AND" while separate rows are connected with "OR". If group filters have been set, the balance only shows those values which fulfill the filter criteria.

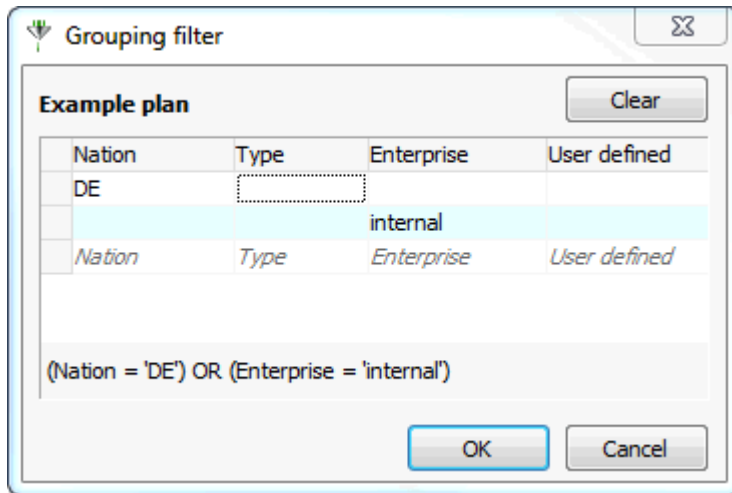


Figure: Definition of grouping filters

7.4.2.15 Export to Microsoft EXCEL®

The balances created in GaBi can be exported to Microsoft EXCEL®. Under the "Object" menu, select "Copy view" and then the desired balance view (LCA, LCC, or LCWE). After copying, you can paste the balance into a Microsoft EXCEL® sheet.

If you would like to only copy a part of the balance, select it with the mouse and click on the "Copy" button on the tool bar or in the right mouse button menu, then paste it into Microsoft EXCEL®. GaBi will not only copy the content of the selected cells but also the respective column and row headers.

7.4.3 GaBi i-report

The i-report editor is standard in GaBi and is located in the i-report tab of the balance window. Users can generate report templates for use in GaBi with other plans and balances (GBP) or they can combine the LCA model data and template into a complete interactive i-report (GBMX).

Parameters you have built into your model are accessible in an interactive report interface - as you change your parameter values, your report will update automatically. GaBi i-reports allow users to easily create static and dynamic reports to share with others.

7.4.3.1 Introduction to GaBi i-report

GaBi i-reports can be accessed via the  **i-report** tab in the balance window.

GaBi i-reports have an input frame where parameters from the underlying GaBi models can be modified and where model parameters can be structured and compiled in "Parameter sets". The input frame can be kept on display or can be hidden.

There are two different modes for editing and viewing i-reports. You can switch between the edit mode and the runtime mode by clicking on and off the  **edit** button in the i-report tool bar.

In the **edit mode**, the compilation and formatting of the report and the structuring of the input frame is carried out by the experienced GaBi user.

The **runtime mode** serves for the alteration of parameter values and for viewing the results. In this mode, less-experienced GaBi users can obtain essential information from the GaBi model interactively and simply.

You can save changes made to the parameter scenario settings and the report itself in your GaBi i-report by saving the report template (via the "Object" menu or clicking ). This will open a new window in which the location and name for the generation a GBP file can be defined. In an i-report template only the report content as the text, the i-report scenarios, the graphs and the tables will be saved. This i-report template can then be connected to other balances.

If you make changes in your GaBi model that you want to have displayed in an i-report that is similar that you built previously, you must create a new balance and then load your i-report template (GBP file) onto this new balance.

Report templates can be loaded via the Object menu or by clicking . Be aware that saving the balance (and hence the i-report of that balance) does not lead to changes in the i-report template and vice versa.

7.4.3.2 < Linking parameters to a GaBi i-report>

In most applications of a GaBi i-report, it is useful to allow the user to see results for different scenarios side-by-side. If you have not set-up scenarios for your GaBi model already in the **parameter explorer (Section 7.5.5)**, you may do this now directly in the GaBi i-report window. If you do so, these scenario settings are only stored in the i-report, not in the DB object of the model. Therefore it is possible to load an i-report template with its scenario settings into a new balance which does not have scenarios.

In the following section, a description how to create scenarios in the i-report is given.

Open a balance and go to the  i-report tab.

To access the DB object settings, where parameters are linked to the i-report, select anything but "hidden" from the drop-down menu "Input area" in the i-report menu bar. In the figure below the option "top" was selected.

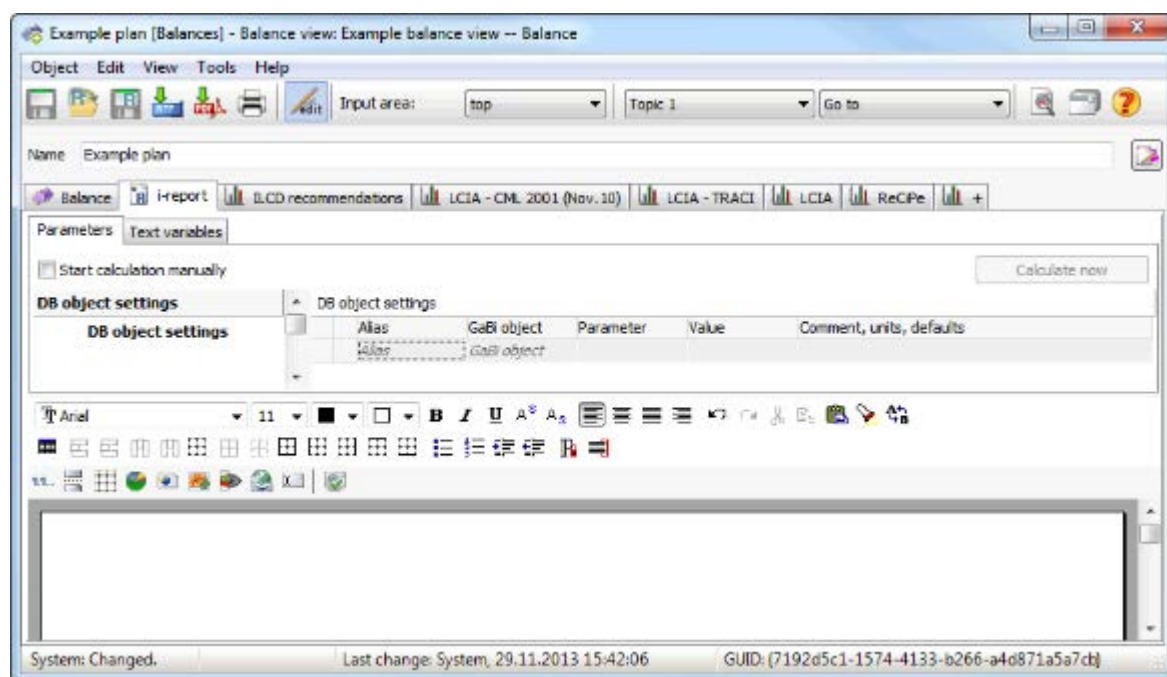


Figure: i-report input area

Scroll down in the DB object settings and create a new scenario group by clicking on "New: Scenario group". Within this scenario group frame, you can now create scenarios using the right mouse button menu. After creating new scenarios, there are two areas in the right frame where parameters can be linked: Parameters that are linked in the "Basic settings" frame are valid for all scenarios and can only be set for all scenarios at the same time. Parameters that are linked in the "Scenarios" frame can be set individually for each scenario.

To add a parameter linked in the scenarios, click on  in the cell showing "GaBi object" in italics and choose a parameterized process or plan in your model.

Hint: Processes or plans which contain parameters are shown in blue.

In the Parameter column to the right of the GaBi object, you can now select a list of all the free parameters

contained in this GaBi object. A parameter can be named in the "Alias" column. Comments can be written in the respective column. You can also already define default values for your scenarios. Via the right mouse menu, under "Range of values" a range (and steps) of parameter values that can be entered in the runtime mode can be defined.

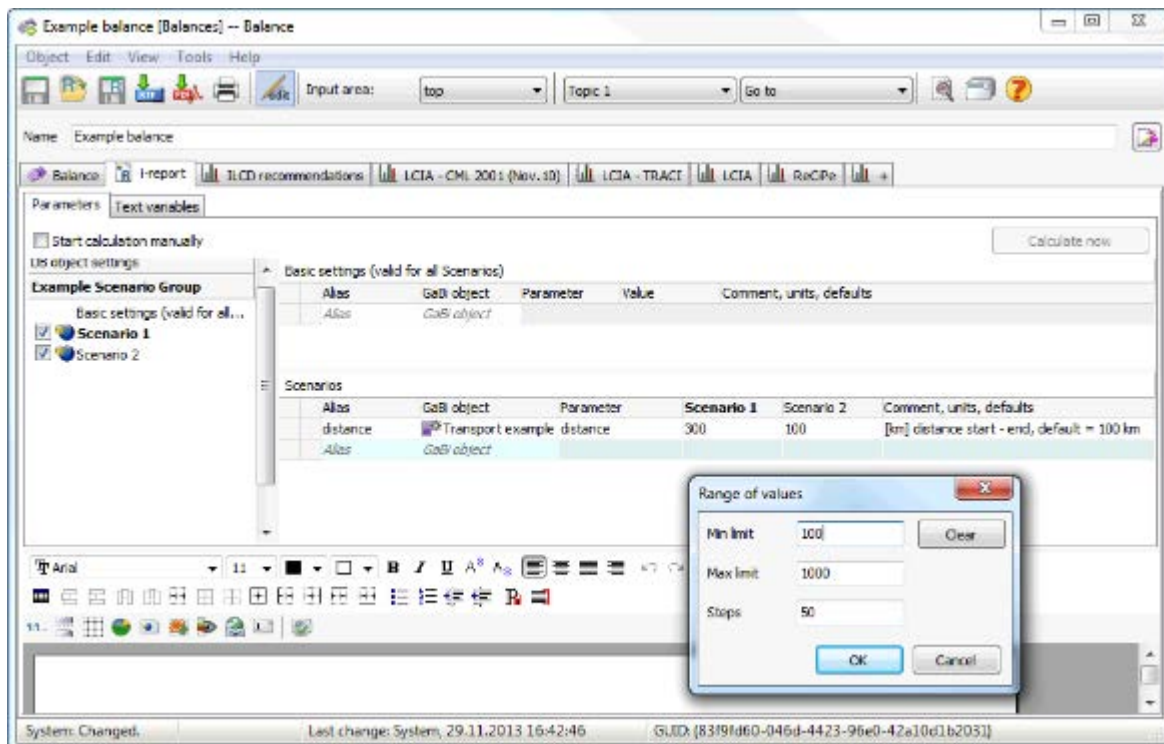


Figure: Scenario parameters in the i-report

You can switch from the edit mode to the runtime mode by clicking the  button in the menu bar to see how this will look for the i-report users.

Within a scenario group, subsets can be created. These are essentially sub-scenarios within a scenario in which a whole group of parameter settings can be selected at one time. In the runtime mode it is not possible to change the subset parameter values, it is only possible to select a sub-scenario from a subset in the parameter area via a drop-down menu.

Subsets are created in the same way as scenario groups. To create a subset, scroll down in the DB object settings area and click on "New: Subset". Within this subset window use the right mouse menu to create new subsets.

Example: We are transporting a fluid by pipeline, by truck and finally again by pipeline. The distance the fluid is transported in pipelines depends on where the truck can pick up the fluid. Hence it makes sense to define a subset for a scenario group in which the distance of both pipeline transports can be altered at once, depending on the distance the truck is being used. The following figures are supporting this example.

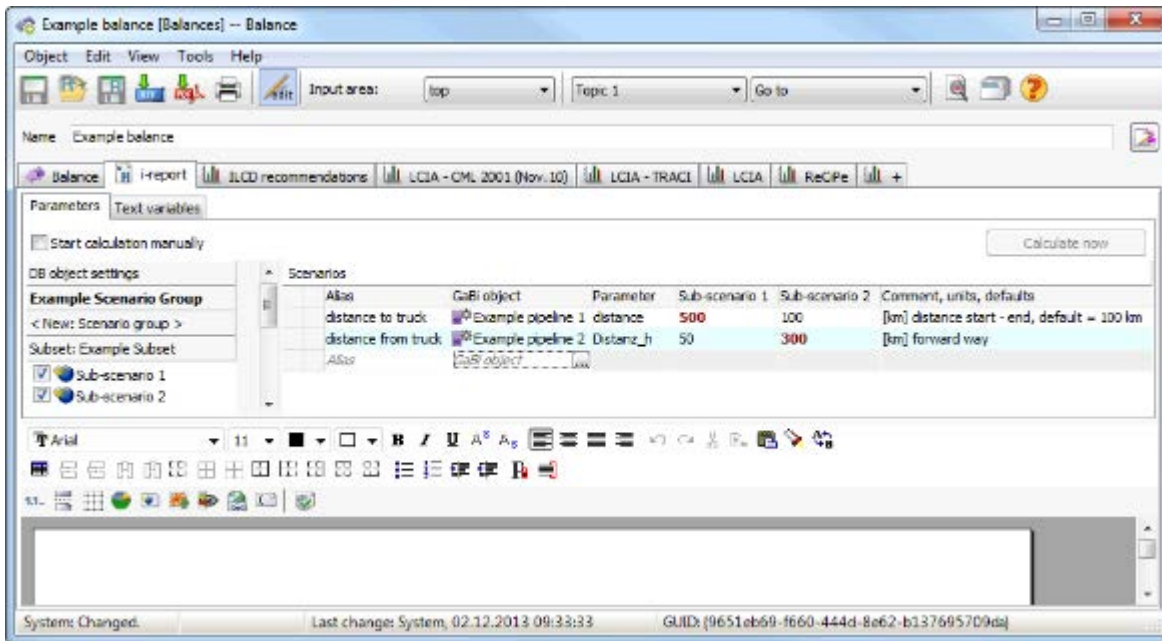


Figure: Subset parameters

The subsets can now be integrated in the scenarios. Open a scenario group. Now, click on  in the cell that shows "GaBi object" in italics and select the subset.

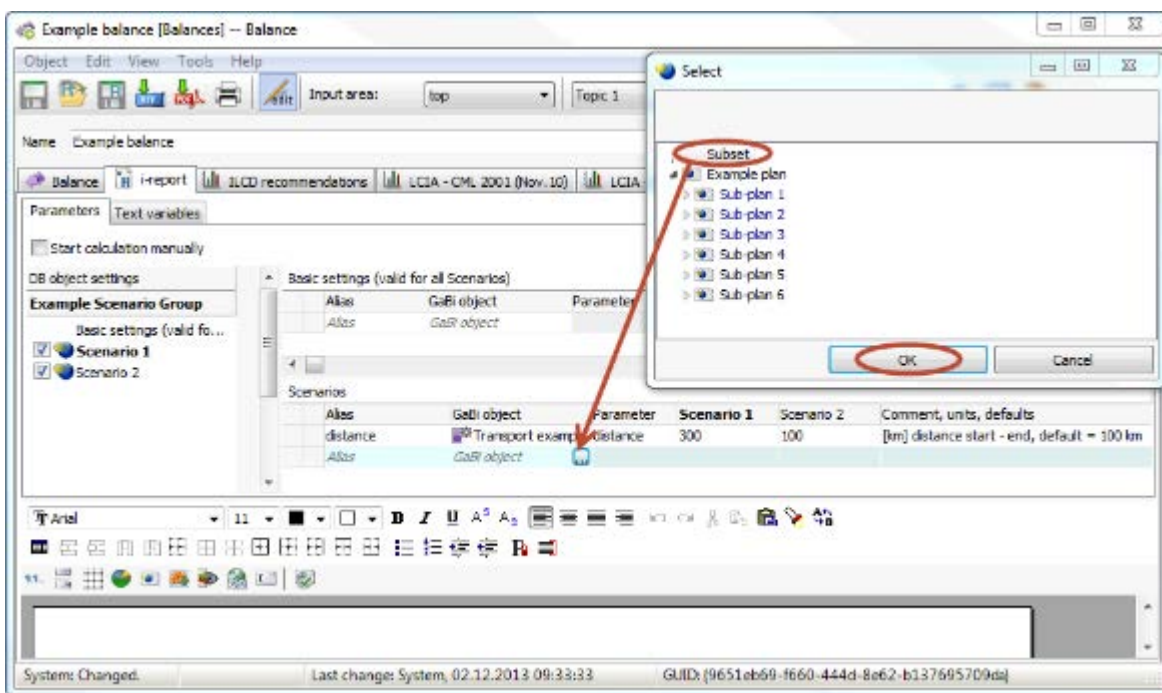


Figure: Adding subsets to a scenario

In the Parameter cell, you can now select from the drop-down menu which subset you want to include. Now it is possible to select any of the sub-scenarios in the respective subset in drop-down menus for each of your scenarios. In the runtime mode it is not possible to change the subset parameter values, it is only possible to select a sub-scenario from a subset in the parameter area.

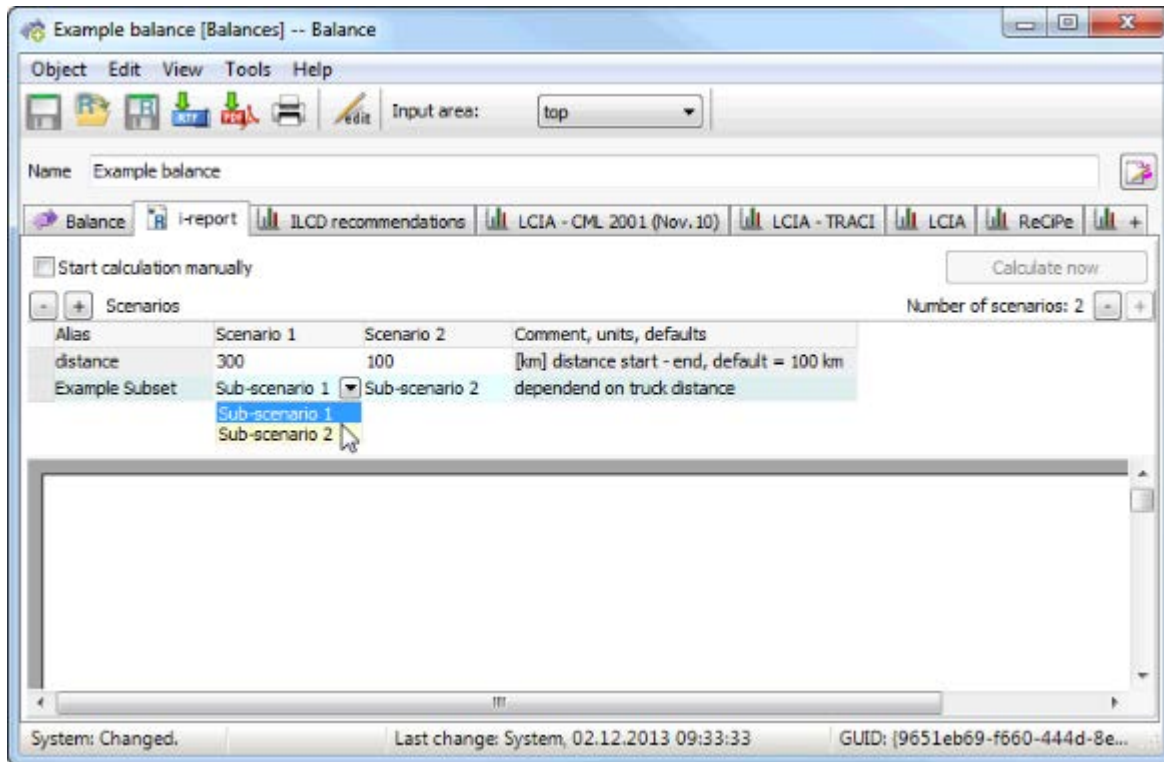


Figure: Selecting a sub-scenario in runtime mode

7.4.3.3 Editor area

The editor area of a GaBi i-report is similar to other word processing programs. Text can be entered in different styles and formats. A variety of report elements such as tables, diagrams, images, etc. can be included in the report. These elements can be formatted via the properties windows. There is a Global Report Properties window for the entire report, and Property Windows specific to each report element. The following report elements are available:

-  Structure element
-  Page break
-  Table
-  Diagram
-  GaBi process plan
-  Image
-  Object tree
-  Hyperlink
-  Input fields

The properties window for a particular report element is opened by double-clicking on the report element or by clicking the  button while the report element is selected.

7.4.3.3.1 Header and footer

Headers and footers can be integrated into the GaBi i-report. The header section is activated by clicking the area at

the top of a page. A blue frame will appear in the location the the content of the header can be entered. Free text can be entered as well as predefined variables (via the "Paste" option in the right-mouse menu). The footer can be created in the same way. Each topic of the i-report may have its own header and footer.

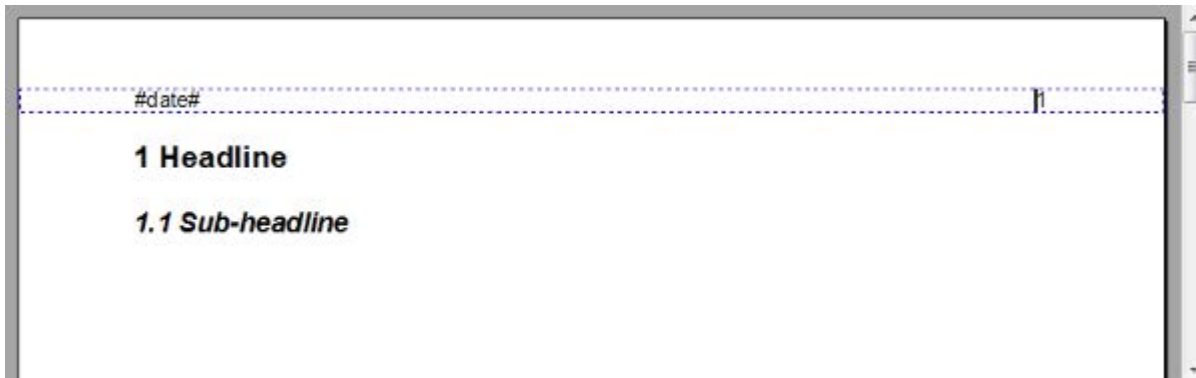


Figure: Example of a GaBi i-report with activated header section

7.4.3.3.2 Text editor tools

The text in a GaBi i-report is entered in a similar way to many other word processing programs. The style of the text can be modified with the toolbar shown below:



The font type, font size, superscript and subscript, font color and background color can be selected. The text can be formatted as a combination of bold, italic and underlined styles. The alignment of the text is also selected in this toolbar.

The toolbar shown below contains the typical controls for undo, redo, cut, copy, paste, search and replace:

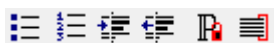


The next toolbar comprises controls to add tables to a GaBi i-report. The number of rows and columns can be selected, rows or columns can be inserted or deleted, and the style of the cell border can be modified:



Please note that these tables are **not** GaBi tables showing balance results. For this, the table report element () should be used.

The tools on the panel below are for formatting paragraphs. The first two buttons allow lists with different levels to be created while the second two define tab stops for paragraphs. The fifth button prevents editing certain paragraphs. The last button keeps the paragraph together and prevents it being split up by a page break.



7.4.3.3.3 GaBi Report properties

The global report properties window can be opened by right-clicking on the white background of a report (avoiding having any report elements selected) and using the menu or by clicking the  button.

The other global report properties are divided between 6 tabs:

- Page properties
- Fonts
- Topics
- Renamings
- Variables
- Context overviews

7.4.3.3.3.1 Page properties

The page properties tab enables you to modify the page settings. The appearance of the report can be optimized for printer or for screen. The size of the page can be selected from a list of typical formats such as Letter, A4, etc. The page size can also be defined manually by selecting a width and height in centimeters.

The margins of the page can also be defined on this tab. The orientation of the page can either be portrait or landscape.

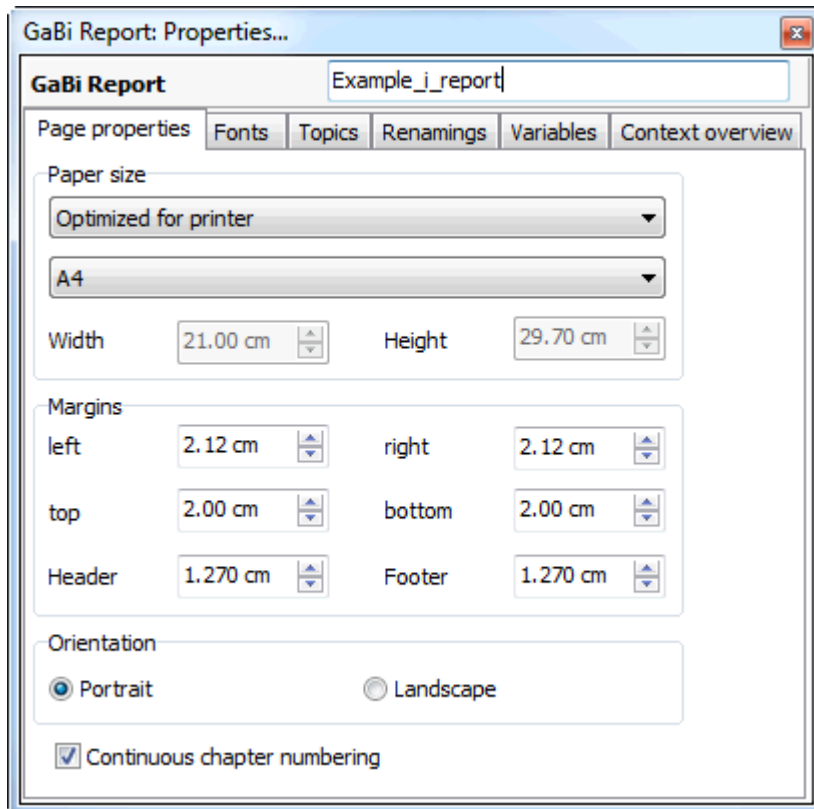


Figure: Page properties

7.4.3.3.3.2 Fonts

The style and size of the font for the different elements can be adjusted here.

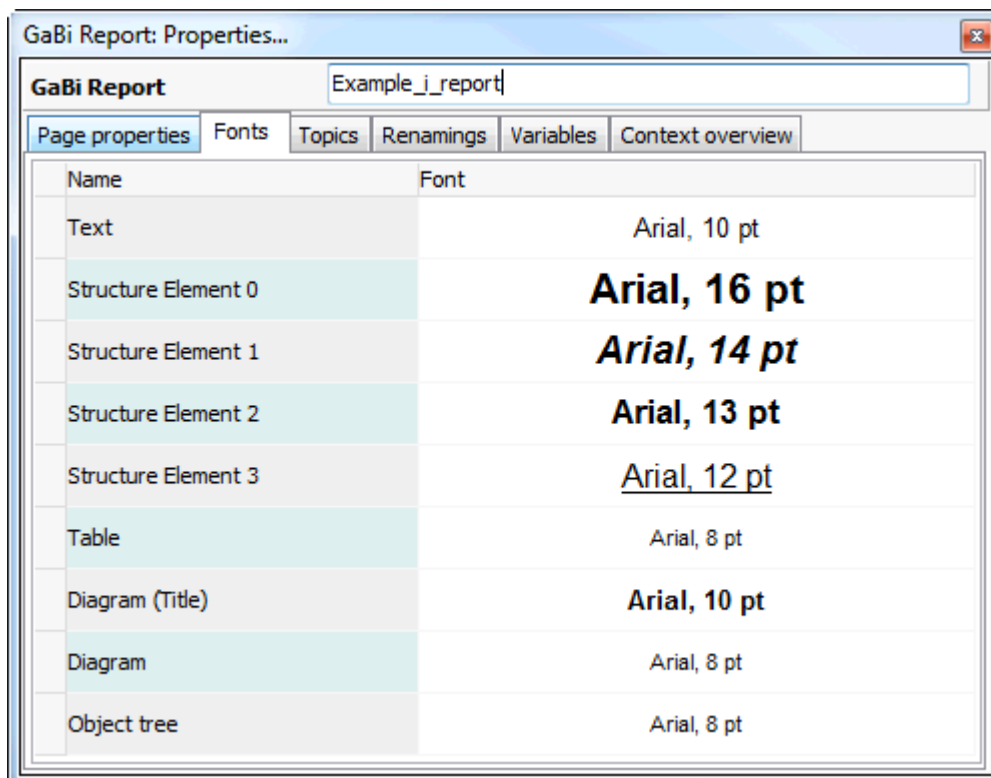


Figure: Properties window – fonts

7.4.3.3.3 Topics

You can define various topics within a GaBi i-report. These topics work to split up the report into its main chapters and can be selected via a drop-down menu in the report view. This function allows you to move to a particular topic quickly and avoid scrolling.

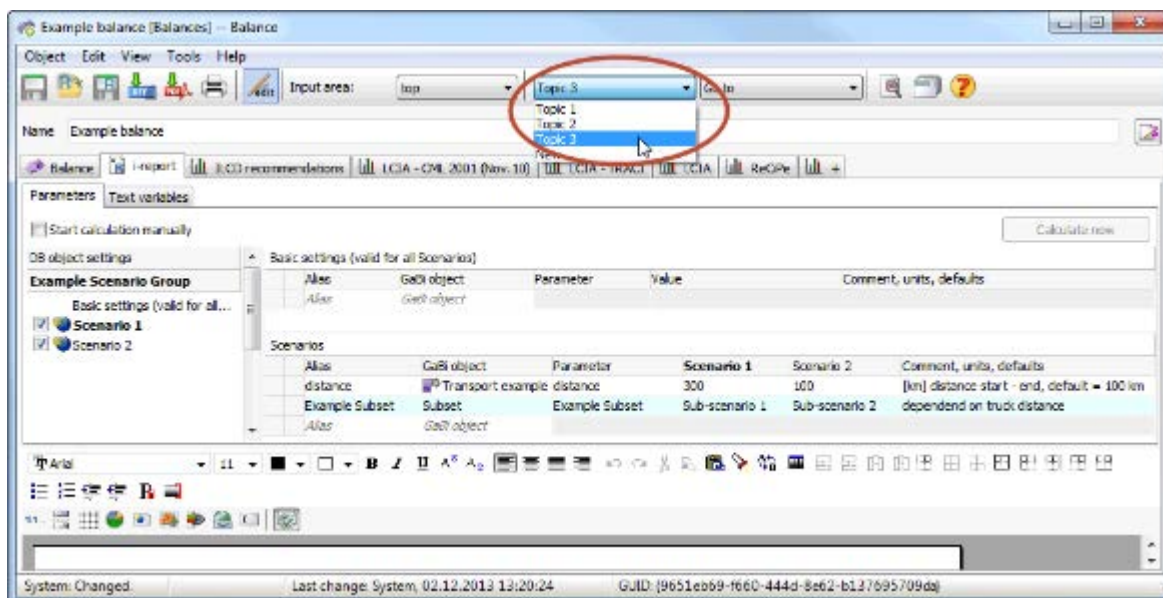


Figure: Topic Selection

In the "Topics" tab of the "Properties window" you can create new topics or rename them. To change their order or delete topics, use the right-mouse menu.

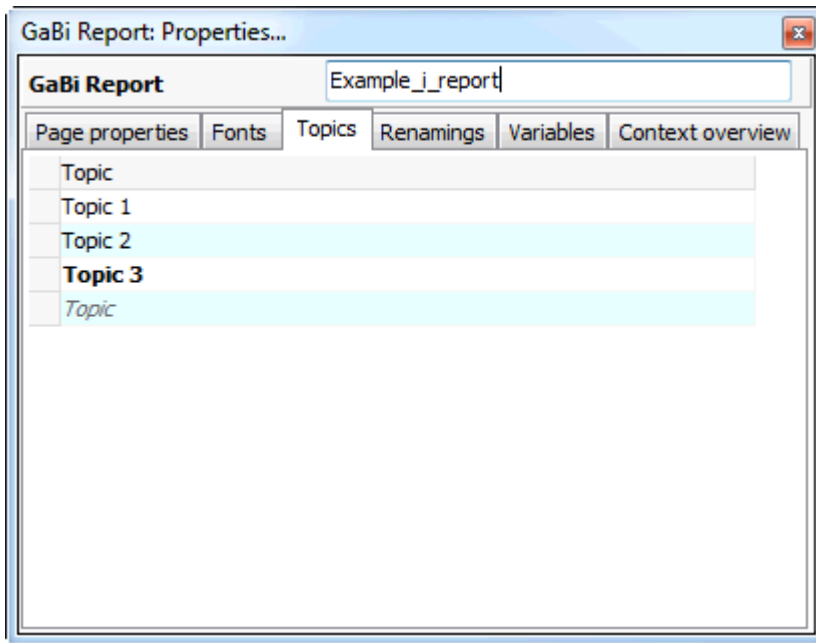


Figure: Properties window – topics

7.4.3.3.3.4 Renaming

Single objects of an underlying GaBi model can be renamed in the GaBi i-report. This function is particularly helpful where long object names should be abbreviated or similarly-named process instances must be differentiated between.

To do this, click on  in the lowest row in the "GaBi Object" column.

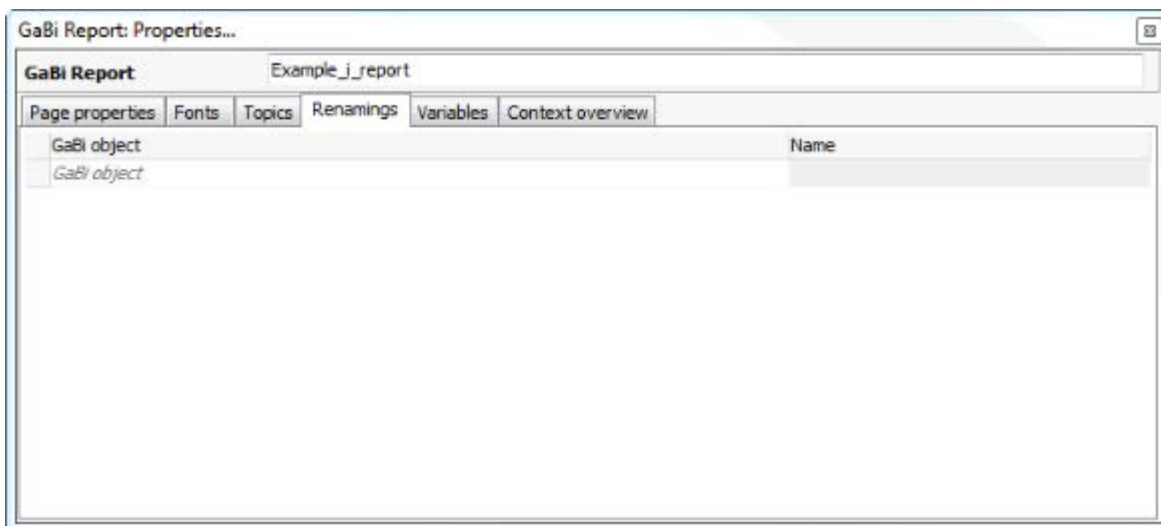


Figure: Selecting GaBi objects for renaming

After clicking on this button, a list of GaBi objects to choose from appears.

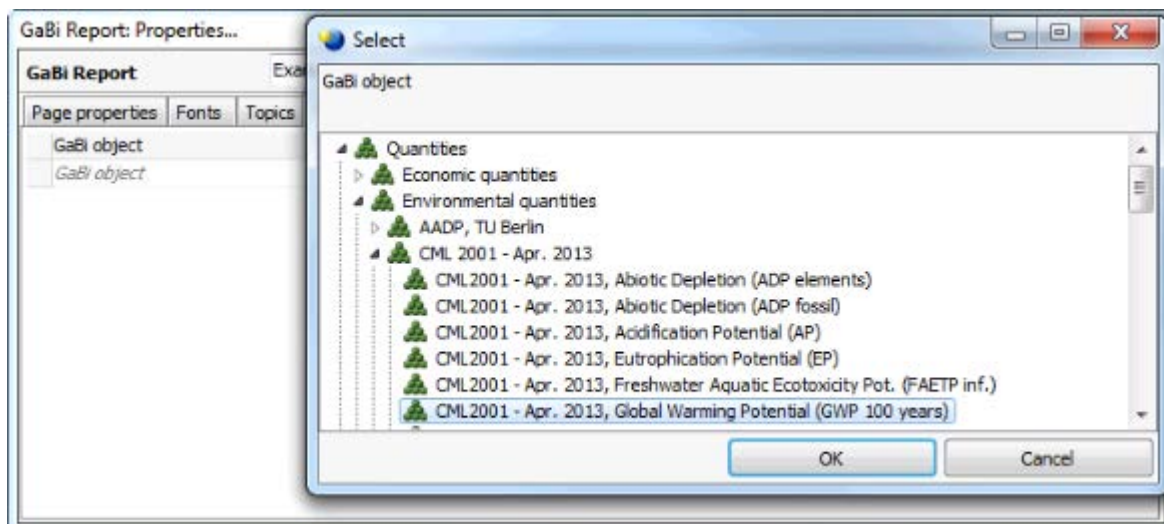


Figure: List of GaBi objects for renaming

Once selected, a new name can be entered in the "Name" column.

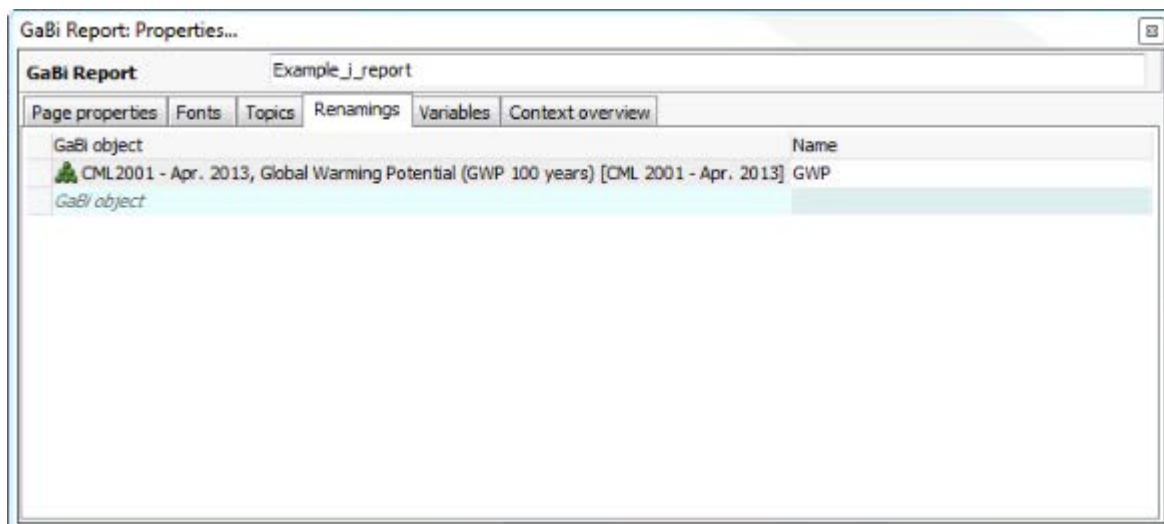


Figure: Properties window – renamings

7.4.3.3.5 Variables

Within the i-report, you can have single variables read in the text (i.e., this is a report on X lbs of coffee).

To define a report variable, enter a clear name and choose the type of variable (Parameter, balance or formula). Then, specify the context of the variable (Plan/Process, Flow/Parameter, Size/weighting, Unit/Normalization or Grouping).

Field	Content
Name	Enter a variable name. The name must not contain spaces or mathematical signs as + - * /
Type	Choose whether the variable should represent: • a parameter value • a balance value (input side, output side, input/output aggregated balance) • a formula value

Scenario/Formula	Scenario: When parameter or balance result values should be displayed the scenario can be specified for which the value is should be displayed. Formula: You can enter a number or a formula. Formulas can refer to other i-report variables in the list.
Plan/process	A plan or process has to be chosen as reference, when the variable type refers to a parameter and it may be chosen as a reference when the variable type refers to a balance result value.
Flow/Parameter	When the variable refers to a parameter value, a parameter has to be chosen; when the variable refers to a flow amount in the balance, a flow may be chosen.
Quantity/Weighting	When the variable refers to a balance result, a quantity may be chosen. If a weighting is chosen, then the sum of the weighted impact indicator results is displayed in the table cells.
Unit/Norm.	The unit of the selected flow/quantity or a normalization can be chosen.
Grouping	The balance result value can refer to a grouping.
Edit	Commands for editing the current object
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard to the active field.

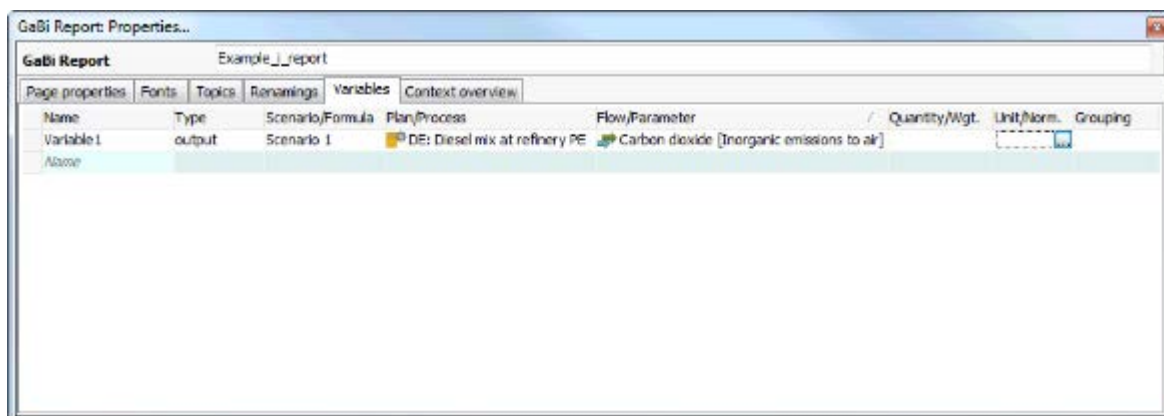


Figure: Properties window – variables

Note: The precision of the i-report variables displayed in the text can be modified in the general "GaBi options" in the menu Extras - Options of the DB manager.

7.4.3.3.3.6 Context overview

All context information of report variables, of single report elements and of the input frame can be accessed, reviewed and modified in the "Context overview" tab. This is particularly useful when a report template is loaded in a balance window. Here you can see which object references from the report template will be transferred to the currently balanced GaBi model and where difficulties could arise (dark red coloring).



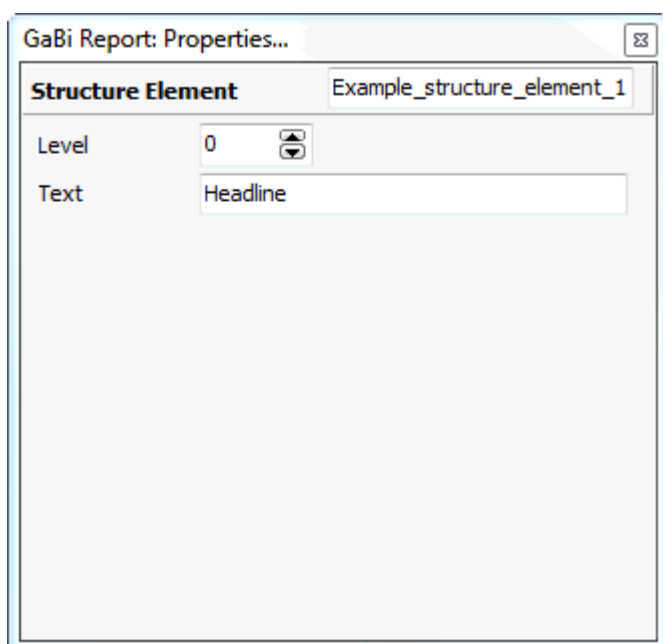
The image shows the 'GaBi Report: Properties...' dialog box with the 'Context overview' tab selected. It displays a table of report elements with columns for Element, Name, Dimension, Value, and Old value.

Element	Name	Dimension	Value	Old value
Table	Other_selected_Quantity/Wgt.		Acidification Potential (AP) [CML 2001 - Nov. 2010], Eutro _{ph}	
Table	Other_selected_Unit/Norm.			
Table	Other_selected_Grouping			
Table	Other_selected_Compared object			
Structure Eleme	Plan/Process			
Diagram	Primary_Energy, Plan/Process		Life cycle photocopier SuperCopy XR-2 (Copy)	
Diagram	Primary_Energy, Flow/Parameter			
Diagram	Primary_Energy, Quantity/Wgt.		Primary energy from renewable raw materials (net cal. val,	
Diagram	Primary_Energy, Unit/Norm.			
Diagram	Primary_Energy, Grouping			
Structure Eleme	Strukturelement Plan/Process			
Diagram	Normalized_Res Plan/Process		Life cycle photocopier SuperCopy XR-2 (Copy)	
Diagram	Normalized_Res Flow/Parameter			
Diagram	Normalized_Res Quantity/Wgt.		Acidification Potential (AP) [CML 2001 - Nov. 2010], Eutro _{ph}	
Diagram	Normalized_Res Unit/Norm.		CML 2001 - Nov. 2010, EU25+3 [Normalization]	CML2001, Europe [Normalization]
Diagram	Normalized_Res Grouping			
Variable	BaseScenCO2 Plan/Process		Life cycle photocopier SuperCopy XR-2 (Copy)	Tutorial Model
Variable	BaseScenCO2 Flow/Parameter		Carbon dioxide [Inorganic emissions to air]	Carbon dioxide [Inorganic emissions to air]
Variable	BaseScenCO2 Quantity/Wgt.			

Figure: Properties window – context overview

7.4.3.3.4 Structure element

The structure allows you to name the headings in the GaBi i-report. Structure elements will be automatically numbered and emphasized by means of their definition in the "Fonts" tab of the i-report property window. Level 0 stands for the highest level structure elements, e.g. 1.0. Level 1 stands for the next level, e.g. 1.1. This is continued according to the same logic.



The image shows the 'GaBi Report: Properties...' dialog box with the 'Structure Element' tab selected. It displays a form for defining a structure element.

Structure Element Example_structure_element_1

Level: 0

Text: Headline

Figure: Properties window – structure element

7.4.3.3.5 Pagebreak

The page break element moves the contents behind the cursor to the next page, no matter how much space there is left. It is especially useful for headings that should be located at the top of a new page.

7.4.3.3.6 Tables in the i-report

Tables in GaBi i-reports may contain any from a balance table. In general, tables are displayed empty in the edit mode. The table's content is shown when switching to the runtime mode.

The columns and rows of a table can be freely configured and may contain values from Plan/Process, Flows, Quantities/Weightings, Units/Normalizations or Groupings. It is also possible to select whether one special scenario should be shown or all scenarios at once. The appearance of the scenarios in the table (in columns or rows) is also selectable. The level in the hierarchy can be chosen for the columns and the rows. You can also choose to hide the levels that are higher in the hierarchy by ticking the check box "Just lowest level".

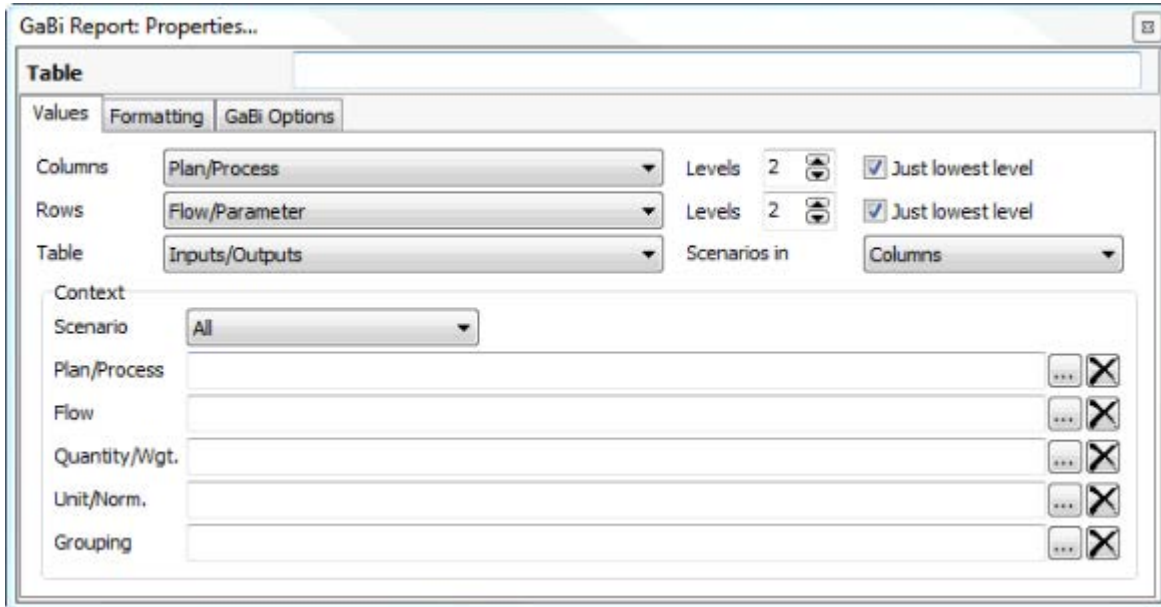


Figure: Properties window – tables, values

Field	Content
Columns	Selection, which values should be displayed in columns
Rows	Selection, which values should be displayed in rows
Levels	Level of detail (inclusion of subfolders/subplans)
Just lowest level	Only the lowest level of detail will be displayed (no subfolders/subplans)
Plan/process	One or more plans or processes can be selected as reference of the table.
Flow	Selection of the flow(s) to be referred to in the table cells.
Quantity/Weighting	Selection of quantities instead of flows to be referred to in the table cells. Should a weighting be chosen, the sum of the weighted impact indicator results is displayed in the table cells.
Unit/Norm.	The unit of the flow/quantity can be specified. A normalization can also be applied.

The formatting tab of the i-report tables allows a flexible adoption of the number format and the font format in tables.

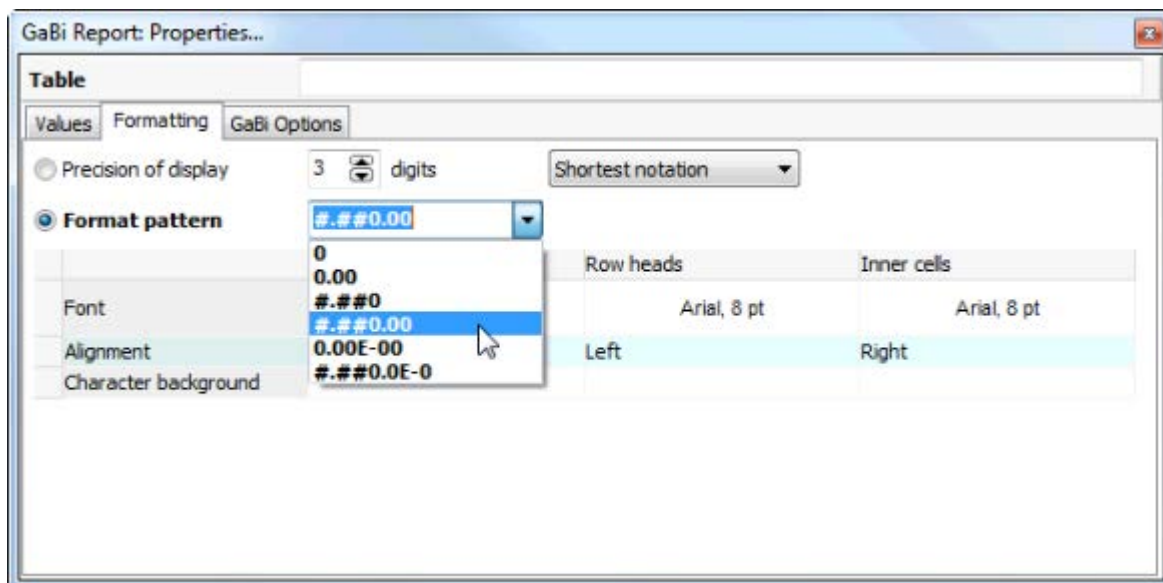


Figure: Properties window – tables, formatting

Tables in the GaBi i-report can be formatted. The font, alignment and background colour of column heads, row heads and inner cells can be selected. The numerical format of the displayed values is another option.

The numerical format of the table values is displayed in an exemplary table:

Formatting	Example [1.2]	Example: [1234.123]
Precision of display		
2 digits, Shortest notation	1.2	1.2 E003
2 digits, Fixpoint notation	1.20	12334.12
2 digits, Scientific notation	1.2 E000	1.2 E003
Format pattern		
0	1	1234
0.00	1.20	1234.12
0.0#	1.2	1234.12
#,##0	1	1,234
0,00 E00	1.20 E00	1.23 E03

There are various options associated with tables in the "GaBi Options" tab. There are three presentation modes: "No extras", "Coloured comparison" and "Weak point analysis". The "No extras" and "**Weak point analysis**" (Section 7.4.2.11) modes are similar to the classic GaBi balance view and can be configured in the same way.

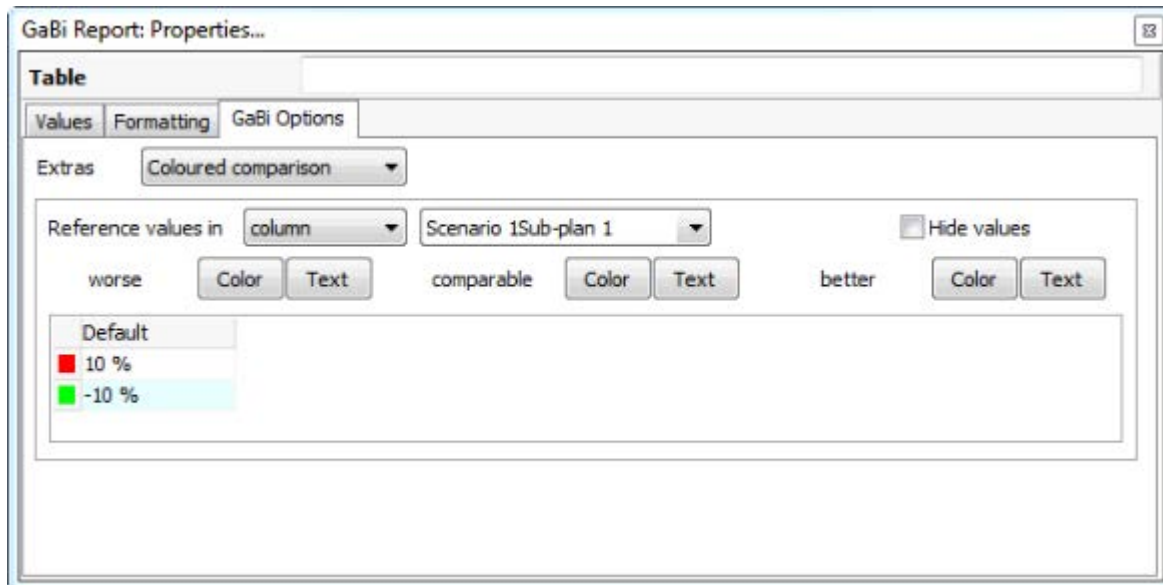


Figure: Properties window – tables, GaBi options

The "Colored comparison" mode enables you to set a certain column or row as a reference. When using a reference, two threshold values can be set in the table (using the right mouse button) which determine at what points a value should be given an indicator colour for worse or better. The values entered must be integral percentages.

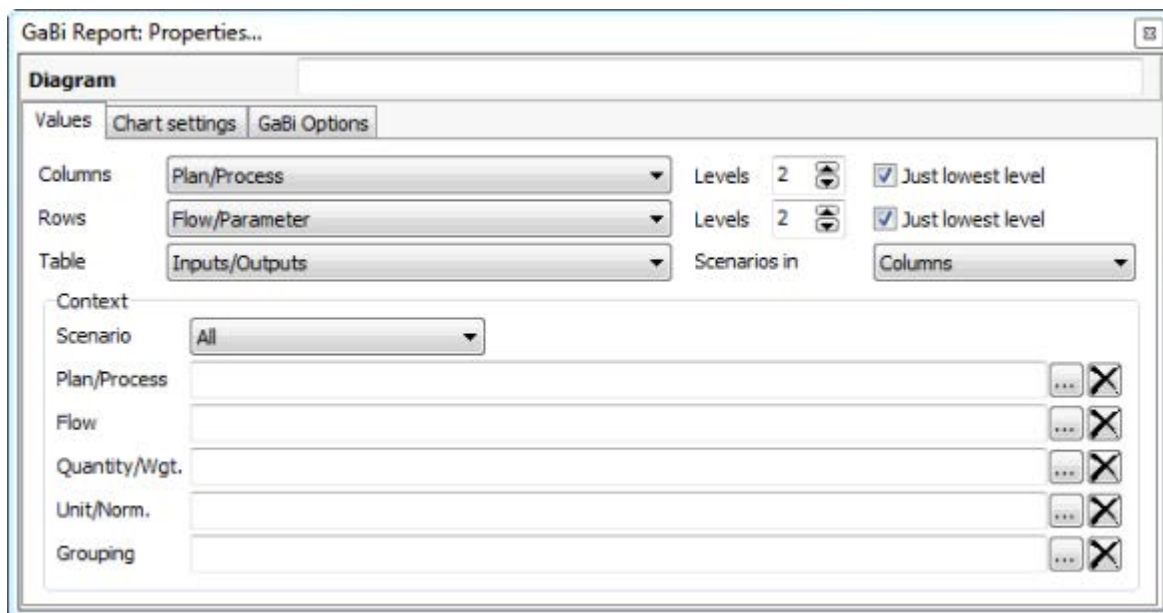
You may also convert predefined charts in the report into a chart by right-clicking the mouse and selecting "Convert to table".

7.4.3.3.7 Charts

All values shown in report tables can also be displayed in charts.

Note: In the edit mode, the charts are filled with random sample values so the visual appearance of the chart can be modified easily. The real values are only calculated and shown in the runtime mode.

The columns and rows of a chart can be freely configured and may contain values from Plan/Process, Flows, Quantities/Weightings, Units/Normalizations or Groupings. It is also possible to select whether one special scenario should be shown or all scenarios at once. The appearance of the scenarios in the charts (in columns or rows) is also selectable. The level in the hierarchy can be chosen for the columns and the rows. You can also choose to hide the levels that are higher in the hierarchy by ticking the check box "Just lowest level".



Figures: Properties window - charts, values

The appearance of the chart can be altered by clicking on the "Chart settings" tab, of the window.

The drop down list "Style" changes the chart type (i.e. bar, line, pie, etc). The drop down list "Arrangement" changes how the bars, lines etc appear relative to each other. If not applicable to the selected style or underground model, certain options here may not effect the chart appearance. The drop down list "Themes" provides a number of pre-defined themes. The drop down list "x-Axis labels" gives options as to how the x-axis labels are displayed.

The tick boxes to the right of these drop down lists allow the user to select:

If the chart is 2D or 3D ("3D")

If the chart is one colour or has a colour gradient ("Gradient")

If the grid lines are turned on or off ("Grid")

If the points of the chart have labels showing the quantity of the bar, line, etc ("Marker")

If the chart is arranged from highest result to lowest, or in the default order ("Pareto")

The button "Other options" opens an extended editor with additional chart options.

User specific charts can be saved as template (TEE file) using the button "Save as chart template".

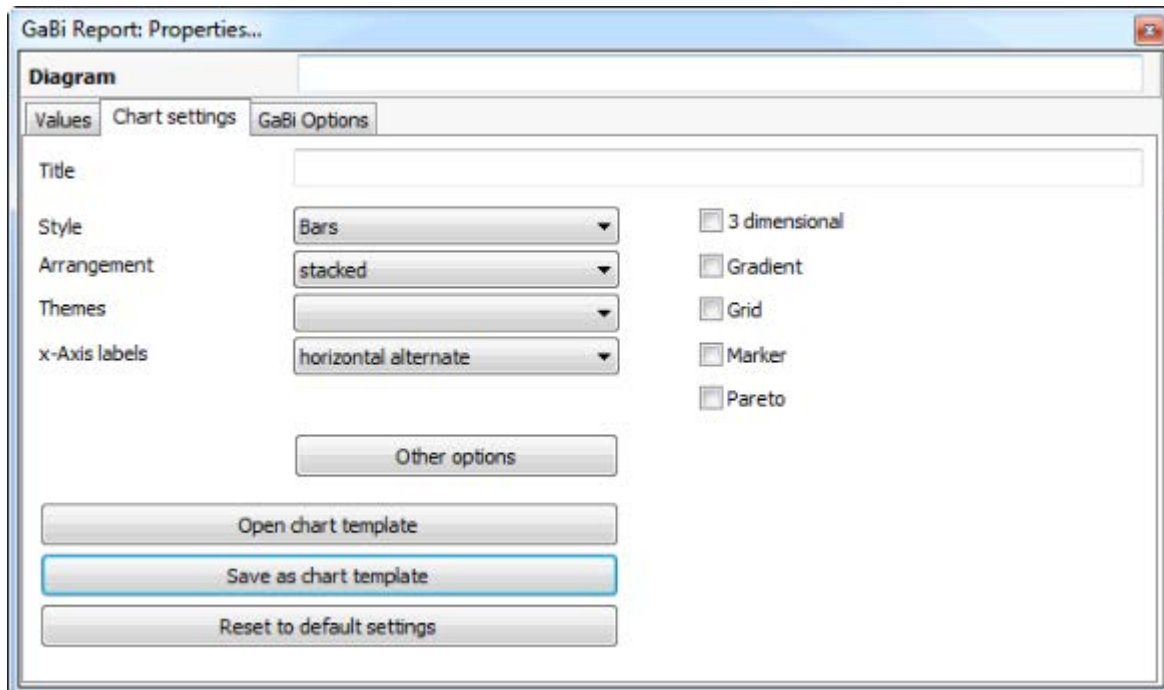


Figure: Properties window – charts, chart settings

You may also convert predefined tables in the report into a chart by right-clicking the mouse and selecting "Convert to chart".

7.4.3.3.8 GaBi Process Plans

The graphical display of GaBi process plans can also be used in GaBi i-reports. To achieve this, a special plan must first be selected from the model's hierarchy. The scenario that should be used can be selected in the drop-down menu. Finally, the flow quantity to be displayed can be selected (as a Sankey diagram), and the display options can be adjusted.

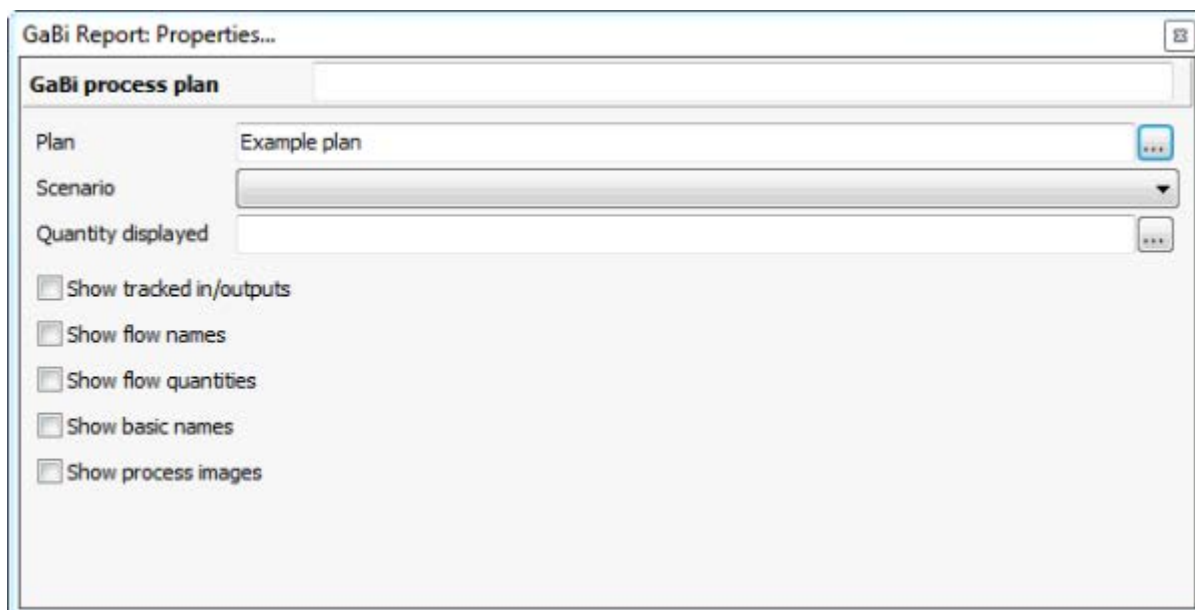


Figure: Properties window – process plan

7.4.3.3.9 Images

The image report element enables image files to be integrated into GaBi i-reports. The following file formats are supported: BMP, JPG, PNG, EMF, WMF and TIF.

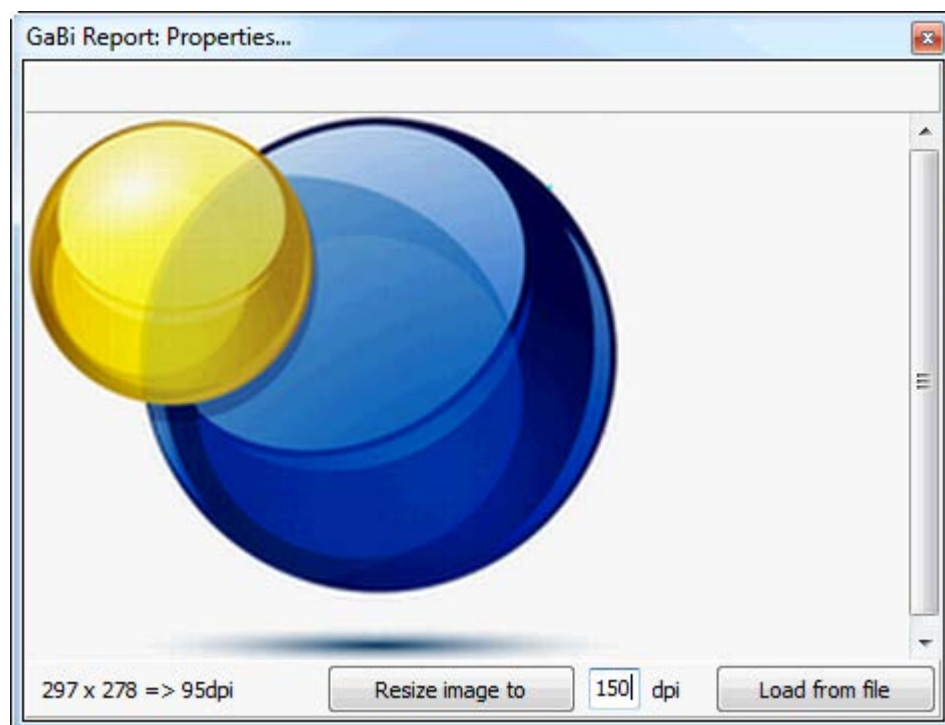


Figure: The properties window – images

With the button "Resize image to" the selected image can be resized to the any resolution between 50 and 300 dpi (dots per inch). For printing purposes 150 - 300 dpi are sufficient. On the screen, 96 dpi is the optimal resolution.

7.4.3.3.10 Object trees

You can display object trees in your i-report. This is achieved using the Object tree report element. The tree root and the number of levels to be shown can be selected.

When displaying the plan/process dimension the model's structure will be shown. When displaying the dimensions flow or quantity, the same structure that can be found in the object hierarchy of the GaBi DB manager will be displayed.

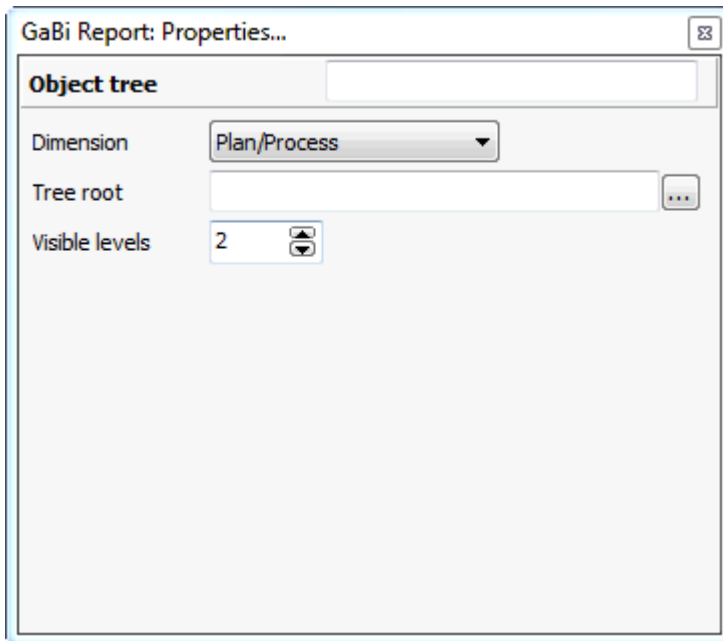


Figure: Properties window – object tree

7.4.3.3.11 Hyperlinks

You can also add Hyperlinks to your i-report. There are different ways to add a hyperlink.

Firstly, the hyperlink button in the toolbar can be clicked. Then the properties window of the new hyperlink shows up and a text and URL for the link can be added.

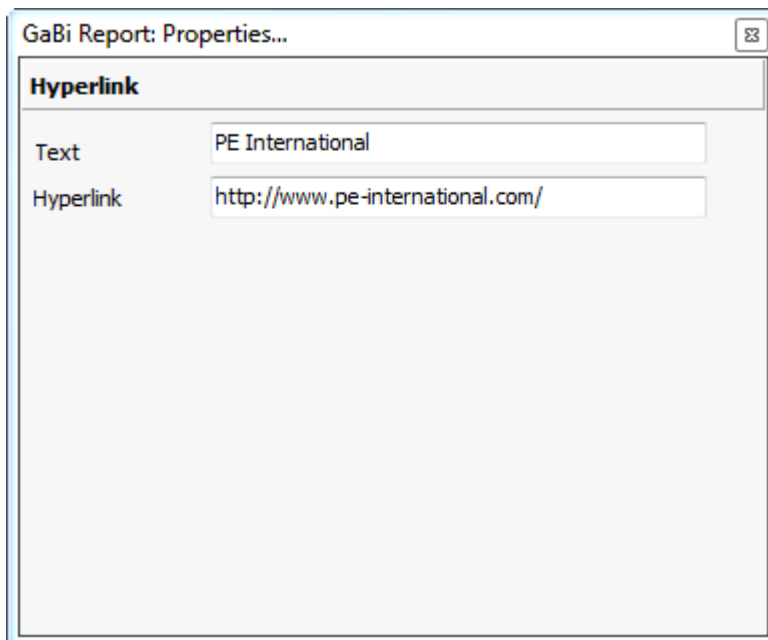


Figure: The properties window – Hyperlinks

Secondly, hyperlinks are also automatically detected: Whenever “http://www” is entered in the text, a hyperlink is created.

In both cases, the hyperlink must contain "http://", in the URL, otherwise they won't work in exported RTF or PDF documents. Hyperlinks are coloured blue and the standard browser will open when they are clicked in the read mode or double-click in edit mode. This means that hyperlinks are the only objects that do not open the properties window upon double-click.

7.4.3.3.12 Input fields

7.4.3.3.13 Text variables

Using text variables, parts of the i-report text can be defined to be editable for the user in the runtime mode. This feature is an alternative to the existing input fields (with blue brackets) in the i-report and offers several advantages:

- The same text variables may be used at multiple locations in the i-report
- All editable texts are arranged in one table, no need to search the whole report for editable parts
- Some of the technical restrictions associated with input fields can be avoided (text selection, scroll position).

To define new text variables go to the "Text variables" tab in the input area of the edit-mode of the i-report. New text variables can be defined by typing the name of the variable in the corresponding field. In the value column a default value for this variable can be added. The comment can be used for further explanations. In the runtime mode, the user will see the same table, but only the value column will be editable.

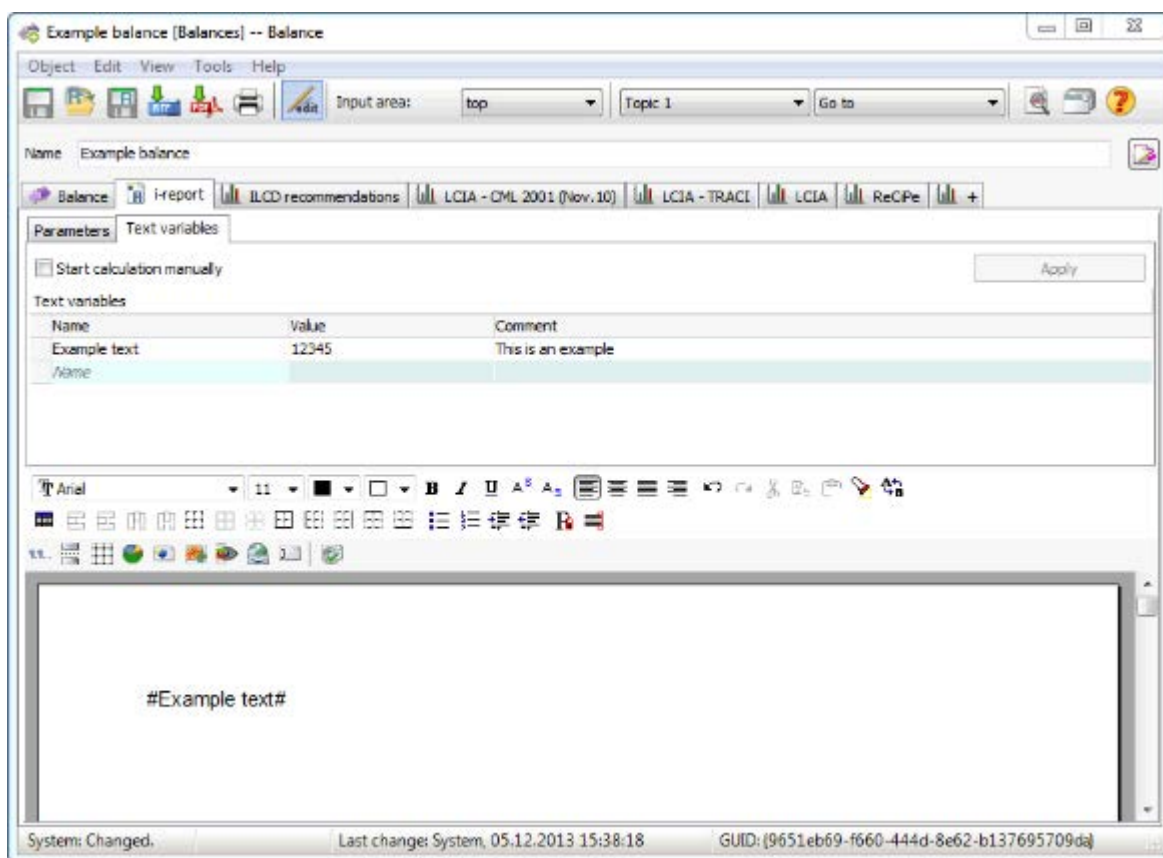


Figure: Text variables in the i-report

After a text variable has been defined, it can be added to the i-report by right-clicking the desired location in the i-report. In the right-mouse menu select "Paste" and then the variable you want to add. You can also type in the text variable's name in hashtags (#).

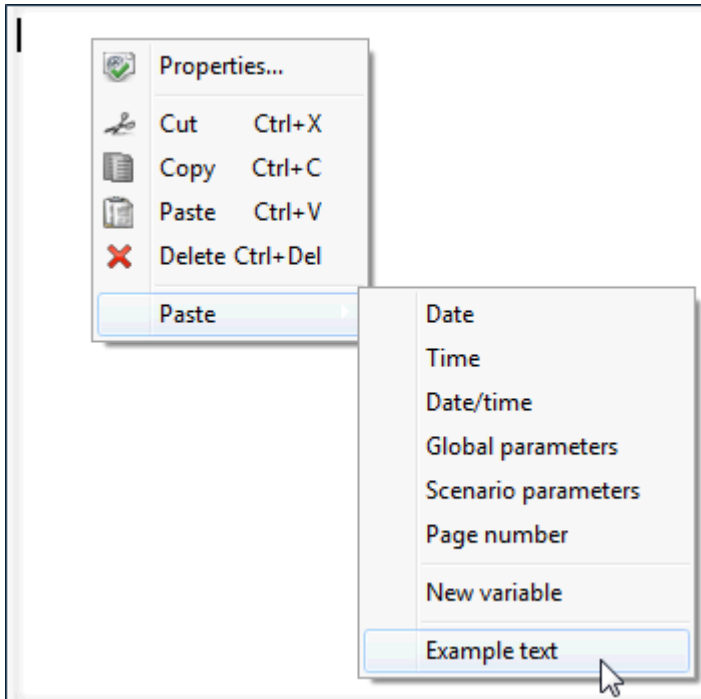


Figure: Right-mouse menu text variables

The text variables that are marked with # in the i-report text will be replaced with their value in the runtime mode of the i-report. A click on the "Apply" button or pressing return on your keyboard exchanges the values in the i-report.

7.4.3.4 Runtime mode

You can switch to the runtime mode by clicking on the edit button in the tool bar. This mode allows the user to see what the report will look like when it is finished. There is a limited ability to change elements of the report in this mode.

In the runtime mode, the left frame of the input area disappears.

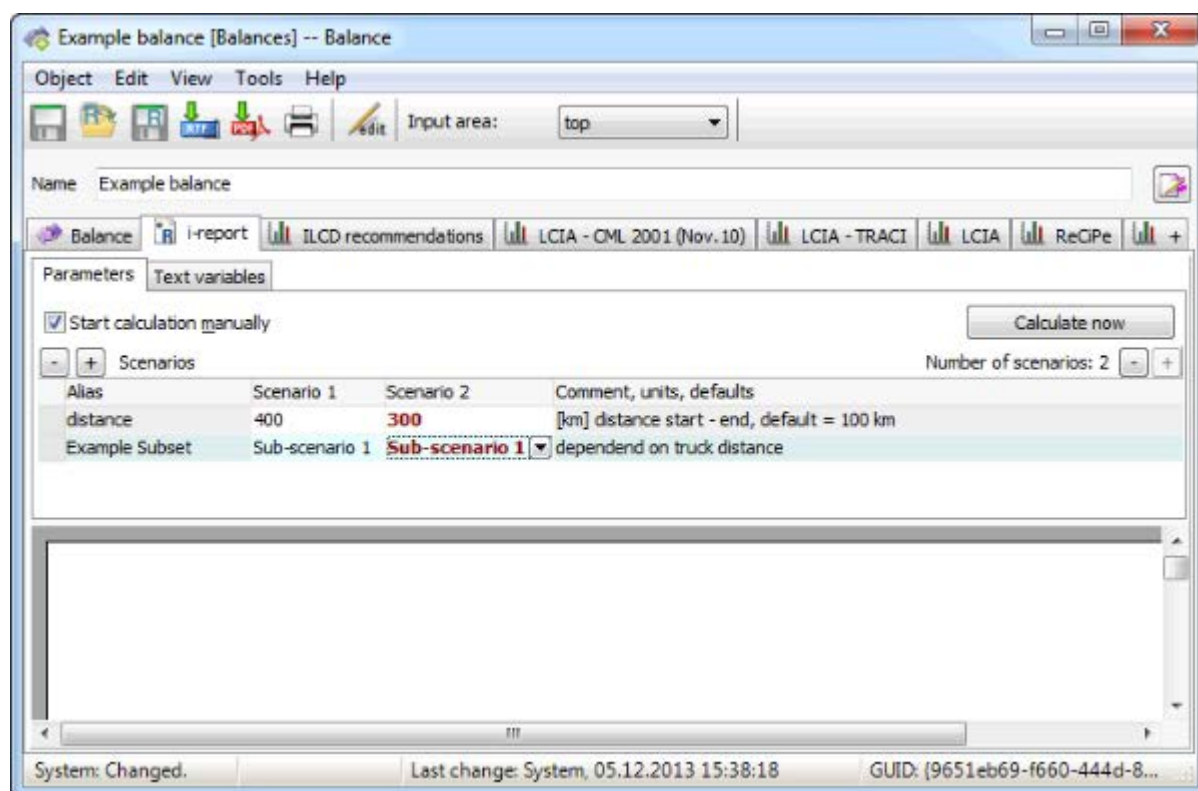


Figure: i-report in runtime mode

For groupings + and - symbols appear in the row borders with which the groupings can be expanded and collapsed.

If input parameter values are changed, they will appear in dark red, bold font because the values in the i-report are not yet calculated using these new parameter values. The button "Calculate now" has to be clicked to recalculate the whole i-report with the modified parameter values. If the "Start calculation manually" check-box is unchecked, the i-report will be recalculated immediately after a parameter value is changed.

For subsets, drop-down menus appear in the parameter value cells with the names of the sub-scenarios. Selecting an entry activates the values of the corresponding sub-scenario.

In the runtime mode, it is still possible to rename the scenarios via the right-mouse menu of the respective column.

7.4.3.5 Navigation

The GaBi i-report offers further functions for navigation.

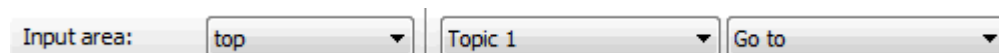


Figure: Navigation in GaBi i-report

You can choose where to have the parameter input area displayed (at the top, bottom, left or right) or choose to hide it.

Should your i-report have more than one topic, you can choose between these.

All structure elements of the current report topics are listed in the "Go-to" drop-down menu. Selecting a structure element will localize and display it in the i-report.

7.4.3.6 Report templates

A report will automatically be saved in when a GaBi balance is. If a report is to be used in another balance, it must be saved as a template in the original balance window (GBP, **GaBi Report file**)  button in the balance menu bar.

It be reloaded in the window of another balance using the  button. If special model components are explicitly referenced, it may be necessary to revise the context information of report elements when using the report template.

GaBi i-reports can also be exported as a RTF (Rich text format document, ) or as a PDF (Portable document format document, ). Of course i-reports can also be printed by clicking . Using these functions will only export/print the current topic. To export/print all topics at once, use the corresponding menu items in the 'Objects' menu.

7.5 Parameter Use in GaBi

7.5.1 General Information about Parameters

The use of parameters in GaBi allows users to change the amounts of variable flow quantities. They can be used to calculate flow quantities that depend on other flow quantities (regardless of the process scaling), on technical parameters (e.g. to calculate efficiency of a facility, load etc.) or on flow properties (e.g. to calculate the CO₂ emission of a power plant depending on the fuel quantity and carbon content of the fuel). Adjusting parameters recalculates the flow quantities, overriding the existing rigid input-output relationship of a process's flows.

Example: You can model a transport process according to transportation distance and payload using a formula which automatically calculates the required amount of fuel. In other words: changing the distance and payload parameters will adjust the amount of fuel required.

Parameter	Formula	Value	Minimum	Maximum	Standard deviation	Comment, units, defaults
distance		100			0 %	[km] distance start - end, default = 100 km
payload		5			0 %	[t] default = 5 t
ppm_sulfur		10	0	2000	0 %	[ppm] sulphur content in diesel, default Europe = 10 ppm
share_check	$share_{mw} + share_{ru} + share_{ur}$	1				Check - value must be 1
share_CO2_bio		0.05	0	1	0 %	[-] share of biogenic C in fuel
share_mw		0.7	0	1	0 %	[-] driving share motorway, default = 0,70
share_ru		0.23	0	1	0 %	[-] driving share rural, default = 0,23
share_ur		0.07	0	1	0 %	[-] driving share urban, default = 0,07
spec_benzene_m	$(0.00224551605060697 + (0.0023650373332024 - 0.002552E-007$					[gbenzene/(kg*km)] benzene emission motorway
spec_benzene_ru	$(0.00222209421917796 + (0.00221424196384168 - 0.002521E-007$					[gbenzene/(kg*km)] benzene emission rural

Figure: Parameters of a transport process

Parameters can be integrated when a unit process is created in the database. The major advantage of using parameters is that it enables you to use the same DB object in multiple locations in your model with different parameters for each use. If you copy a parameterized process onto a plan, the values saved as a default in the DB process are used. You have the ability to overwrite these values in each process/plan instance in your model without having to use another DB object or influencing other process/plan instances.

Apart from directly changing them in the model, parameters can be adjusted in the GaBi parameter explorer, and the GaBi analyst.

In the columns "Minimum" and "Maximum" of the parameter input fields it is possible to create upper and lower limits for the parameter variation in scenarios and analysis.

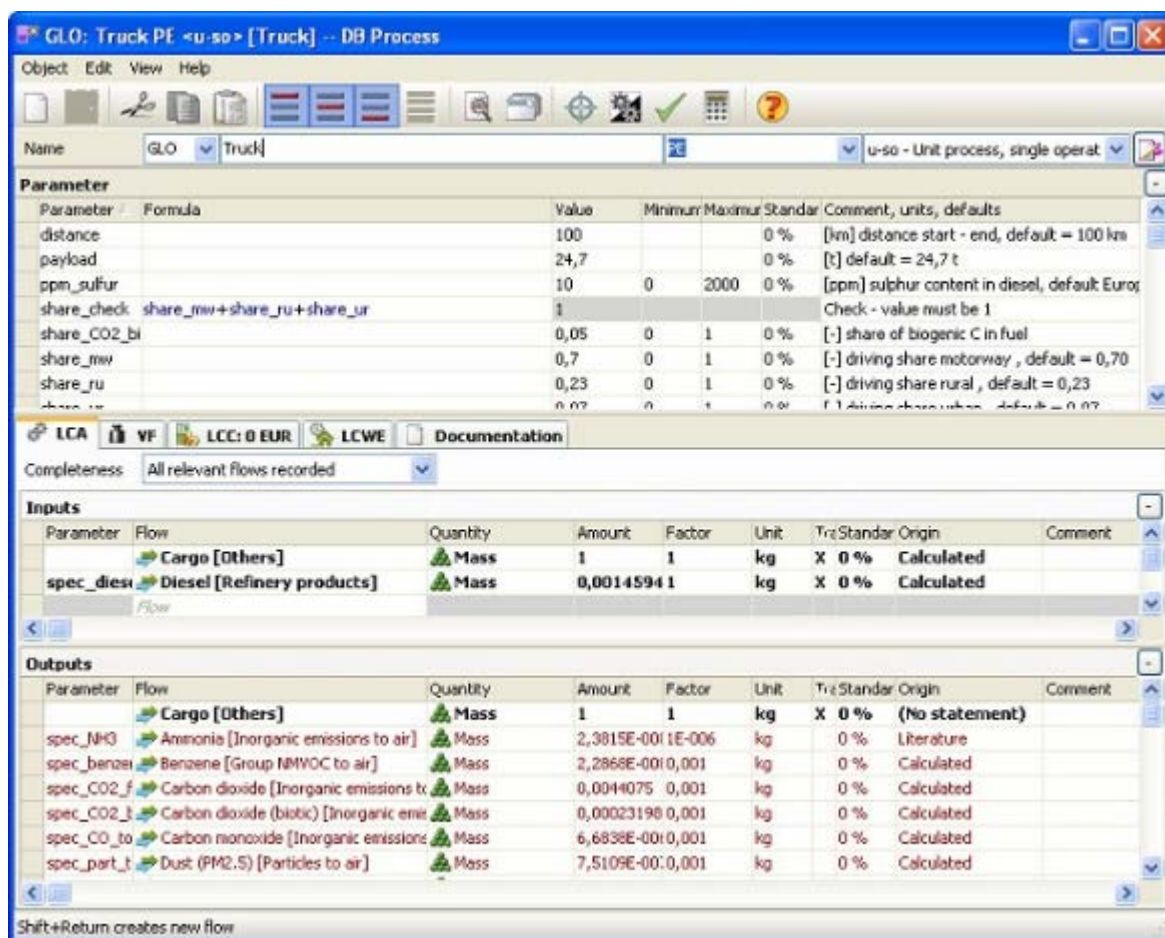


Figure: Instance of a parameterized transport process

7.5.2 Process Parameters

Parameters for processes can be defined in the process window (choose "Details" in the right-mouse menu of a process instance). They are defined in the "Parameter" area using mathematical formulas and comments. If the parameter section of the window is not fully displayed, you may need to click the  button on the right hand side to expand it.

In the Process instance window (accessed by double-clicking on a process instance), a distinction is made between free and fixed parameters. In this window, no new parameters can be defined.

You may create a parameter in the process window by clicking on the bottom field in the "Parameter" column with the "Parameter" written in italics. Now a name for the parameter can be entered. Parameter names may consist of a maximum of 15 characters and may not contain any mathematical symbols (+ - * / > < ...) or blank spaces.

In the "Formula" field, you can specify the values of a parameter by inputting values, mathematical functions and/or previously defined parameters. They can be linked by numbers and parameter references according to the basic calculation types (+, -, *, /, ^) or mathematical functions. If the formula contains an error or is not accepted by GaBi, an error message will be displayed.

You can see a list of the mathematical functions in the GaBi Manual under "**Mathematical Functions (Section 8.19)**".

In the right-mouse menu of the formula cell "Insert Parameter", "Local Parameter" displays a list which shows the local parameters which have already been defined for that process. Clicking on a parameter adds it to the formula. The parameters of processes or plans on a super-ordinate plan cannot be used here. Circular references will be blocked by an error message. In the same menu the item "Insert Function" displays a list with all mathematical functions that can be used. Insert the desired formula by clicking on it.

If a parameter value is specified by an entry in the "Formula" field, it is calculated and displayed in the "Value" field". It cannot be modified there and is displayed in gray. This is called a fixed parameter.

If nothing is entered in the "Formula" field, the parameter can be specified by an entry in the "Value" field and later modified in the process instance. It is therefore saved in white and is called a free parameter.

A standard deviation range can be entered in the "Standard deviation" column for each parameter. If the parameter varies within a certain interval, enter the standard deviation of the expected value in percentage. These standard deviations can be used in GaBi analyst calculations.

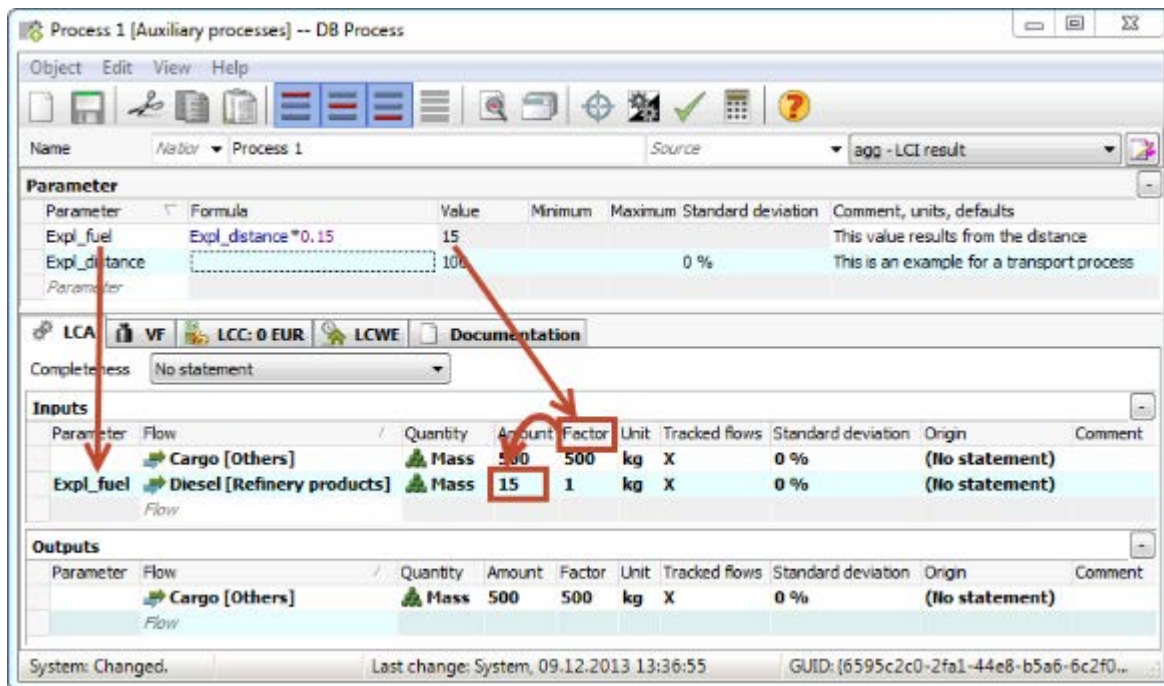


Figure: Assignment of parameters to flows

Since the parameter name is limited to 15 characters, it may be difficult to describe sufficiently. You should therefore use the comment field to explain the parameter and specify its unit. The parameter input procedure is completed by pressing the enter key.

If a process is parameterized two new columns, "Parameter" and "Factor" appear in the input and output section. Here you can attribute previously defined parameters to a flow by entering the parameter name in the column "Parameter". A drop-down menu showing the predefined local process parameters, appears when you click on the respective field.

The flow amount is then calculated by multiplying the parameter value by the adjacent value in the "Factor" column. Thus an additional constant can be used between the parameter and flow quantity by changing the factor. This makes it possible to configure the parameter efficiently, when using the same parameter for multiple inputs.

A parameterized process instance is automatically marked with a blue **p**.



Figure: Parameterized process instance

Previously defined free or fixed parameters can also be attributed to flows in the LCC tab and in the LCWT tab.

7.5.3 Plan Parameters

Plan parameters are parameters which can both be used on a plan and can also be used by all process and plan instances on this plan. They can be forwarded from each plan to the directly connected plans.

The plan parameter window can be opened by clicking on **(P)** in the plan window toolbar. Plans on which plan

parameters are defined are denoted using a blue **p** to the right of the plan name both in the DB object and the plan instance box.

The free parameter names are displayed in white and may be modified. Parameters that are from subordinate processes and subordinate plans are saved in gray and cannot be changed (fixed parameters). Only formulae, values, standard deviations and comments which are in the white fields can be modified. The parameters saved in grey can, however, be used in the formulae of fixed plan parameters. The plan parameter window only lists the plan parameters that belong to its plan and the plan directly below it. Process and plan parameters of lower levels are not visible but can be merged across the plan limits one at a time.

The plan parameter window of a plan shows all the parameters from the processes and plans that are on that plan. The definition of fixed and free plan parameters is analogous to the procedure for the process parameters.

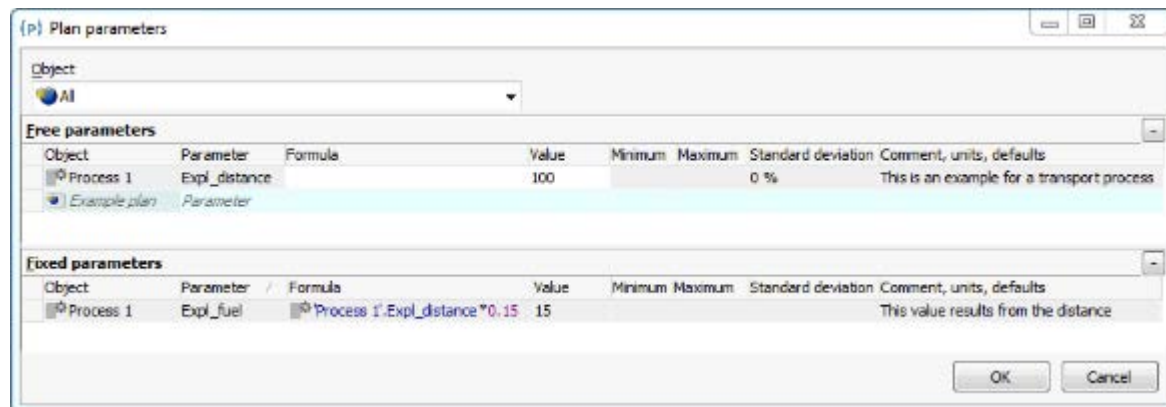


Figure: Plan parameter window

New plan parameters can be defined by entering the desired name in the cell saying "Parameter" in italics. This allows you to insert formulas, standard deviations and comments in the corresponding fields. If you want to activate a parameter from the fixed parameter formulae, enter in this format: 'Object Name'.Parameter Name. In the right-mouse menu a list of all formulas and locally available parameters can be viewed.

To link parameters together, enter the parameter from which the value should be determined into the formula cell of the recipient parameter. Plan parameters are especially designed to allow information from sub-plan hierarchies to be carried upward in your model. They can also be used to carry forward information from super-ordinate levels onto lower plan levels (e.g. the centralized modification of the production rate of a factory has the same effect on all processes.)

Please note that circular references cannot be modeled. They are blocked by the system, indicated by an error message.

Using plan parameters, parameters which are used locally can be applied throughout the plan or transferred from one plan to the next. The parameter need only be defined once; it can then be used in several processes and varied as necessary.

Naturally, the complexity of a model increases when an additional level is added to parameter definition. This complicates the transparency of a model and makes clean, clear parameter definition absolutely necessary.

Compared to global parameters, plan parameters have the advantage that they can only be referenced by a plan or process which is located directly underneath in the hierarchy structure. If a parameter should be used on points of a plan structure which are very distant from each other, this requires forwarding a parameter plan over levels which do not directly require it. If a plan in this process chain is removed, a new plan is added, or the plan structure is modified in a major way, the chain will be broken. In this way, errors can occur in processes which are only indirectly affected by the actual modification of the plan structure.

7.5.4 Global Parameters

Global parameters are parameters that are defined database-wide. In the respective object group in the GaBi DB manager several global parameters can be created simultaneously. In the model they can be modified through the parameter explorer.

A new global parameter can be created in the DB manager in the global parameter object group, by selecting "New" in the right mouse menu. A name and abbreviation can be entered. The abbreviation may not have any spaces,

mathematical characters and may not begin with a number. These rules are directly enforced by GaBi with the help of underscores.

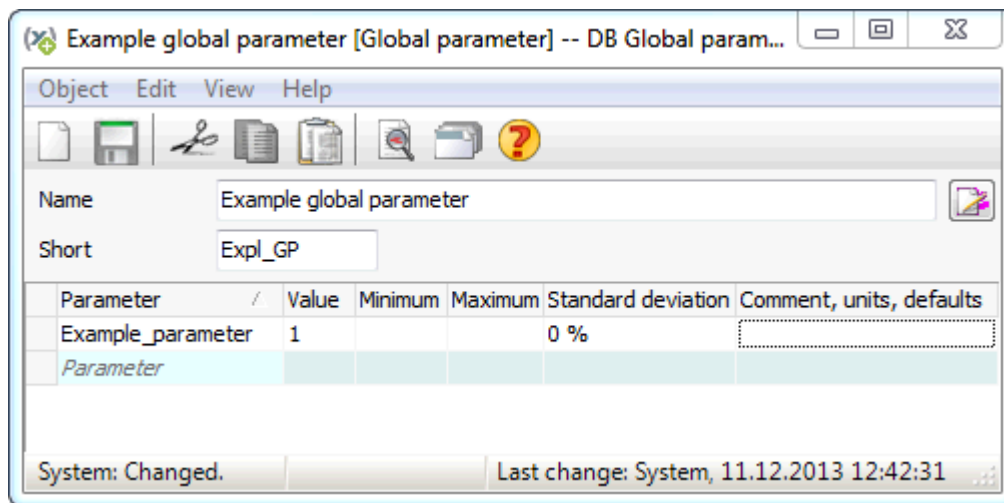


Figure: Global parameter window

Groups of global parameters are called up by their abbreviation. Any number of global parameters can be defined under each global parameter object. Once defined, they can be used in each parameter window in a process by clicking "Insert Parameter" in the right-mouse menu of the formula field.

The name of a global parameter is shown as "Abbreviation of object.Parameter Name". Global parameters are identified in formulas with the (preceding)  symbol.

Global parameters should be used if the same value needs to be used database-wide. Since global parameters are centrally managed in the DB manager no further looping is required as with plan parameters and there is no danger of a broken process chain with their application.

The database-wide definition of a global parameter restricts the variability of a process's application. It is this value which is applied globally in the model for processes which use global parameters. If a life cycle plan which includes sub-plans and sub-processes containing global parameters is copied to be used in another model, a new set of global parameters must be created. Assigning the similar names for the abbreviation of global parameter objects can simplify matters. However by doing so you run the risk of reducing clarity.

7.5.5 Parameter Explorer

Tracking the parameters used in a model and where and how the parameters are connected together can be complex when using plan parameters. To enhance the transparency of parameters and their application, they are identified with process and plan symbols as well as names and can be accessed through GaBi parameter explorer. The parameter explorer feature provides a clear overview of complex plan networks and allows parameter values at several points in the system to be modified efficiently from a single location.

The parameter explorer can be accessed by clicking  in the plan window or in the database manager for the highlighted plan. The parameter explorer window shows the "Parameter" tab after startup. The **use of scenarios (Section 8.18)** is described in detail in the technical reference manual.

The object tree on the left shows all sub-plans and processes, of the active plan system. It is not possible to switch between the parameter explorer and other GaBi windows; it is only possible to work in other windows when the parameter explorer window has been closed. The first folder shown in the plan structure contains the global parameters, which are managed centrally in their own directory. The plan structure is displayed underneath.

All plans and processes which are shown in blue font in the plan tree contain parameters.

- a red point • behind the plan/process names indicates a non-linked input or output
- a yellow point • indicates a broken flow
- a pink point • indicates a negative flow

In the right mouse menu of plans in the object tree you can show or hide all sub-plans. Here you can also save the

plan as a cradle-to-gate process, (based on its current parameterization and scaling). Additionally, the parameter explorer allows you to view the current instance.

Two different views are possible for the right hand side of the window depending on whether you are in the "Parameter" tab or in the "Plan" tab.

In the "Parameter" tab, the parameters of the object which is active in the tree are displayed. Fixed parameters are shown in grey and cannot be modified, free parameters are shown in white and can be modified. When saved, changes made in the parameter explorer are made in all affected plans and processes, and are permanent. Processes or plans that have been modified are shown in bold.

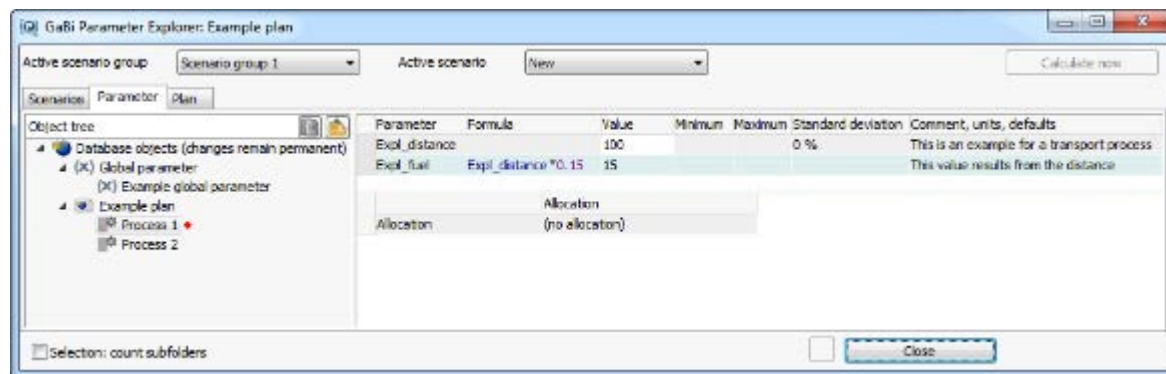


Figure: GaBi parameter explorer

The plan view shows the selected plan. If a process is selected in the object tree, the plan on which the process is located is displayed. You can view the plan instance via the right-mouse menu of the plan background.

The plan view toolbar offers further tools. The drop-down menu on the left allows to set the zoom. The display options can be adjusted with the "View" button (inputs/outputs visible, flow names, flow quantities and process images). The plan can be loaded onto the clip board using the "Copy all" button to import it into other programs as a screenshot. Finally, the "Save as process" button allows to save the plan as an aggregated process.

7.6 GaBi Analyst

There are many analyses you can conduct with your results when using parameters. Use GaBi Analyst to check the robustness of your results, conduct basic and advanced statistical analyses and evaluate different scenarios.

All parameter types (process, plan and global parameters) can be varied using the Analyst features and the resulting values can be transferred to a balance for analysis. Therefore, parameters must be used in the GaBi model for every variable you wish you analyze.

GaBi Analyst enables you to simulate changes to flow quantities and to make variations to environmental impact categories or normalization factors.

In addition, allocation methods used in a model can be varied if necessary. The GaBi Analyst consists of four analysis tools:

- **Scenario analysis (Section 7.6.1)**
- **Parameter variation (Section 7.6.2)**
- **Sensitivity analysis (Section 7.6.3)**
- **Monte Carlo analysis (Section 7.6.4)**

You can start the GaBi Analyst clicking  in the balance window menu bar. Please note that GaBi Analyst only supplies those columns of the balance for analysis that are shown in the current balance view. The Quantity you currently have displayed is irrelevant since you can switch between different quantities in the results window of the GaBi Analyst anyway.

7.6.1 Scenario Analysis

Part of "Scenario analysis" includes studying the impacts of different boundary conditions on the balance result.

Upon starting the GaBi Analyst, you will see an empty window.

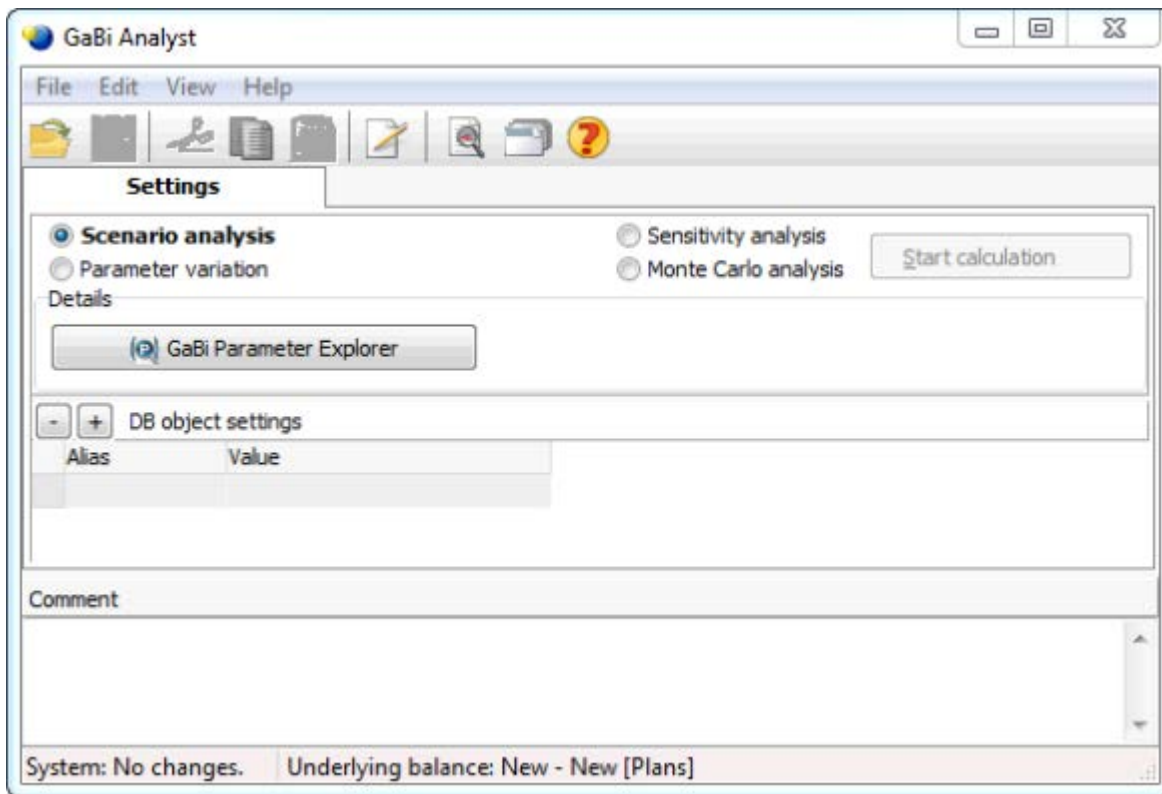


Figure: GaBi Analyst - scenario analysis

When you have completed defining the scenarios in the **GaBi Parameter Explorer (Section 8.18)**, start the scenario calculation using the **Start calculation** button.

The new tab "Results" allows to change which part of the balance the diagram is showing.

Select the option "Paste Quantities" in the right-mouse menu of the first free table field to the left to enter numerous quantities at once. You can transfer GaBi Analyst results to Microsoft EXCEL® using the copy function.

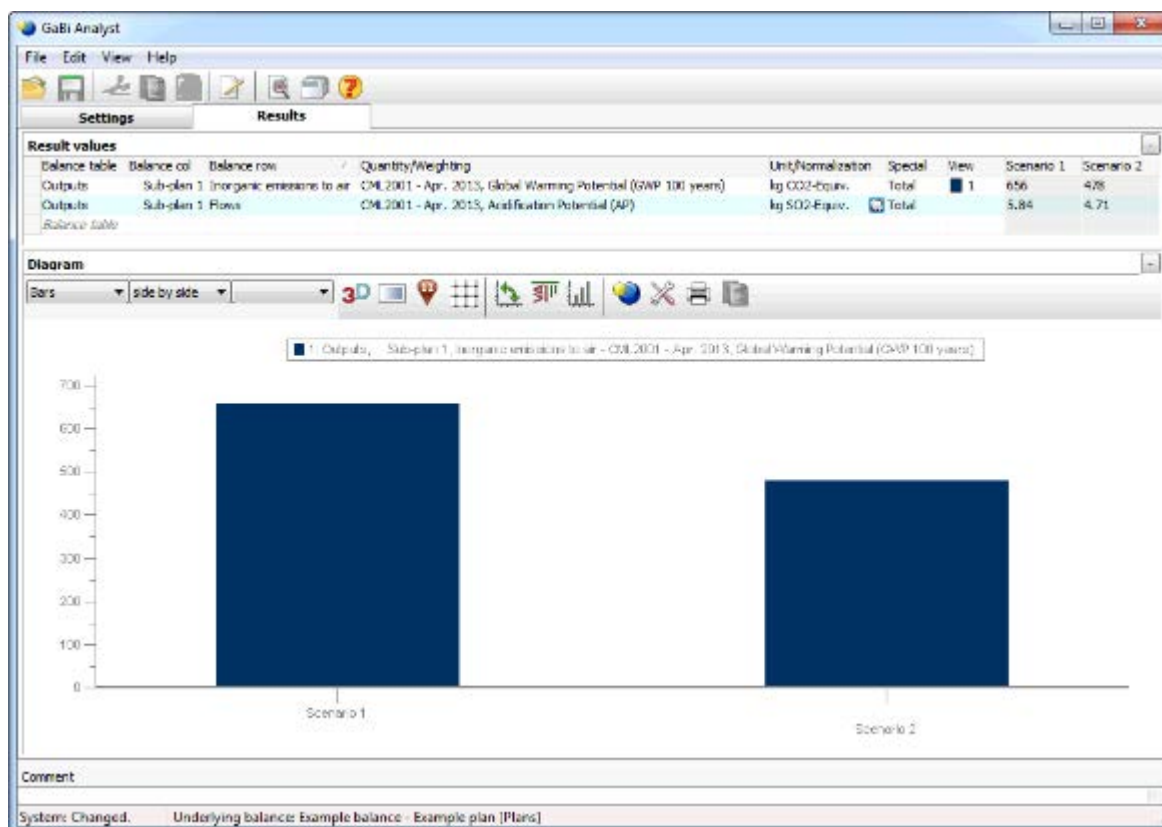


Figure: Results of the scenario analysis

Note: Scenarios can also be compared in the balance table without using the GaBi Analyst. The Analyst is needed if different characterisations of flows or different normalizations are analysed.

7.6.2 Parameter Variation

Unlike in scenario analyses, the parameter variation changes selected parameters, quantities, or evaluations gradually between a start and end point. Select the option "Parameter Variation" on the "Settings" tab of the GaBi Parameter Explorer. A field appears in which you can specify the number of intermediate steps.

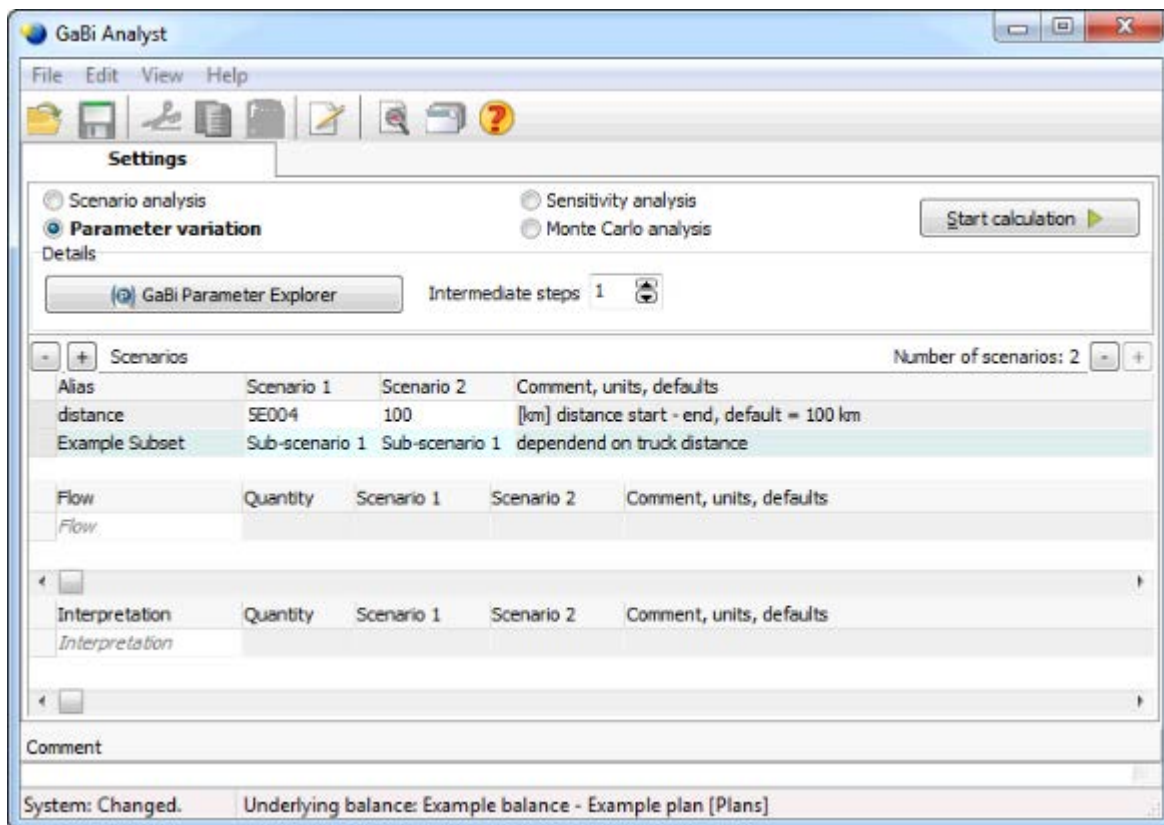
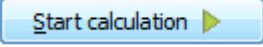


Figure: GaBi Analyst - parameter variation

After starting the calculations using the , a graph showing the progression of the results from one scenario to the next will appear.

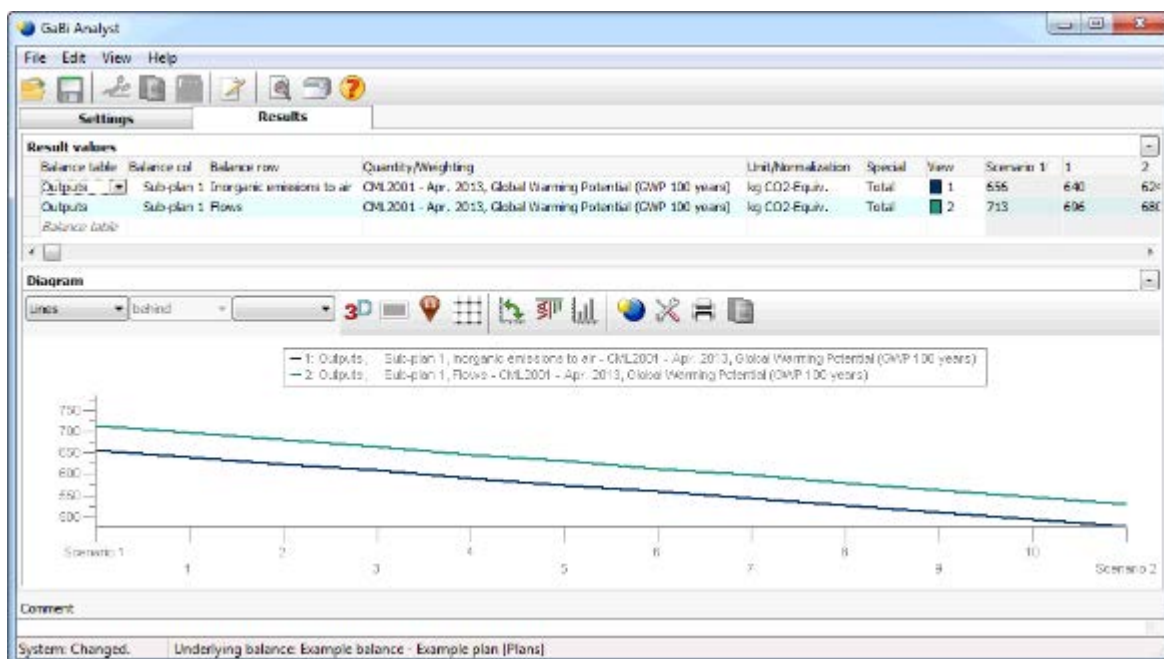


Figure: Results of the parameter variation

7.6.3 Sensitivity Analysis

The sensitivity analysis function provides information on how sensitive the balance is in relation to various

parameters, quantities or evaluations. It is possible that variations of individual parameters can have a minor effect on the balance results despite a pronounced variation range. Minor modifications to other parameters may cause major changes in the results.

After you have selected the "Sensitivity Analysis" option in the "Settings" tab, the input screen changes. Now you can define one basic scenario instead of several scenarios and indicate a deviation in percent of the parameter in both the negative and positive direction of the scenario. Changes in the positive and negative range need not be equal. You can use this function to approximate, for example, skewed distributions.

Note: If you have already indicated a standard deviation for a parameter when creating a parameterized process (or for a quantity or assessment), these values are then imported into the Analyst as a suggestion.

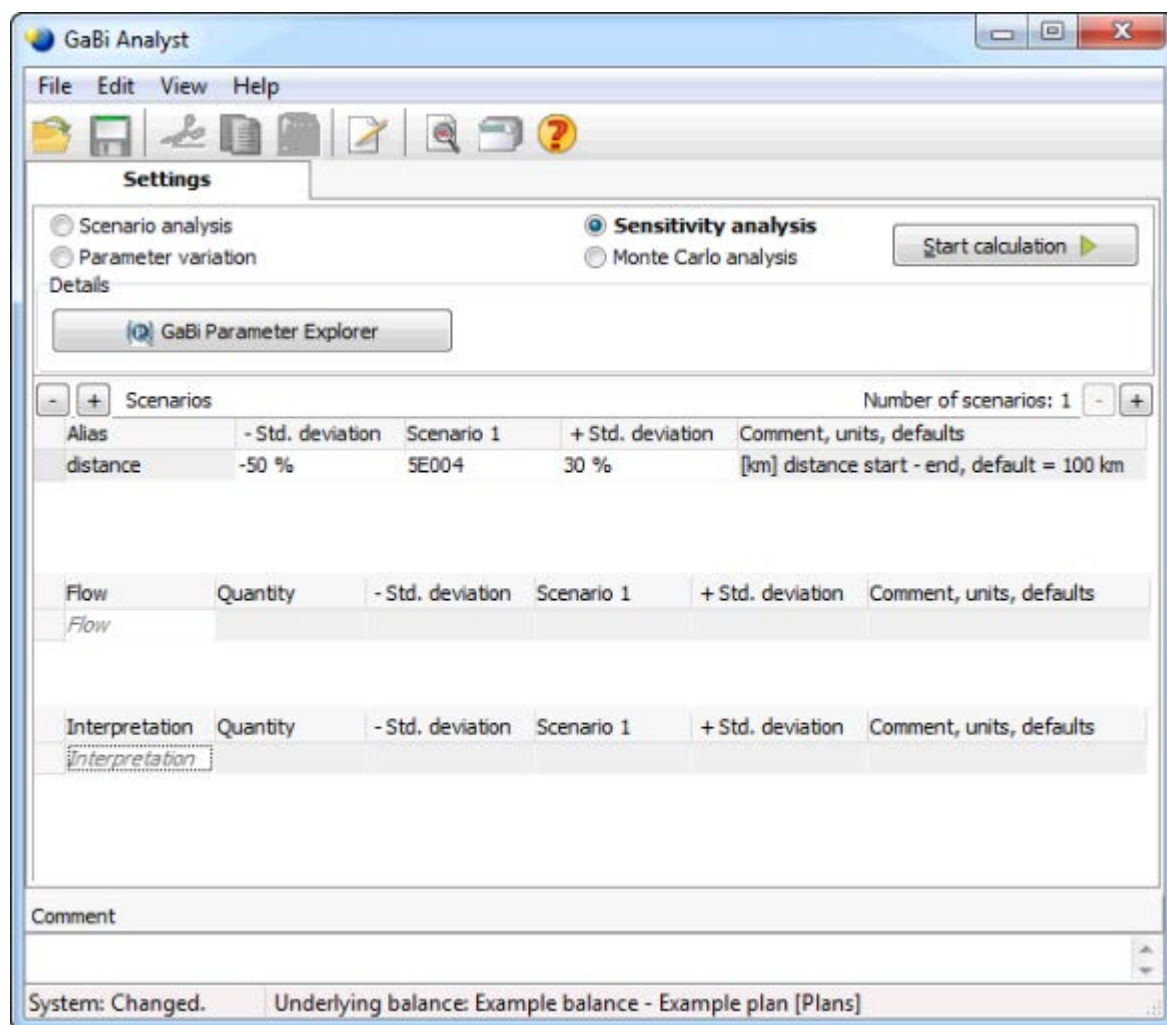
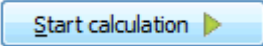


Figure: GaBi Analyst - sensitivity analysis

After starting the calculations using the , the results of the sensitivity analysis are shown in table form.

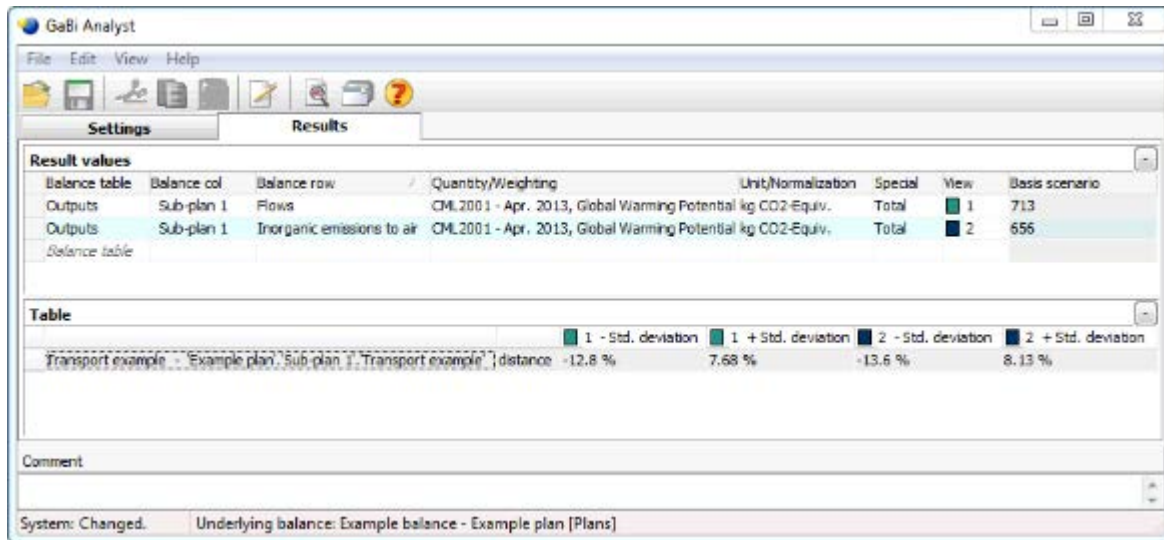


Figure: Results of the sensitivity analysis

7.6.4 Monte Carlo Analysis

Note: The following section will serve as an introduction to the use of the Monte Carlo tool in GaBi. The underlying purpose and functionality of the Monte Carlo Analysis is not described. Please familiarize yourself with the background and the purpose of a Monte Carlo analysis before using this function. When performing the analysis, please ensure that the parameters you have chosen are independent of each other; this is necessary for the sampling procedure.

Unlike previously described analyses, the Monte Carlo analysis does not perform an analytical evaluation, but rather a stochastic analysis of the data. It is assumed that the parameters, quantities or weightings are statistically distributed by an expected value. For the distribution type, you can choose between a Gaussian distribution and an equalized distribution. Since a positive and negative deviation need not be equal, like in the sensitivity analysis, asymmetric distributions can also be shown.

In the case of a uniform distribution, the values "-Std. Deviation" and "+Std. Deviation" are interpreted as boundary points of the distribution (always in % of the expected value).

In the case of a normal distribution, the basic scenario shows the anticipated value. The "-Std. Deviation" and "+Std. Deviation" values saved in the fields represent the 1st interval of the distribution.

The Monte Carlo analysis is now performed from the samples taken from the defined distributions, i.e. **in each simulation a value is selected at random from each distribution**. A **balance result** is calculated using the random values. Thus the number balances entered in "Simulation runs" are calculated. The clustering of the individual results is calculated from these balances. As more simulations are performed, a more stable distribution curve will result. This is because high and low anomalies are seen stochastically in the sample, and occur rarely. Experiment with the number of simulations. Note, however, that in the case of a higher number of simulations and distributions with extensive plan networks, an enormous number of complex balance calculations must be performed. This can result in a longer calculation time and requires a very large amount of memory. If necessary, perform large-scale calculations in **batch mode (Section 7.6.5)** overnight. As a general rule, the results are considered stable if the graph shows a Gaussian curve.

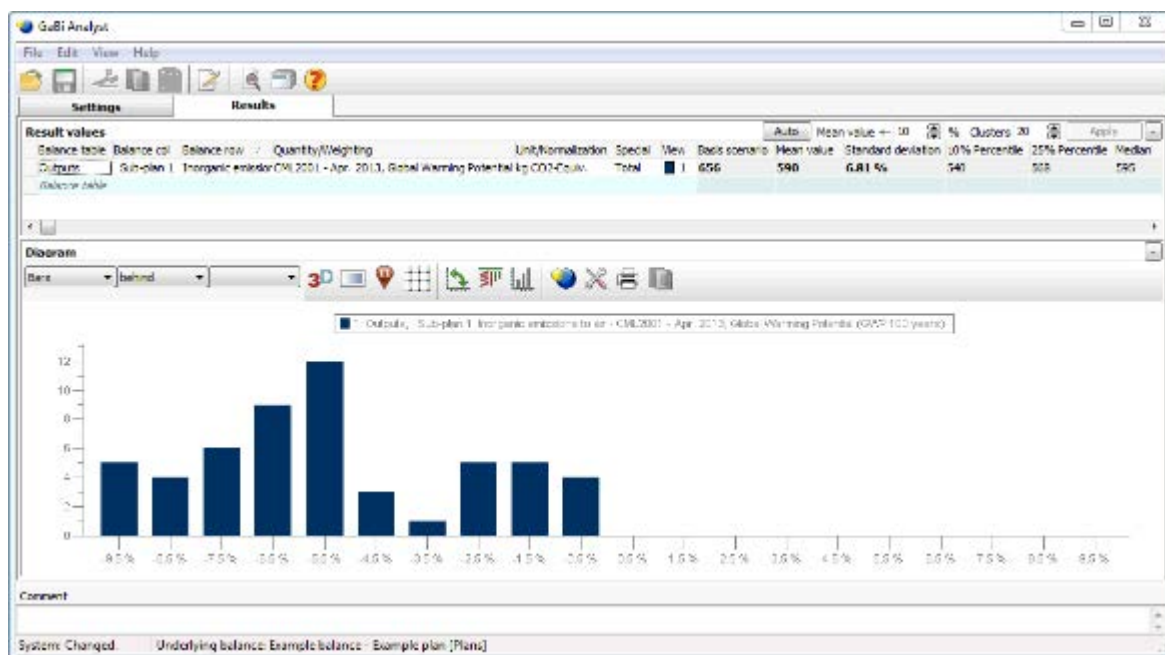


Figure: Results of a Monte Carlo analysis

If you have performed a Monte Carlo analysis, you will find the result values of the basic scenario, the new stochastic mean value, its standard deviation and the percentiles, etc. in the upper part of the window. In the lower part you can see if the result distribution around the mean value has been distributed in a normal way and whether enough simulations were run – recognizable by the "smoothness" of the curves – to ensure a stable result. The distribution can be adapted to the visible area using the **Auto** button. You can set the visible area as well as the number of clusters manually to configure the diagram.

If you would like to further edit the results in Microsoft EXCEL®, you can transfer the result values with copy and paste.

Tip: For a given plan system, a crucial factor for the calculation duration and the memory requirement of the results is how many plan and process hierarchies you set when activating the analyst in the balance. If you would only like to see the spread of the total results, you should not expand the lower hierarchies.

7.6.5 Analyst Batch Mode

The calculations in the GaBi Analyst may require enormous calculating capacities in the case of extensive simulations. GaBi supports large analyses by processing the calculations in batch mode. This means that you can perform bundled calculations of scenarios, parameter variations, sensitivity analyses or Monte Carlo analyses, if your computer is not being used for other activities over night.

To calculate analyses in batch mode do the following.

Define your scenarios in the GaBi Analyst as usual. Save the analysis; do not press the start button with the green arrow. You can define and save any number of analyses.

To start the analysis calculation at any time, open the GaBi DB Manager and call up the Analysis Manager "View" menu.

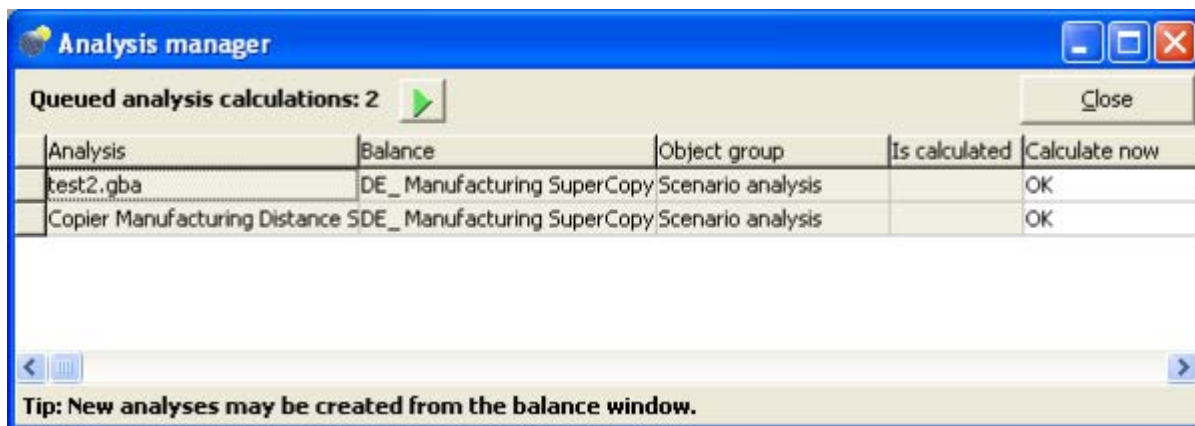


Figure: GaBi Analysis Manager

You will see an overview of all available analyses, which are stored within the database folder, and the status of the calculation. If you would like to exclude the calculation of an analysis, you can deactivate the calculation with a double click in the "Calculate now" field.

You can start the calculation of the analysis by clicking the play button.

Tip: You can open or delete selected analyses directly from the Analysis Manager using the right mouse button.

7.7 Allocation

An allocation is the distribution of a process's input flow quantities (e.g. resources, energy or recoverable materials) and output flow quantities (e.g. emissions) between two or more tracked outputs.

Example: In a coal plant, a certain mass of hard coal is used to generate (1) electricity and (2) thermal energy. Emissions result from the coal's processing. The power plant supplies energy for a production process in which only electricity is required and no thermal energy. In order to show the environmental burden of electricity production, part of the mass of hard coal required by the power plant and part of the resulting emissions must be assigned to the thermal energy produced.

7.7.1 Standard Allocation

If two or more outputs of a process are marked with a valuable (recoverable) material cross (i.e. are tracked flows in GaBi), an allocation can be performed in the software. Allocation can be performed by opening the process instance view of a process on a plan by double clicking. Now you may select a standard allocation via the "Allocation" drop-down menu (top right corner). The drop-down menu provides you with standard allocation options (depending on the quantities defined for the outputs e.g. mass, energy, market price), which are applied to all output flows marked that are valuable or recoverable.

If you do not select any allocation and then click on "OK", no allocation is performed.

To perform an allocation, select the desired quantity and confirm with "OK". GaBi will now automatically calculate the new conditions of the selected allocation according to the formula:

Proportional allocation = Quantity in the particular output / Total quantity in all tracked outputs

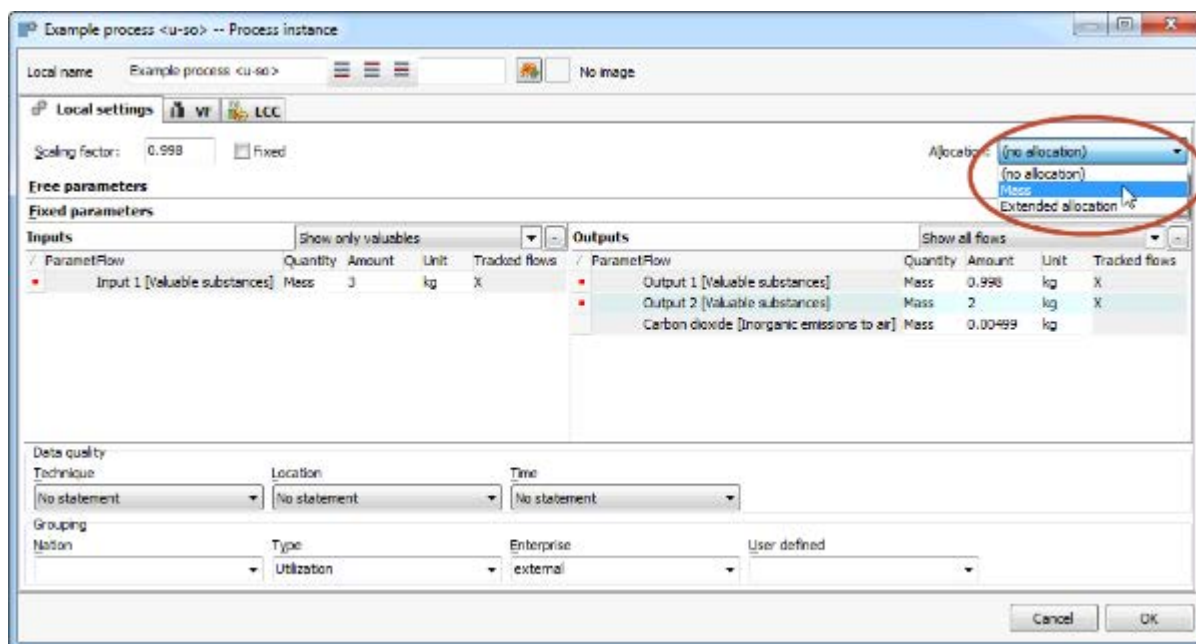


Figure: Standard allocation

7.7.2 Extended Allocation

The extended allocation functionality enables users to use additional allocation capabilities.

This type of allocation may be necessary if a standard allocation does not truly demonstrate the process intention. For example:

- if the process is best modeled by applying multiple standard allocations (e.g., emissions depend on the energy content and resource consumption, which depend on the mass of the output);
- if there are different dependencies in the loads of the inputs and outputs (e.g., resource requirements depend on mass while the emissions depend on energy content);
- if you would like to define your own dependencies which cannot be demonstrated using a standard allocation;
- if technical issues of a process require the dependencies of a process but cannot be shown as part of a standard allocation; or
- if the quantities of the outputs are not consistent.

You may perform an extended allocation by selecting "Extended allocation" in the "Allocation" drop-down menu. This will cause a new tab to appear (and directly get activated).

Example process <u-so> -- Process instance

Local name: ess <u-so> No image

Local settings | VF | LCC | **Extended allocation**

LCA standard allocation: Mass Include wastes in allocation

LCC allocation: Mass LCWE allocation: Mass

Allocation relevant outputs Manual allocation

Parameter	Flow	Quantity	Amount	Unit	Tracked flows	Mass
Output 1	[Valuable substances]	Mass	1	kg	X	33.3 %
Output 2	[Valuable substances]	Mass	2	kg	X	66.7 %

Allocated inputs

Parameter	Flow	Quantity	Amount	Unit	Tracked flows	Allocation
Input 1	[Valuable substances]	Mass	3	kg	X	LCA standard allocation

Allocated outputs

Parameter	Flow	Quantity	Amount	Unit	Tracked flows	Allocation
Carbon dioxide	[Inorganic emissions to air]	Mass	0.005	kg		LCA standard allocation

Cancel OK

Fig: Extended allocation

The window above gives an overview of the outputs to be used in the allocation (those which have are a valuable or a recoverable material) in the top section, the inputs to be allocated in the middle section and the outputs to be allocated in the bottom section. If you tick "Include wastes into allocation" flows which have a waste asterisk are also displayed and may also be utilized in the allocation.

The standard allocations that are available can be selected via the "LCA standard allocation" drop-down menu for each input or output to be allocated. The impact of the selected allocation will be displayed in the "Amount" column. A new column will appear in the "Allocation relevant outputs" section displaying the respective allocation for the used quantities in percent.

On top of that, the quantity LCC allocation and LCWE allocation are based upon can be defined here.

7.7.3 Mixed Standard Allocation

Energy amounts and emissions for allocation can each have different standard allocations.

Thus it is possible to distribute carbon dioxide emissions to air depending on the energy content of the power and the thermal energy, while resources can be allocated according to their exergy percentage.

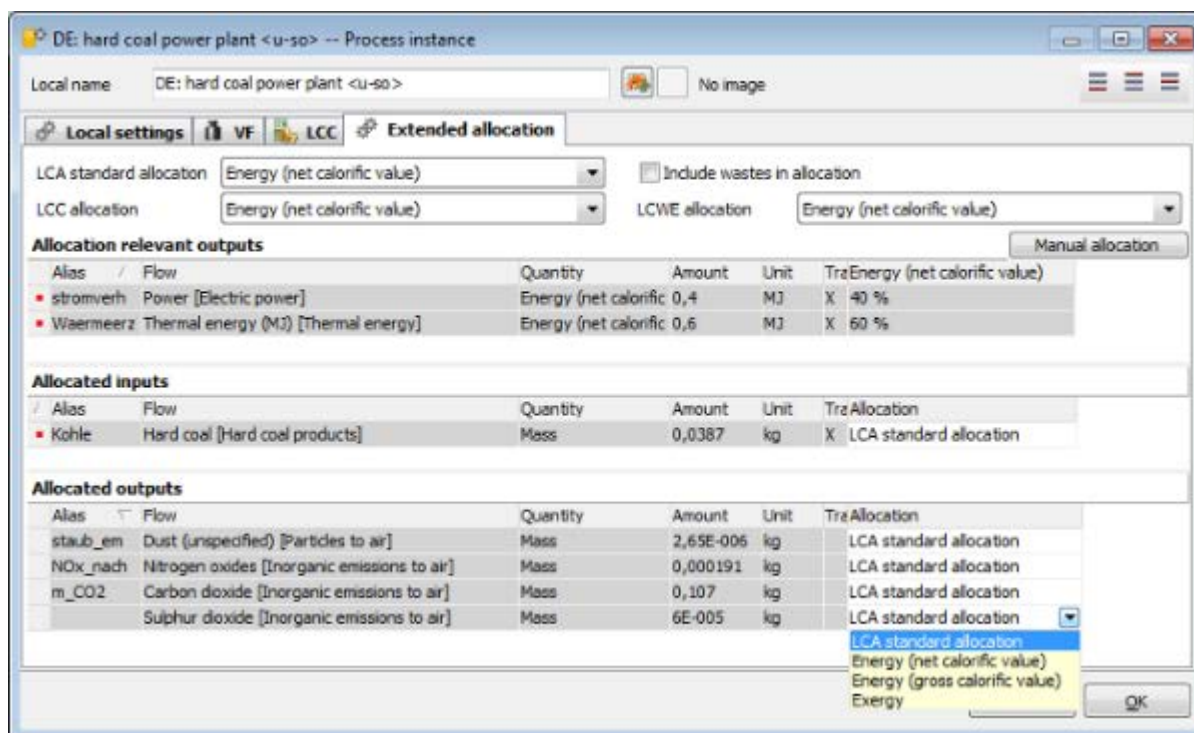


Figure: Mixed standard allocation

7.7.4 Manual Allocation

An additional feature which increases modeling flexibility is the "Manual Allocation" feature.

Note: The manual allocation should only be used if the user has enough experience to make sense of the effects on the model or system.

Click the **Manual allocation** button and a selection menu "Create based on" appears. An additional window provides a selection of the standard allocations. After selecting an option, a new column, "1st Manual allocation" will appear in the "Allocation relevant outputs" table. This column has editable cells. Now you can enter any percent figure.

Caution! At user's own risk: To increase modeling flexibility, combinations which do not equal 100% are also possible!

The newly defined manual allocation is now located in the drop-down menu of the allocated inputs and outputs, ready to be applied to them. You can define several manual allocations and use them in any combination with other manual allocations or standard allocations.

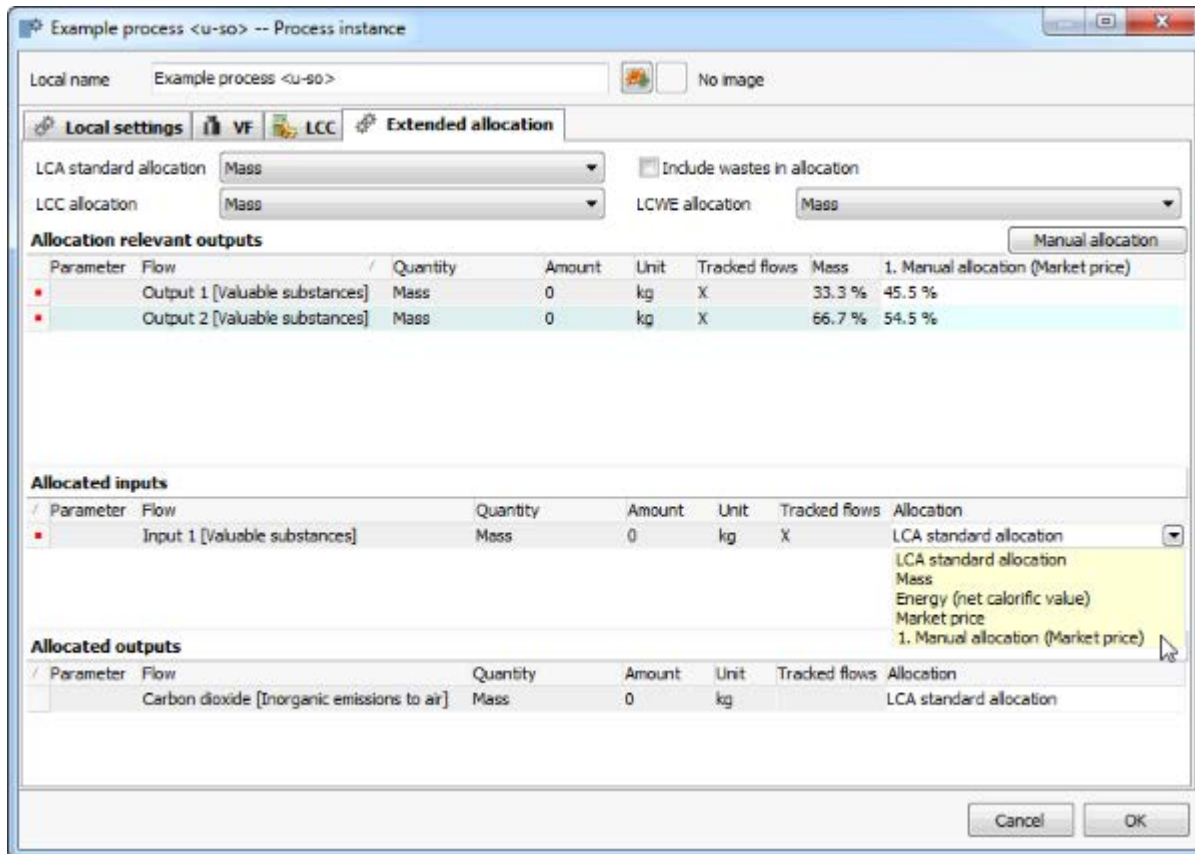


Figure: Manual allocation

7.8 Quantities

7.8.1 General Information about Quantities

GaBi already includes many predefined quantities. These quantities are the basis of the processes included in the database. They are the basic tools needed to work with GaBi. However, since it is not possible to predefine all conceivable balance quantities important for your specific tasks, the system is flexible and may be expanded according to your needs. You may add an infinite number of quantities using your own definitions. The default quantities, however, cannot be deleted since they are necessary to ensure the consistency of the database processes.

Predefined quantities are classified into three different classes:

- Technical quantities,
- Economic quantities,
- Social quantities and
- Environmental quantities.

We recommend using the same classification scheme for your new definitions to maintain a clear and user-friendly system structure.

7.8.2 Creating a Quantity

Follow these steps to define a new quantity:

1. Open the GaBi DB Manager.
2. Double-click the "Quantities" object group (or click once on the plus sign of the structure to show the

subfolders).

3. Double-click the folder or sub-folder where the new object is to be created.
4. Then click the "New" button in the tool bar. You can also use the right-mouse menu. A quantity window opens. This window shows the usual menu and toolbars as well as input fields for naming quantities and defining their unit type.

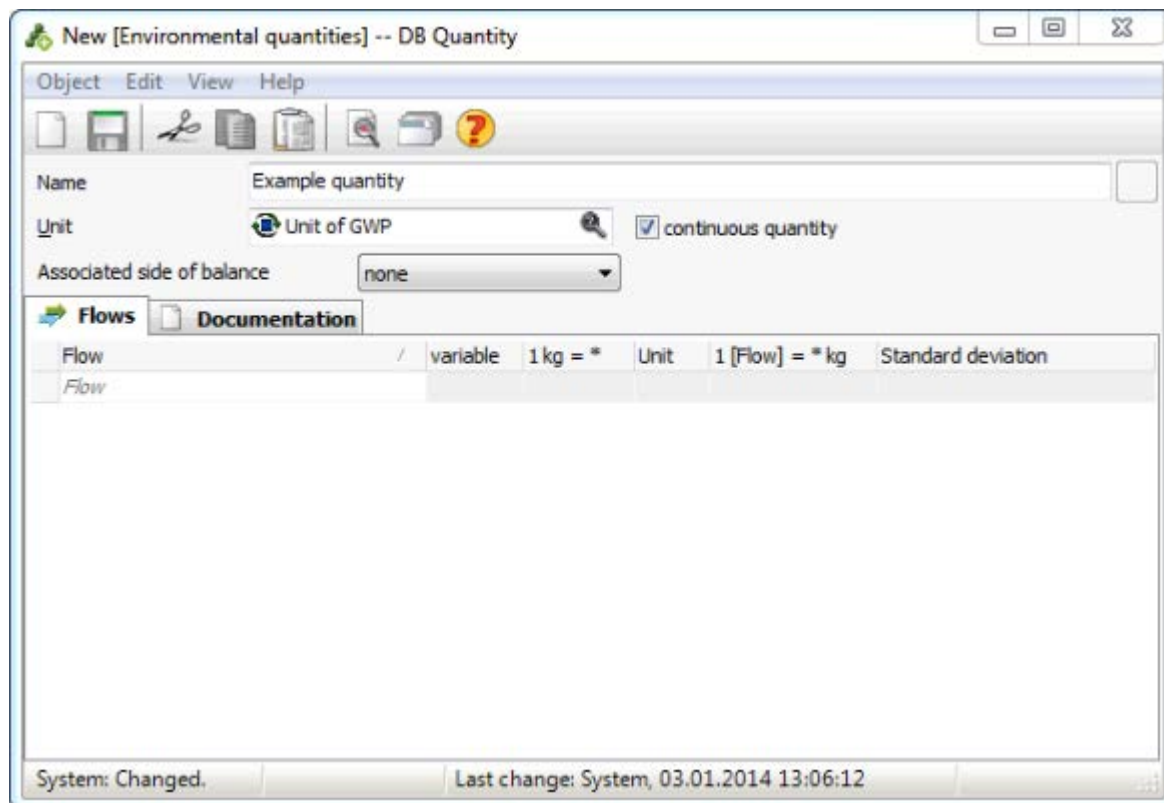


Fig: New GaBi quantity

5. Enter the name for the quantity in the top field and the unit type in the lower field. Confirm your input in the "Unit" field by pressing return (or do not enter anything and directly click on). GaBi then activates the search function and suggests all of the units in the database that match the character string that was put in.
6. Double-click the unit of your choice to import into the field.
7. In the drop-down menu, choose the associated side of the balance for your quantity (input, output or none).
8. Click "Save" or save the object by confirming when closing the window.

In the flow list of the quantity window flows can be added to be defined for conversion into this quantity.

The column with the header "1 (Unit) = *" depicts the conversion factor of the current quantity to the selected secondary quantity. Here, the entry "Ref" is used for flows that use the current quantity as a reference quantity. The right column with the column header "1[Flow]=*(Unit)" depicts the conversion of the secondary quantity to the current quantity. The value 1 is assigned to flows that are only measured using the reference quantity.

Usually, the reference quantities and conversion factors are defined when defining a new flow. However, you can also define these data from within the GaBi quantity window:

1. Double-click a cell in the first column and enter the desired flow. Confirm your input with "ENTER". GaBi then activates the search function and suggests all of the flows in the database that include this character string. GaBi will prompt you to define a new object if the database search does not find a match. If necessary, confirm with "Yes" and **create a new flow (Section 7.2.6)**.
2. Double-click on the flow of your choice to import it into the list.
3. Enter the conversion factor in the corresponding columns by clicking in the corresponding cell and

entering the value.

4. Click "Save" or save the object by confirming when closing the window.

7.9 Units

7.9.1 General Information about Units

In order for the GaBi database to track amounts of real world materials and energy flows, it defines both a unit of measure, or "Unit", and the number of those units associated with any particular item in the system. Quantities in the system are the combination of a defined Unit and a defined number of those units.

All commonly used global units and some of their multiples (e.g., J, kJ, and MJ) are already predefined in the default database. Usually, working with GaBi will only require these definitions. Of course, you may also add new units. The default unit defined for a unit type is the basis for defining the conversion factor for an additional unit (secondary unit).

There are six (6) predefined units available:

- Ecoinvent units,
- Technical units,
- Environmental units,
- Economic units,
- Land use units and
- Social units.

The "Units" folder itself lists the additional unit types "Unit of currency" and "Unit of time".

It is recommend to use the same classification scheme for your newly defined units to maintain a clear and user-friendly structure.

7.9.2 Creating or Changing a Unit

In order to create a new unit, follow these steps:

1. Double-click the "Units" folder (or click once on the arrow next to the structure to show the subfolders).
2. Double-click the folder or sub-folder where the new object is to be created.
3. Then click the "New" button in the tool bar or use Ctrl + N. You can also use the right-mouse menu. A unit opens. This window shows the menu and toolbar as well as input fields for naming the unit type and defining its reference unit.

The list used to define conversion factors is located below the input fields. Here, you can enter different units of the same unit type and their conversion factor.

The "Reference unit" is the unit in which the numerical values of the corresponding quantity are managed in GaBi. The conversion factors in the "Unit" column make an automatic conversion into these secondary units possible. GaBi uses this data to define processes and depict balancing results.

Example: The "Mass" quantity has the "Unit of mass" unit type with the reference unit "kg".

To change the reference unit use the right-mouse menu to select the desired reference unit.

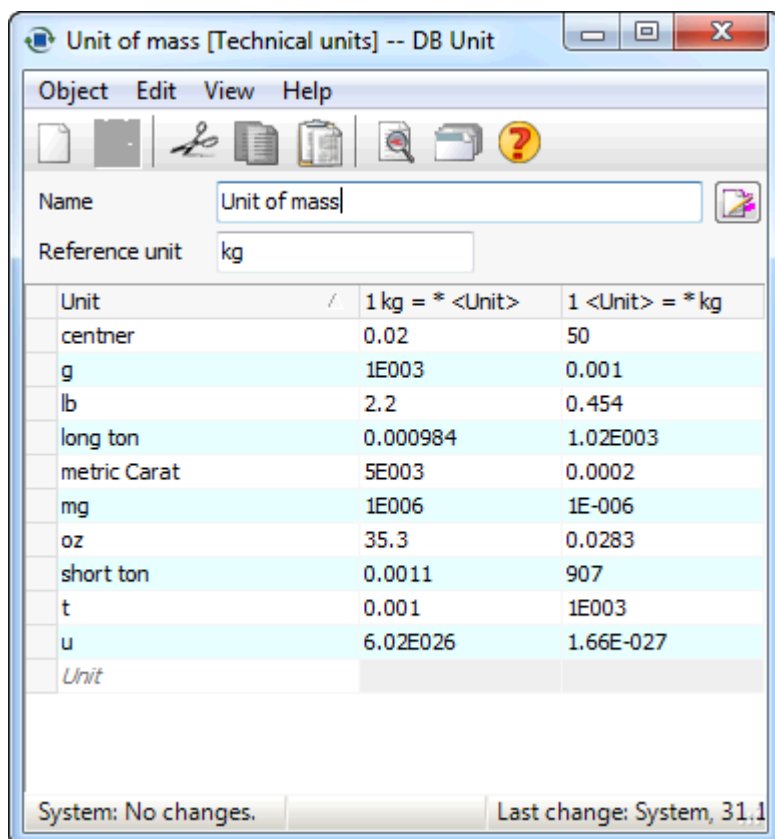


Figure: GaBi unit window

7.10 Creating and Managing Users

7.10.1 General Information about Creating and Managing Users

To access the GaBi system, you need to log on with a user name and password. After installing GaBi on your computer, the user "System" is automatically created without a password. Enter the user name "System" when you log in for the first time. You may then create a password for this user and set up additional users.

User rights may be assigned to each GaBi user. User rights determine whether a GaBi user can only open ("read") or open and save ("write") GaBi objects and whether these rights apply only to the user's own or to all objects. User rights work as follows (a more detailed description is given in **Quality assurance statuses (Section 7.10.3)**):

Guest	Read access to all objects
LCA Expert	Read access to all objects. Write access to own objects
Project Manager	Read/write access to all objects (exception: "User" object)
Administrator	Read/write access to all objects (creating new users, assigning access rights)

The current logged in user name is displayed in the footer of every GaBi window.

7.10.2 Creating or Changing a User

In order to create a new user, follow these steps:

1. Double-click the "User" folder or click once on the plus sign of the structure to view the subfolders.
2. Then click the "New" button in the tool bar. You can also use the right-mouse menu. A user window will

open, consisting of a conventional menu and toolbar plus fields for defining the user rights.

Figure: User management

3. Enter the desired information into the fields.
4. Specify the assigned user rights by clicking and selecting one of the options: "Administrator", "Project Manager", "LCA Expert" or "Guest".
5. Click "Save" or save the object by confirming when closing the window.

The new user is now saved and then appears in the database manager of the folder you indicated. Follow the steps 3-5 to change settings for an existing user and then save the user to apply the changes.

The "System" user without a password is available as a default user for all databases. It has administrator rights.

7.10.3 Quality assurance statuses

GaBi supports a quality assurance process by using the different groups of user rights and their ability to change the Quality Assurance statuses (QA statuses). The QA status of any object can be changed by right-clicking on the object, selecting "Change QA status" and selecting the desired QA status. The ability to select the different QA statuses depends on the user rights.

There are four different QA statuses:

Draft: The default QA status that is set when a new object has been created (but not after an object has been edited). This QA status shows that the work on this object is still in progress. Also it can be used for objects that do not have to pass through quality assurance like dummy processes or example models.

Ready for QA: This status shows that – in the opinion of the modeler – the work on this object is completed. The user can hand over this object to the quality manager by submitting the changes to GaBi Server or by exporting it as a GBX file.

Needs Revision: This object failed the expectations of the quality manager. It has to be revised by one of the modelers. When handing back such an object, be aware that only Main users or the Clerk who originally created the

object will be able to apply changes to the object and hence revise it. For the quality manager it makes sense to leave a comment as to how the object did not meet the expectations.

Quality Assured: This object met the expectations of the quality manager. It can now be applied for further use in the modelling process or its result can be used for reporting (e.g. in an i-report). Once an object has this status, it cannot be edited by anyone except an Administrator.

The consequences of QA statuses and the possible choices that can be made by certain User rights are as follows:

Guest: As a Guest cannot edit any content or create new objects, the QA statuses cannot be modified either.

LCA Expert: An LCA Expert can select between two QA statuses: "Draft" and "Ready for QA". This and other modifications can only be performed for the objects he created himself. Also, if an object has been marked as "Needs Revision" an LCA Expert can only revise and modify those objects that he created himself. Once an object has been marked as "Quality Assured", the object cannot be edited by LCA Experts anymore.

Project Manager: A Project Manager can select between two QA statuses: "Draft" and "Ready for QA". The ability to modify these objects works independently from who created the object and what kind of user rights the creator of the object had. Once an object has been marked as "Quality Assured", the object cannot be modified by Project Managers anymore.

Administrator: Administrators can select between all four QA statuses: "Draft", "Ready for QA", "Needs Revision" and "Quality Assured". They can do this for all objects no matter who created an object, what kind of user rights the creator of an object had or what its previous QA status was. As the only user rights group Administrators can also modify objects that already gained the status "Quality Assured".

7.11 Creating and Linking Contacts

New contacts may be created and linked in the documentation tab of flow and process windows. Detailed contact information about the documented data set generator, the registration authority, etc. can be attached to the documentation tab. Additionally, the contact organization or person for references, citations and reports can be specified.

Contacts have the same icons as Users and can be linked in the documentation tab, in references and in contacts in the appropriate fields by clicking on  to activate the search function. Also, new contacts can be created out of the flow, process, reference and contact windows by clicking on .

A new contact can be created like all other objects in the DB Manager. Additionally sub-folders for contacts as persons, companies and organisations can be created.

New contact [Contacts] -- DB Contact

Object Edit View Help

Name: New contact

Long name:

Description:

Address:

Password:

Confirm password:

Telephone:

Telefax:

Email:

Website:

Central contact point:

Belongs to:

Logo:

User rights: ☒ Reference

System: No changes. Last change: System, 03.01.2014 14:51

Figure: Contact window

In the contact window all contact information can be specified and changed later. In the field "Belongs to" contacts can be linked to each other. This way a person can be linked to a company or organization.

7.12 Creating and Linking References, Citations

New References and Citations can be created to be linked in the documentation tab of flow and process windows. This way, very detailed references and citations can be attached to the documentation of flows and processes.

References and citations have a book as an icon and can be linked in the documentation tab, in the appropriate fields, by clicking on  to activate the search function. Also, new contacts can be created out of the flow, process, reference and contact windows by clicking on .

A new reference or citation can be created like all other objects in the DB Manager. Additionally, sub-folders for different references can be created.

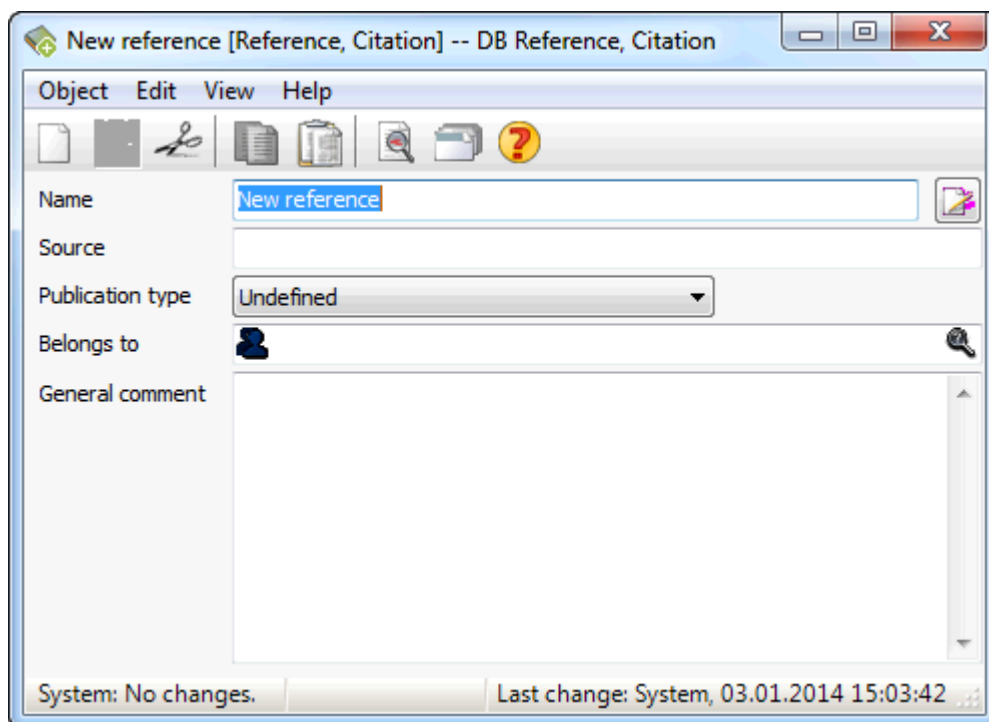


Figure: Reference, Citation window

The "Publication type" can be chosen by a drop down menu, specifying whether the object refers to an article, questionnaire, database, etc.

A name, source and general comments can be entered. In the field "Belongs to" any contact can be linked to a reference, citation. Next to the field of the name external files as reports, office documents or pictures can be linked to the citation.

7.13 Data Quality Indicators (DQIs)

Use quality indicators to document the quality of your data to ensure the reproducibility of balance results and increase their transparency. All GaBi databases include four different categories with the corresponding quality indicators. Quality indicators can be both qualitative and quantitative.

The following lists all options possible when using quality indicators:

"Completeness (LCWE)" of processes:

- All direct process-related employees considered
- All employees considered
- All employees of company considered

"Data origin" in processes:

- Calculated
- Estimated
- Measured
- Literature

"Integrity" of processes:

- All flows captured

- All relevant flows recorded
- Individual relevant flows recorded
- Some relevant flows not recorded

"Plan integrity" of plans:

- All processes linked
- Individual relevant processes linked
- All relevant processes linked
- Some relevant processes not linked

DQI objects cannot be created. However, you can assign a new value to a DQI object.

"Representativeness" of processes on plan level:

- Not representative
- Partly representative
- Completely representative

7.14 Interpretation

7.14.1 General Information about Weighting

The Interpretation is an optional element of the LCIA. With a normalization the magnitude of category indicator results is compared relatively to reference values. Weighting is the multiplication of category indicator results with weighting factors which are based on value choices.

Weighting and normalization can help to do macro-level comparisons, comparisons of different indicator results or to aggregate category indicator results to groups and single score results.

GaBi enables transparent and easy weighting and normalization via the pre-defined weighting keys and normalization methods which can be accessed via the DB Manager. You can also create your own weighting keys or normalization standards.

7.14.2 Creating or Changing Weighting Keys and Normalizations

In order to create a weighting or normalization, follow these steps:

1. Double-click the "Interpretation" folder in the object hierarchy (or click once on the arrow sign of the structure to show the subfolders).
2. Double-click the category where the new weighting/normalization is to be created or modified.
3. Then click the "New" button in the tool bar or use Ctrl + N. You can also use the right-mouse menu. A weighting/normalization window opens. This window shows the usual menu and toolbar as well as input fields for naming weighting keys. The list for the weighting/normalization definition is below the input fields. Enter the name for the new weighting/normalization into the top field.
4. Use the mouse to click in the first cell of the quantity list underneath and enter the first letters of the desired quantity. Confirm your input by pressing return. GaBi then activates the search function and suggests all of the GaBi quantities in the database matching this character string.
5. In the weighting/normalization window you can click in the column "Equivalents" in order to enter a weighting/normalization reference. When this weighting/normalization is used in a balance the balance result value for this particular quantity will then be divided by this weighting/normalization reference. You may also enter a weighting/normalization factor in the column "Factor". The normalization factor is the reciprocal of the weighting/normalization reference.

6. Continue to define additional weighting factors or normalization references by inserting and filling in additional rows.
7. Click "Save" or save the object by confirming when closing the window.

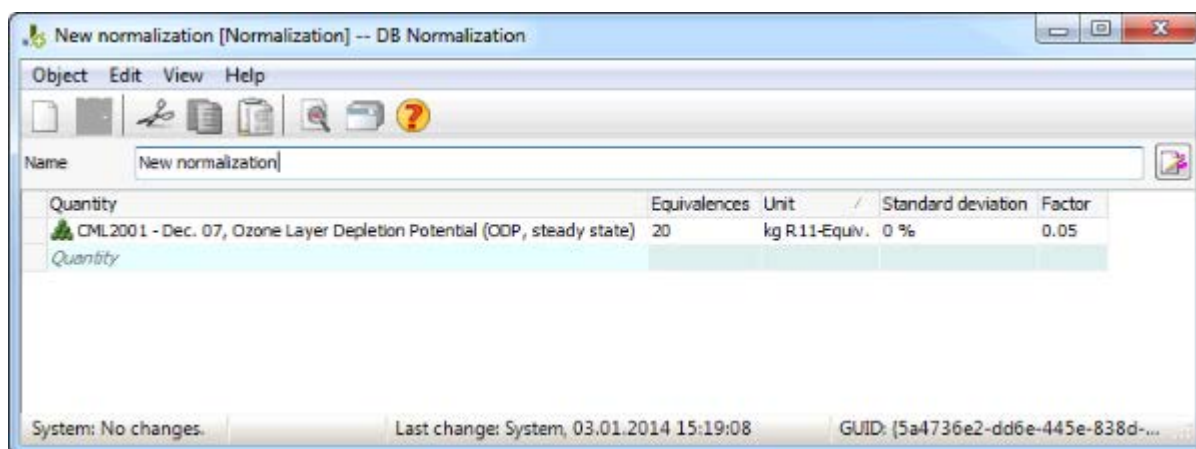


Figure: GaBi normalization window

7.15 Database Management

7.15.1 Creating a New Database

Additional databases can be created in the database manager in one of two ways:

1. Creating a new database.
2. Copying an existing database.

The current user is automatically created in this new database when creating a new database.

Follow these steps to create a new database:

1. Select in the "Database" > "Create new database" in the GaBi menu and select the kind of database you want to create. You can also access this option via the right-mouse menu of the object hierarchy. A window opens displaying a prompt to indicate the name of the database and the the folder where the database is to be saved.
2. Confirm your input by clicking "OK".

The system now generates a new database in the selected folder. The new database is immediately displayed in the database manager with the name that was assigned.

Follow these steps to copy an existing database:

1. Click on an existing database.
2. Select "Database" > "Copy" in the GaBi menu. You can also access this option via the right-mouse menu of the object hierarchy. A window opens displaying a prompt to indicate the name of the database and the the folder where the database is to be saved.
3. Confirm your input by clicking "OK".

The system now generates a new database in the selected folder. The new database is immediately displayed in the database manager with the name that was assigned.



Figure: Creating a new database

7.15.2 Exchanging Data between Databases

7.15.2.1 Transferring single GaBi objects to a different database

You can transfer single GaBi objects between different databases by simply using GaBi's drag and drop function. Drag and drop the selected object from the activated 'source' database into the connected but deactivated 'target' database.

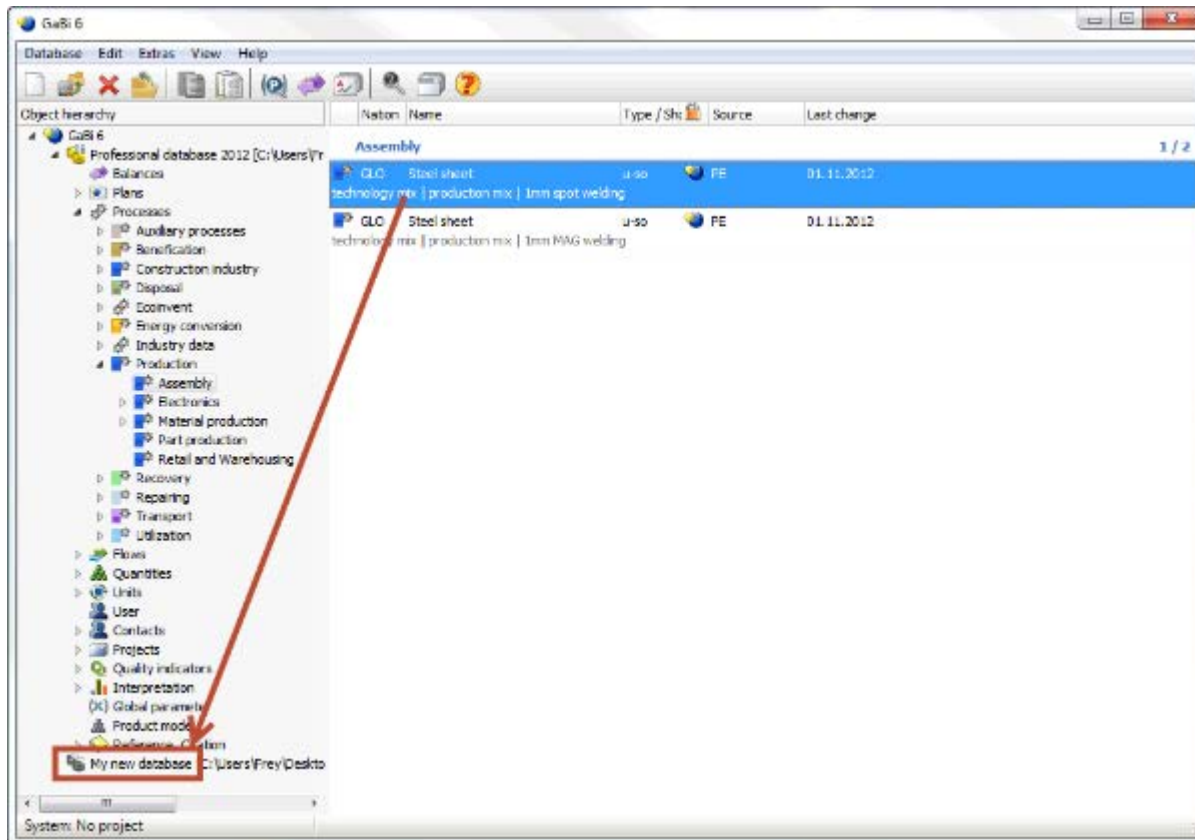


Figure: Transferring single objects to a different database

Dragging the GaBi object across automatically creates a copy in the same folder as the source database, or, if the folder does not exist in the target database then a new folder will be created.

GaBi objects cannot be exchanged between databases which have different Service Pack levels or are in different languages.

7.15.2.2 Transferring multiple objects to a different database

If you want to transfer multiple GaBi objects, we recommend collecting the objects to be transferred in a project and then using GaBi's drag and drop function to transfer the entire project.

1. Create a new project.
2. Name and activate the project.
3. Select the GaBi objects to be transferred (select multiple objects by holding down the Ctrl-key) and add them to your project by using GaBi's drag and drop function or by copying and pasting them.
4. Drag and drop the project into the target database.

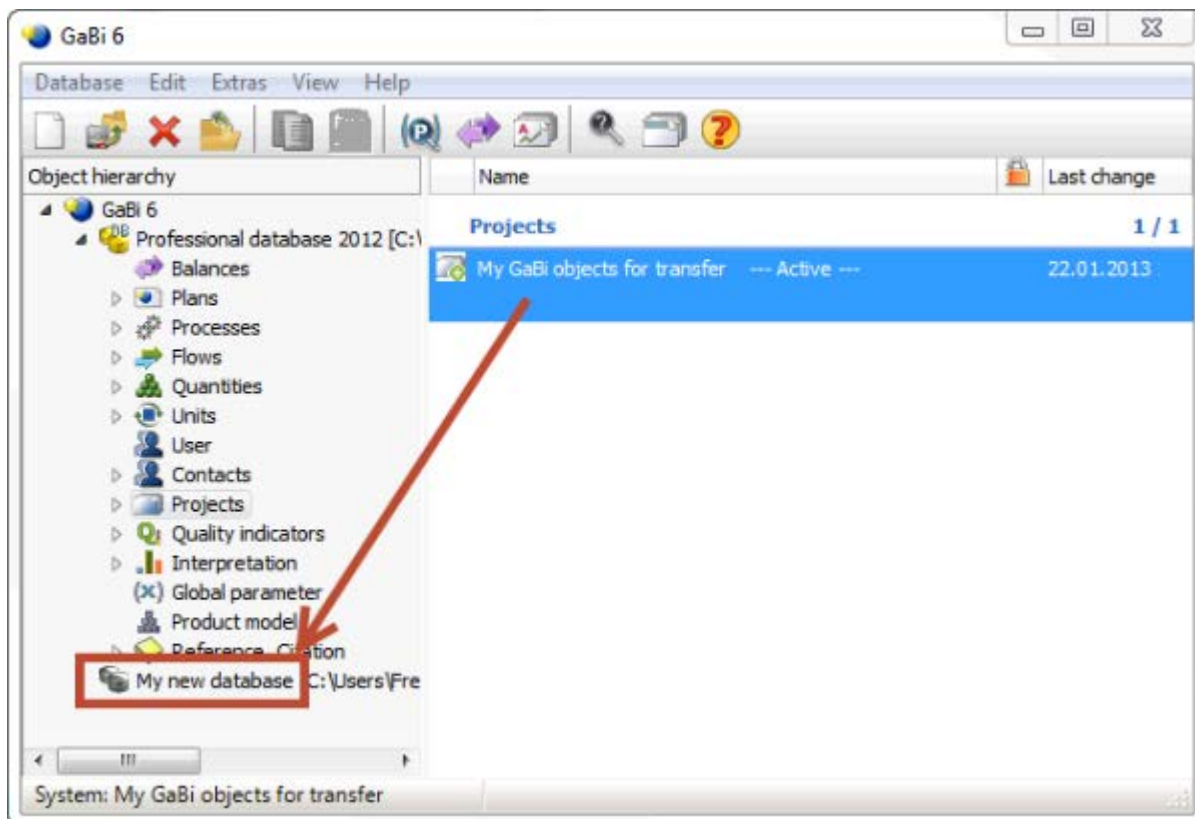


Figure: Transferring multiple objects to a different database

A list of all objects that have been collected in the project is generated before the actual export process starts. You can cancel the export if you notice that the export includes any undesired objects.

7.15.3 Replacing Objects

You will likely encounter similar objects of the flows, processes, quantities, or units object classes when working with GaBi. This is frequently the case when importing plans or processes from another user or when different users accidentally create several similar objects. It is recommended to clean the database (database maintenance) at regular intervals to keep the database and its use streamlined and efficient.

Cleaning the database is not problematic if duplicate or similar objects are not used (example: a process is not used on a plan). In this case, just delete these objects from the database.

If one of the duplicate objects is used in a model, it is best to replace similar objects. Users can replace an existing GaBi object in all its applications in the active database by another object. Use the "Usage" function to determine whether an object is used or not (with a right click on the object in the DB Manager).

Note: Be careful when using the "Replace" function because this operation **cannot** be undone.

- When quantities are replaced/combined, an additive combination takes place (that is, the final object contains all flows of both original objects).
- For flows, you have the choice of an additive or a substitutive combination.
- For all other objects, the combination is substitutive (that is, one object is simply replaced by the other).

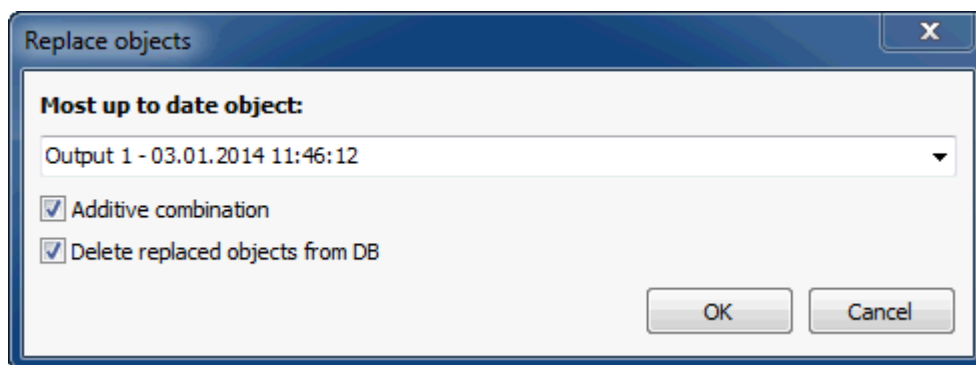


Figure: Replacing objects

Follow these steps to replace objects:

1. Move all objects to be replaced into the same folder. The selected folder should be the final location of the final object after combining whenever possible.
2. Then select the objects to be combined. You can also search for the different objects and select all in the search window.
3. Select "Edit" > "Replace" in GaBi menu. A window opens where you can define the most up to date object which will then be the one replacing the instances of the others.
4. You can specify if the replaced objects will be deleted or not.
5. Then click "OK".

GaBi will replace all object instances with the most up to date one.

Note: Combining objects that are not similar can break apart flow connections on plans.

Be aware, that the flows of write-protected processes cannot be replaced.

7.15.4 Comparing Objects

Use the Compare Assistant to identify the final object when replacing objects. Use this assistant to compare objects and apply extended combining functions.

Start the Compare Assistant by selecting "Extras" > "Compare Assistant..." in the GaBi menu. Select the GaBi objects to be compared with the search function by clicking in the cells of the columns "Object 1" and "Object 2".

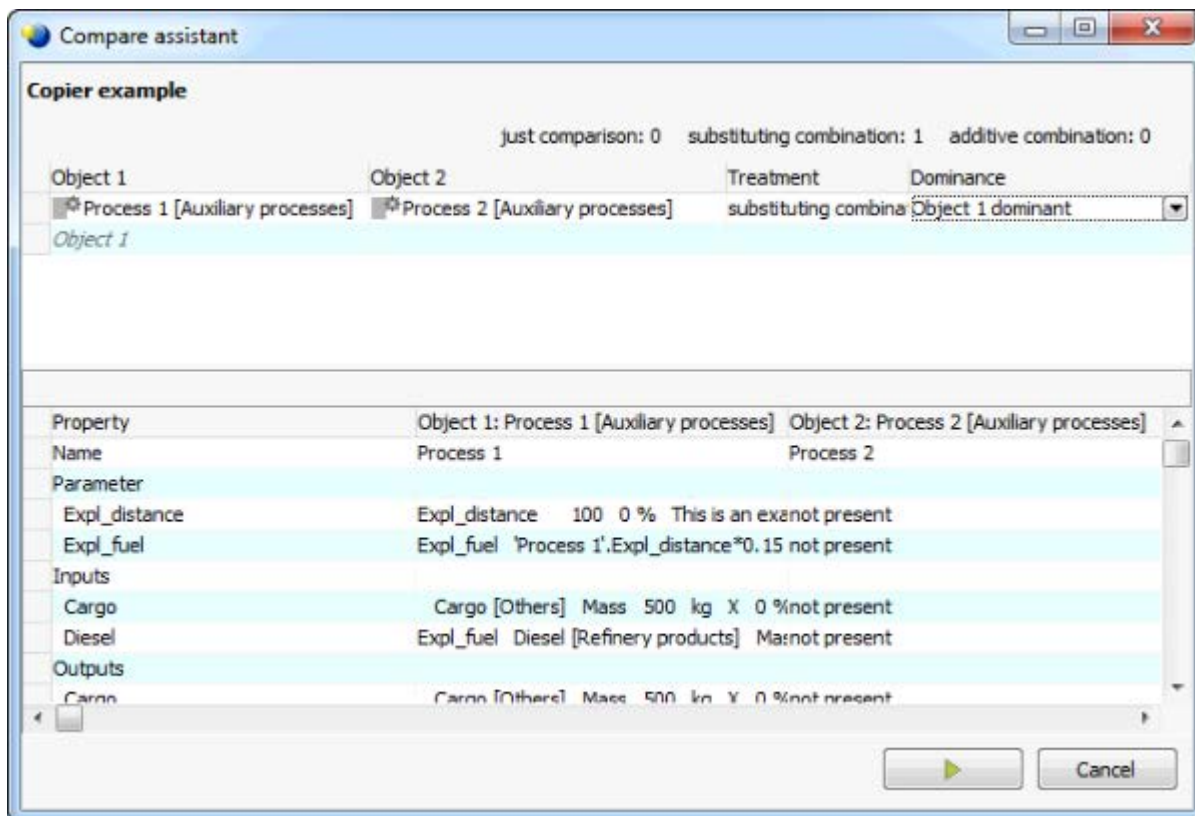


Figure: GaBi Compare assistant

The Compare assistant checks and depicts the differences between objects. Choose from these two different combination processes based on the type of objects selected.

Note: The Compare assistant does not only replace object instances. The replaced object will be deleted from the database.

The treatment and the dominant object has to be selected before replacing objects.

When two flows have different quantities, the dominant object will contain all quantities of both flows.

When two flows have the same quantity with different values, the values of the dominant object are dominant.

7.15.5 Automatically Saving Databases

Save your database frequently to prevent data loss. GaBi automatically saves databases when shutting down your system. You may activate or deactivate this function in the GaBi database menu "Extras/Options". In the options you can also define the default directories for databases and backups. Databases are saved by default to a subfolder named "_DB backups\Database_Name sav_Date" located in the database directory.

Note: Automatically saving databases will result in a large amount of data accumulating over a short period of time. Please delete backup copies of databases that are no longer required.

7.15.6 Compressing Databases

When you delete datasets from a database, the database size does not decrease. Databases do not automatically release the memory previously occupied by deleted records. Databases should therefore be compressed at regular intervals. GaBi automatically compresses databases when shutting down your system. You can activate or deactivate this function in the GaBi database menu "Extras/Options".

7.15.7 Modifying Database Objects

The original delivery content objects of your databases are write-protected (locked). This is to avoid accidental changes and enable the successful maintenance and updates to the GaBi databases using service packs. If you wish to modify a delivery content object (identifiable by the grey background), simply copy and paste this object in the DB manager. You are now free to make changes to this copy.

7.16 Multilingual Use of GaBi

Global companies or user groups can easily switch the user interface and the database to different languages.

7.16.1 Switching User Interface Language

Switch the GaBi user interface language to a different language in the GaBi database manager using the menu option "Language" in the "Extras" menu. Changes are applied immediately.

7.16.2 Switching Database Language

The language of the GaBi database is not dependent on the user interface language. To translate a database to a different language, start the database language management tool in the GaBi database manager and use the menu option "Translate" in the "Database" menu. The "GaBi Language Management" translation program opens.

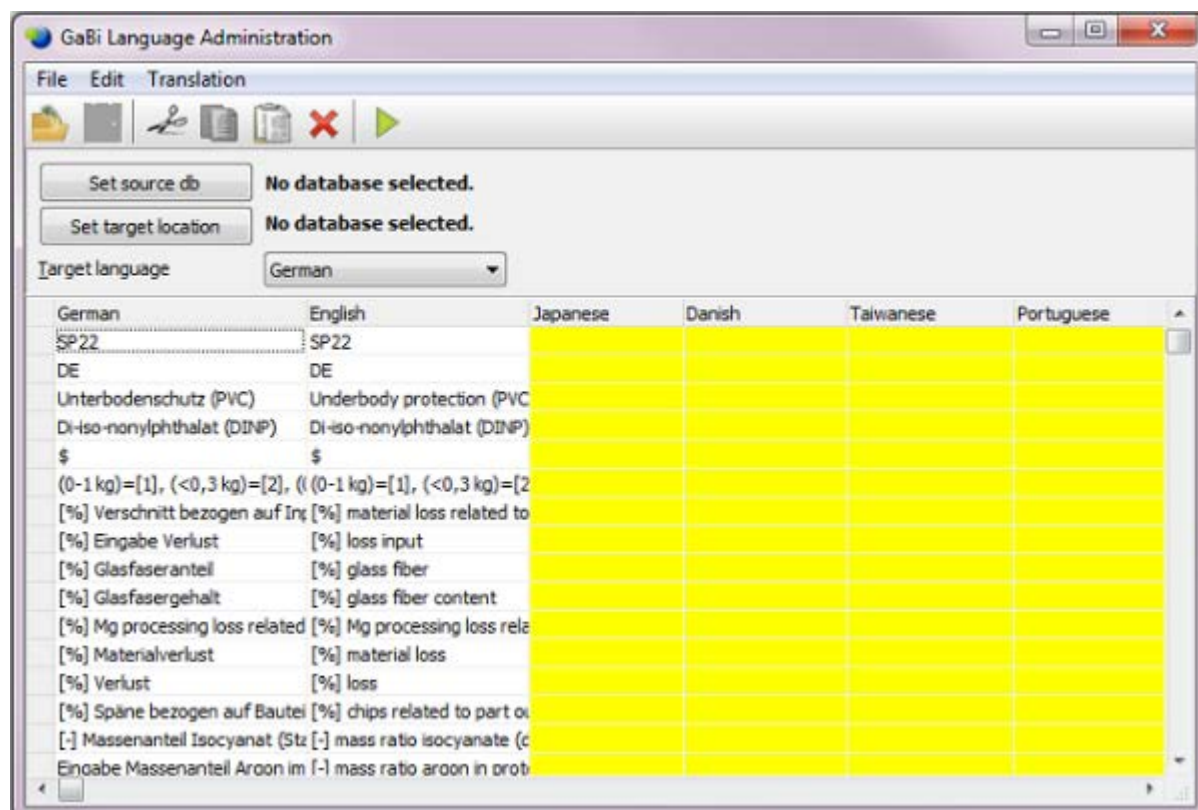


Figure: GaBi database translation tool

Translate a database by selecting the source database with the "Source Database" button. Then specify the target directory and the target language of the new database. Finally, click the start button with the green arrow to start the

translation process.

Once translation has finished, a log will provide a list of entries that were not found in the translation list and thus were not translated. Terms that are not defined in all languages are highlighted in the translation tool in yellow. Enter a translation into the corresponding field to supplement the list.

Scroll to the end of the list and enter any terms you wish to add.

7.17 Other GaBi Features

7.17.1 Exchanging Data with Other Applications

All of the information and data saved in GaBi objects can be copied to the Windows Clipboard and pasted to other applications. For example, use this function to paste process data into external databases, graphically prepare balance results, paste process plans to graphics applications, or exchange individual records between (distant) GaBi installations without having to copy an entire database.

Please read the [Chapter about exchanging objects between linked GaBi databases](#).

The following section describes how to import/export data from/to Excel. Objects of all object classes follow the same basic import/export principles. This process is described in detail because exchanging data with Microsoft Excel® is the most important and probably most frequent import/export when working with GaBi.

7.17.1.1 GBX Export/Import- Drag-and-drop of Objects

Data in the GaBi data-exchange format have the ending ".gbx" (**GaBi eXchange** format). The import-export interface for GBX data within the GaBi system has two primary functions:

- The export of GaBi data.
- Copying data between GaBi databases and, in doing so, executing a matching of data (e.g. in case of changed GaBi flows).

This functionality is the basis for the data exchange between databases via drag-and-drop.

GaBi plans, processes and flows can be dragged and dropped with the mouse into another database like in MS-Explorer™. GaBi gives the user the opportunity to choose the desired treatment of the objects (**e.g. additive or substituting combination**) (**Section 7.15.4**).

7.17.1.1.1 Optional feature: GBX Export

The GBX export function can be found in the menu of the 'Database Manager' window, the 'Search' window and the 'Project' window. Before activating the export function, first select the GaBi object that is to be exported from the object list of the respective window. A dialogue box will appear. You can accept the file name suggested or enter a new file name.

7.17.1.1.2 GBX Import

The function of the GBX import can be found in the DB manager "Database" menu. The GBX import runs in two phases. First the data to be read are automatically matched with the active database. The user has the opportunity to combine the GaBi objects to be imported with objects of the active database or to import them as copies. Subsequently the second GBX import phase starts in which the objects of the active database are integrated.

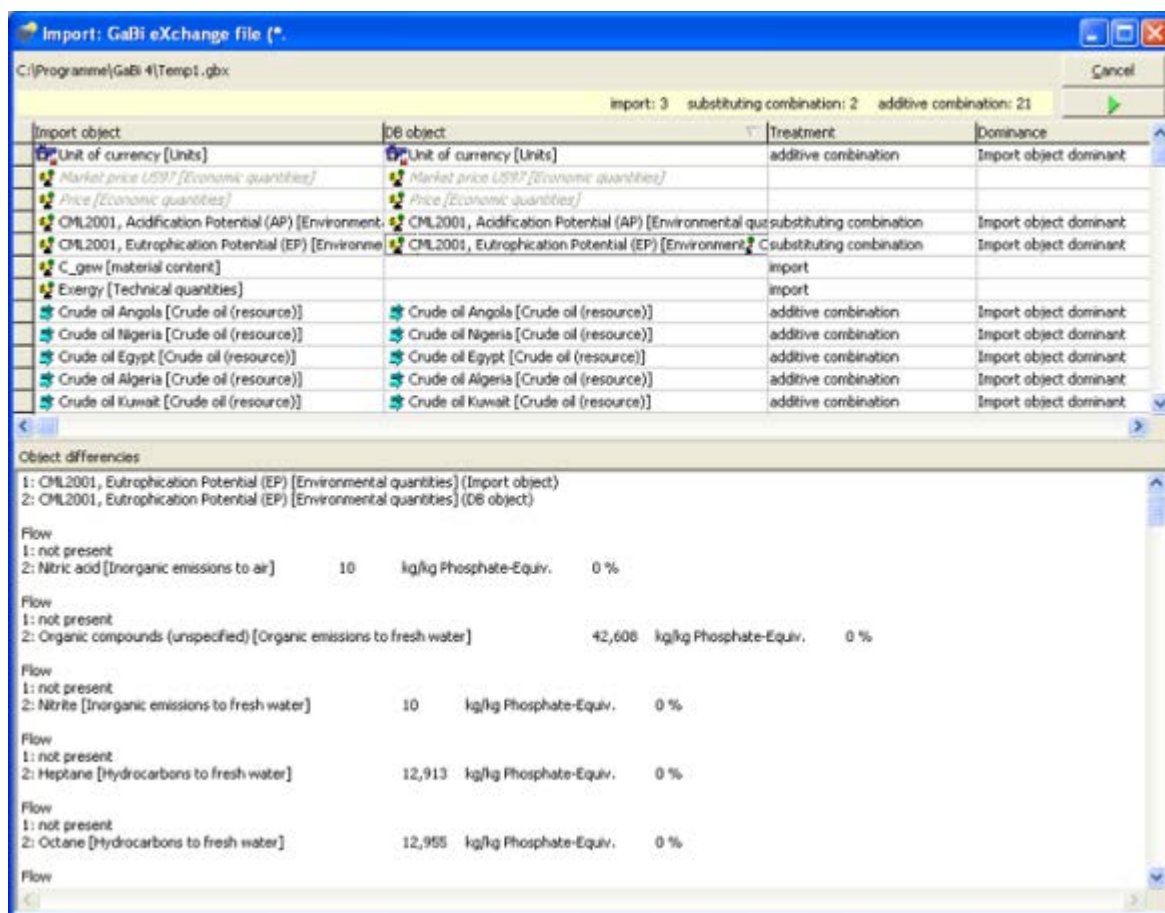


Figure: The dialog window for the interactive GBX import

This dialog window has the following functions:

Shows an assignment of the list “Import Object” – and the “DB Object”

The assignment will be done automatically, this can, however, be modified by the user (according to the rule that customer objects can not overwrite original PE/LBP objects)

It enables the selection of the individual assignment:

Import as copy (only possible, if two objects have the same name and place of storage, but changed content and different GUIDs)

Substituting Combination: One object is replaced by the dominant object, the information of the replaced object get lost.

Additive Combination (only units, flows and global parameters): One object is replaced by the dominant object, the properties of both objects are added in the dominant object.

When two flows have different quantities, the dominant object will contain all quantities of both flows.

When two flows have the same quantity with different values, the values of the dominant object are dominant.

Automatic update of the objects to be imported (Section 7.17.1.1.3)

Preview field: Text list showing differences of import and database object

Ability to show single objects in the respective windows (user modification not possible)

7.17.1.1.3 Detailed description of the automatic update of objects

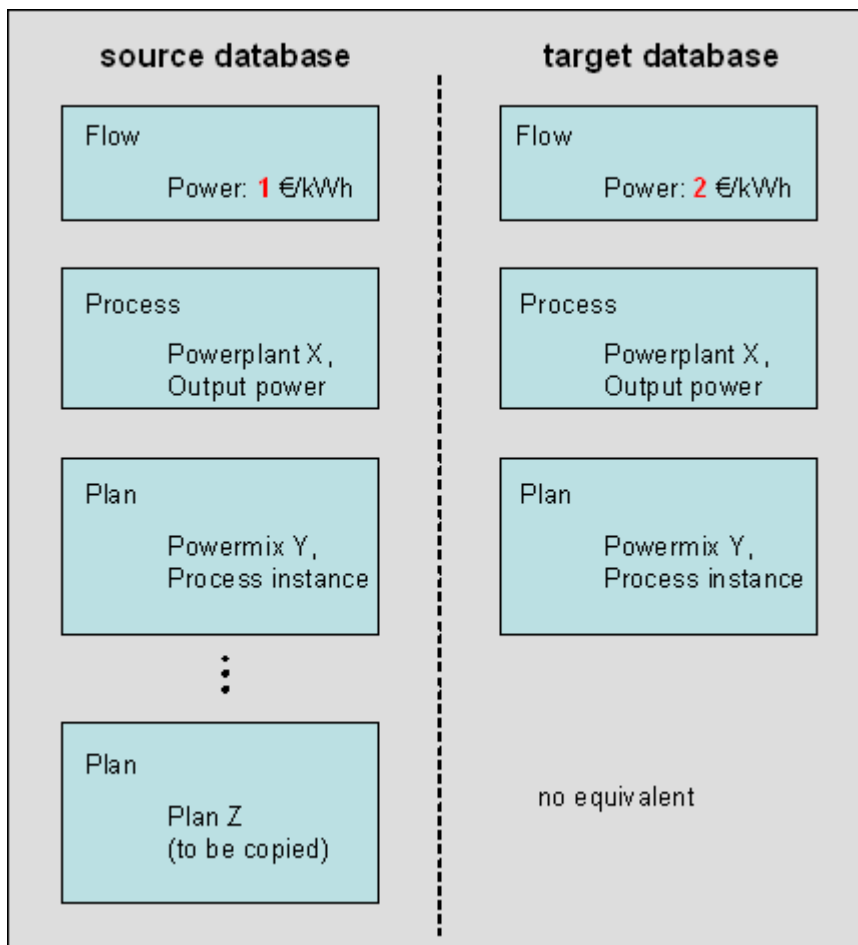


Figure: Initial situation when copying objects between databases

Problem description: 'Plan Z', which indirectly uses the 'Electricity' flow, is to be copied. The 'Electricity' flow will be changed with respect to the target database. This flow will be disposed as a copy by copying between databases using drag'n'drop. As a result, the process "Power plant X" is cross-referenced to the 'Electricity (Copy)' flow in the source database and to the 'Electricity' flow in the target database. The process "Power plant X" is therefore different from the process "Power plant X" in the target database and would consequently be created as a copy in the target database. The same is true for the over-lying plans, which must similarly be created as copies in the target database.

In the GBX import dialog box the user can specify that the 'Electricity' flow from the source database should be combined with the 'Electricity' flow in the target database. This way, both of the "Power plant X" processes will cross-reference to the same 'Electricity' flow and are thereby the same. Therefore, "Power plant X" process and the over-lying plans do not have to be copied into the target database. As a result, in this copying example, only 'Plan Z' will be disposed into the target database and the 'Electricity' flow will possibly (depending on the chosen combination method) be modified. (The method of combination chosen does not influence the analogousness of the process "Power plant X" and the over-lying plans in the source and the target databases.)

The objects that drop out as a result of the combination are shown as deactivated in the mapping list, they have a different color and font (in this case, the electricity flow). This procedure is termed as an automatic update of the objects to be imported.

7.17.1.2 ILCD data exchange

Datasets from PE International are modeled and documented according to ILCD recommendations, and if you export PE datasets into an ILCD archive, the file format, the archive structure and all included datasets are

compliant to ILCD.

However, if you import a dataset, which is not compliant to ILCD modeling guidelines, documentation guidelines or compliant to ILCD flow nomenclature, you just import it the way it is. If GaBi can import an ILCD archive, simply because it has the correct file format, this does not mean, that the data inside the file is ILCD compliant as well. Please ask the authors of those datasets about this.

7.17.1.2.1 ILCD Import

Basic information:

1. The archive to be imported needs to correspond to the ILCD format requirements.
2. To transfer data from GaBi to GaBi we recommend to use gbx and not ILCD.
3. Please be aware, that you import the datasets inside the ILCD archive "as is". This means, if you import data, which is not compliant to ILCD modeling guidelines, documentation guidelines or compliant to ILCD flow nomenclature, you just import them the way it is. If GaBi imports a file with the correct file format, this does not mean, that the data inside the file is ILCD compliant as well. Please ask the authors of those datasets about this.

Processes:

- Processes, which already exist in the import database are not imported; overwriting a process is not possible.
- The folder name of objects (their location of storage in a folder hierarchy) is also stored in the ILCD archive. When you import an object, GaBi will sort them in the appropriate folders, if they already exist.
- If no corresponding folder is found, the structure of the imported archive is used, starting with the folder ILCD\...
- The same applies for new flows, citations, users,...

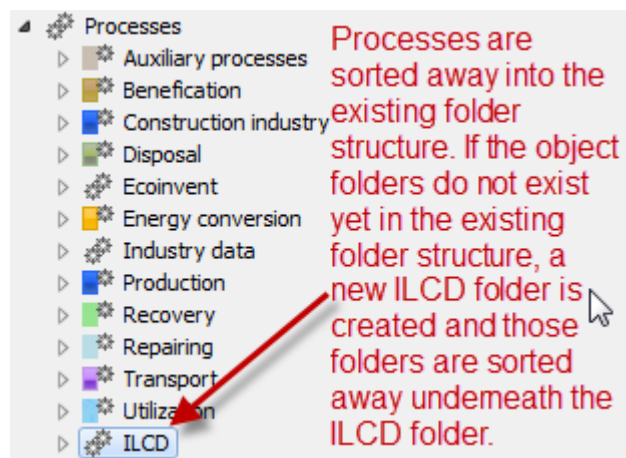


Figure: ILCD Process folder

Flows:

- Flows from an ILCD archive are only imported, if they are used in a process – otherwise you could import up to 40 000 ILCD flows (if they are in the archive) of which only 500 are used in the process you want to import...
- ILCD flows are "mapped" to existing GaBi flows. ILCD flows of an archive are not simply imported into the database, but they are "mapped" to existing GaBi flows. If you would import an emission flow (e.g. "CO2") into the GaBi database, this newly imported flow would not have any environmental quantity to calculate the GWP of this flow. If this import flow is "mapped" to the original GaBi flow "Carbon dioxide", it is guaranteed, that the existing GaBi flow already has a characterization for the GWP according to all LCIA methods.
- The flow mapping was created on basis of CAS codes per compartment.
- ILCD import flows, which could not be mapped to GaBi flows, are stored in a new "ILCD" flow folder. Please have a look into those folders and decide, if the flows inside could be relevant for the impact assessment. If yes, add environmental flows with an appropriate characterization factor to the flow.

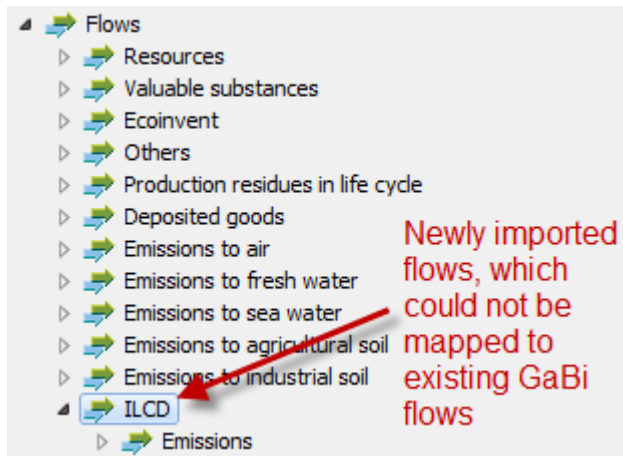


Figure: ILCD flow folder

LCIA:

GaBi already supports most of the ILCD recommended LCIA methods.

Supported LCIA methods are:

Acidification, accumulated exceedance
 CML2002 Resource Depletion, fossil and mineral, reserve Based
 IPCC global warming, incl biogenic carbon
 Particulate matter/Respiratory inorganics, RiskPoll
 ReCiPe 1.07 Endpoint (H) - Climate change Ecosystems
 ReCiPe 1.07 Endpoint (H) - Climate change Human Health
 ReCiPe 1.07 Endpoint (H) - Freshwater eutrophication
 ReCiPe 1.07 Endpoint (H) - Ozone depletion
 ReCiPe 1.07 Endpoint (H) - Photochemical oxidant formation
 ReCiPe 1.07 Endpoint (H) - Terrestrial acidification
 ReCiPe 1.07 Midpoint (H) - Freshwater eutrophication
 ReCiPe 1.07 Midpoint (H) - Ionising radiation
 ReCiPe 1.07 Midpoint (H) - Marine eutrophication
 ReCiPe 1.07 Midpoint (H) - Photochemical oxidant formation
 Terrestrial eutrophication, accumulated exceedance
 Total freshwater consumption, including rainwater (acc. to UBP 2006)
 TRACI 2.1, Ozone Depletion Air
 USEtox, Ecotoxicity (recommended)
 USEtox, Human toxicity, cancer (recommended)
 USEtox, Human toxicity, non-canc. (recommended)

7.17.1.2.2 ILCD Export

GaBi can export processes to ILCD archives. When a process is exported into an ILCD archive, also the the folder hierarchy, under which the process is stored (location of storage) and all underlying objects (flows, quantities, references, citations, docus etc., which are used in the process) are exported as well. If you export a single process, it is easily possible, that the ILCD archive contains 1000 subobjects of this project.

Exported flows are mapped to ILCD flows. They get ILCD specific UUID's and flow nomenclature. This means their name and unique ID is compliant to ILCD nomenclature. Datasets from PE International are modeled and documented according to ILCD recommendations, and if you export PE datasets into an ILCD archive, the file format, the archive structure and all included datasets are compliant to ILCD.

You can export one or several GaBi processes the following ways:

- Select one or more processes in the DB manager and go to the menu bar: Database/Export/ILCD...
- Select one or more processes inside a project window and go to the menu bar: Object/Export/ILCD...
- Select one or more processes inside the search window and export the dataset using the right click menu.

7.17.1.3 EcoSpold Data Exchange

EcoSpold format data files end in .xml and are subject to the schematic definition of EcoSpold (see <http://www.ecospold.org/download/espl.pdf>.) The GaBi system is able to import information from data files in an EcoSpold format and can also export several datasets in an EcoSpold data file. However, only information that exists in GaBi can be exported. Other information, such as detailed personnel data or data source references must be re-worked manually using an appropriate program.

7.17.1.3.1 EcoSpold Import

Information from EcoSpold files is imported via the menu in the GaBi Database Manager (Database/Import/EcoSpold file...). Once this item has been chosen, a dialog box appears in which you select the file you want to import. Confirm your choice by clicking OK.

The GaBi system subsequently opens the dialog box for the EcoSpold import. In the top half of this window is a list of the datasets from the chosen EcoSpold file. Choose the 'Object list' tab. With the option buttons on the left, you can select which datasets are to be considered for import. Furthermore, a Preview of the inputs and outputs from the dataset that is highlighted in the list appears.

An EcoSpold file can contain information in two different languages, whereby the second language is optional and need not be complete. Choose your desired language from the list (in the Figure, you can choose between 'en' and 'de'). You can check the data that is to be imported in the Preview in the lower section of the window.

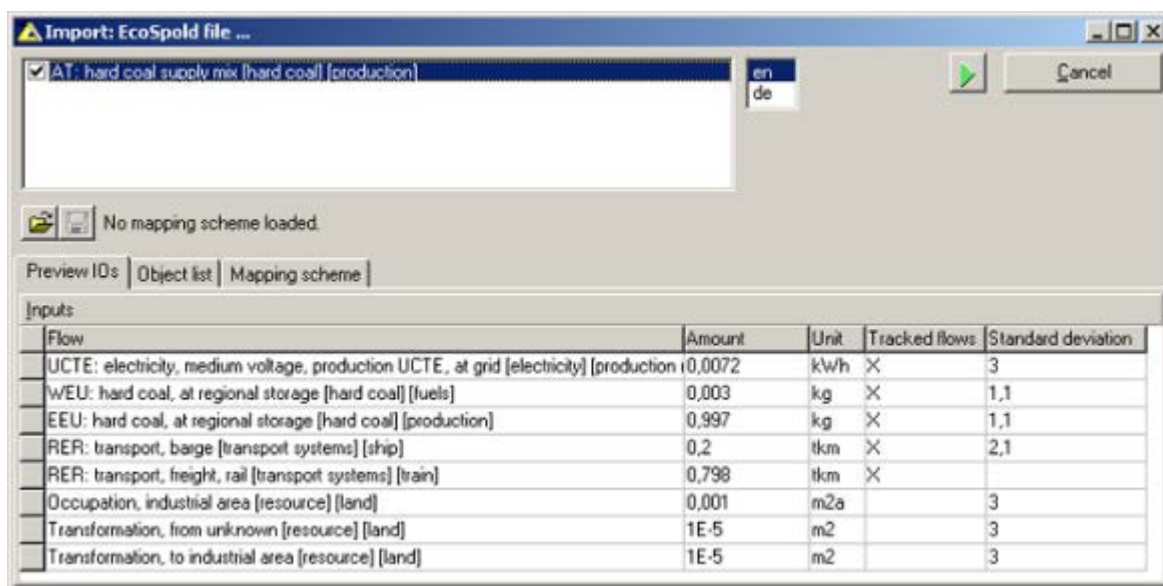


Figure: Window for importing EcoSpold files (Preview)

When importing EcoSpold data into existing GaBi databases, it is possible to construct a Mapping Scheme. In this, objects to be imported (mainly flows and flow object groups) will be assigned to objects in the GaBi database. Under the tab 'Mapping Scheme', the classifications can be altered using the text field. Mapping Schemes can be loaded using the open button on the left, changes can be saved in file form using the save button. Files for the GaBi Mapping Scheme have the ending ".gmp" (GaBi mapping).

Alternatively, new names can be assigned in the 'Object list' tab, which is perhaps easier than using the text field in the 'Mapping Scheme' tab.

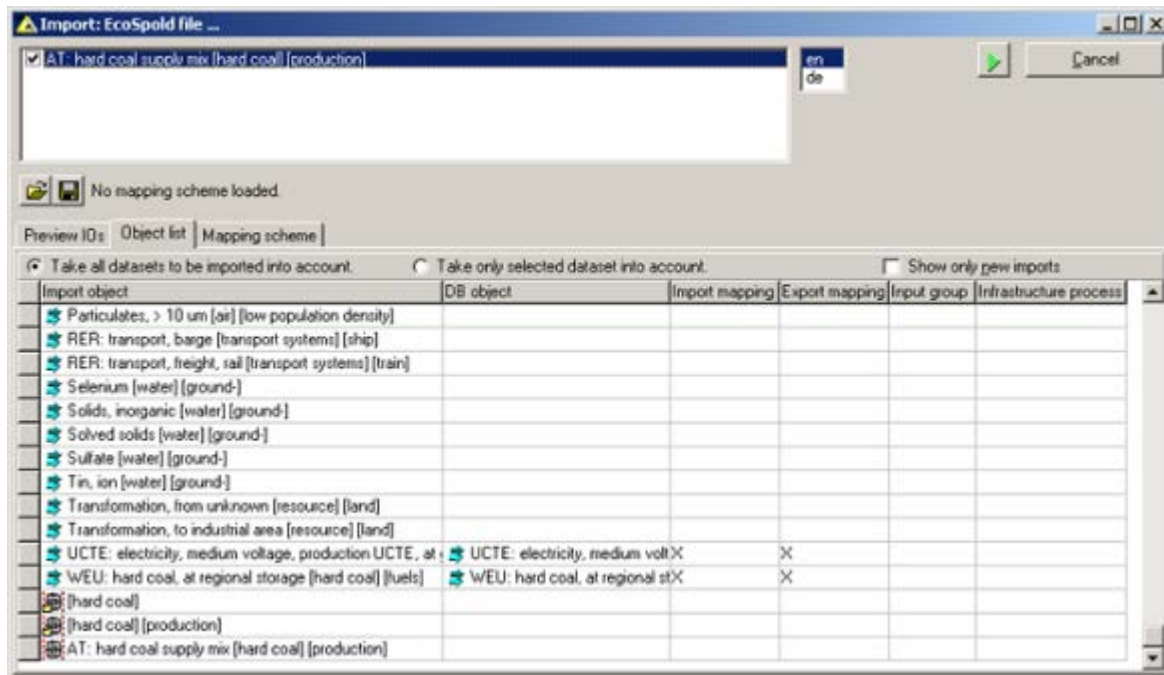


Figure: Window for importing EcoSpold files (Object List)

In the top row of this section, you can choose whether the objects of one dataset (the dataset highlighted in the top field of the window) or the objects of all the datasets to be imported are displayed. Furthermore, objects that already exist in the active GaBi Database can be hidden by ticking the 'Show just new imports' option.

If you want to assign an import object to an object in your GaBi Database, select the cell to the right of your import object (in the column 'DB object') and click on the button that appears there. Choose an Object from your GaBi Database in the dialog box that appears and confirm with OK. A classification will automatically be generated in the Mapping Scheme and in the Preview; the name of the Database Object appears in place of the imported name. Each classification will be denominated as to whether it is suitable for import or export procedures, or for both. (This is made possible by n:1-mapping). Aside from this, the necessary information for the export ('Input Group' and 'Infrastructure process') can be entered and saved with a Mapping Scheme.

As soon as the Preview shows the desired result, start the import procedure by clicking the Start button (the green arrow head). Following the Import, a protocol will appear where the new GaBi Objects are displayed. Imported EcoSpold Datasets will be automatically documented in individual files in the GaBi documentation index. Reference documents for the GaBi Processes and Impact Quantities will be automatically attached.

7.17.1.3.2 EcoSpold Export

The Export of EcoSpold files occurs in the same way as their Import. To do this, select the Dataset to be exported in the Database Manager and go to Database/Export/EcoSpold file... from the GaBi Database Manager Menu.

The Dialog box for the EcoSpold Import and Export appears, with a Preview of the data to be exported. In place of the 'Tracked Flows' column, familiar from GaBi processes, is the column 'Input Group' or 'Output Group', which is necessary for the EcoSpold format. The column 'Infrastructure process' also appears. Since the information from the columns 'Input Group' and 'Infrastructure Process' does not exist in GaBi Objects, the EcoSpold Export uses default values. The user can, however, enter values manually using the Object list and save them in the Mapping Scheme. (The information for the 'Object Group' will be automatically generated by GaBi.)

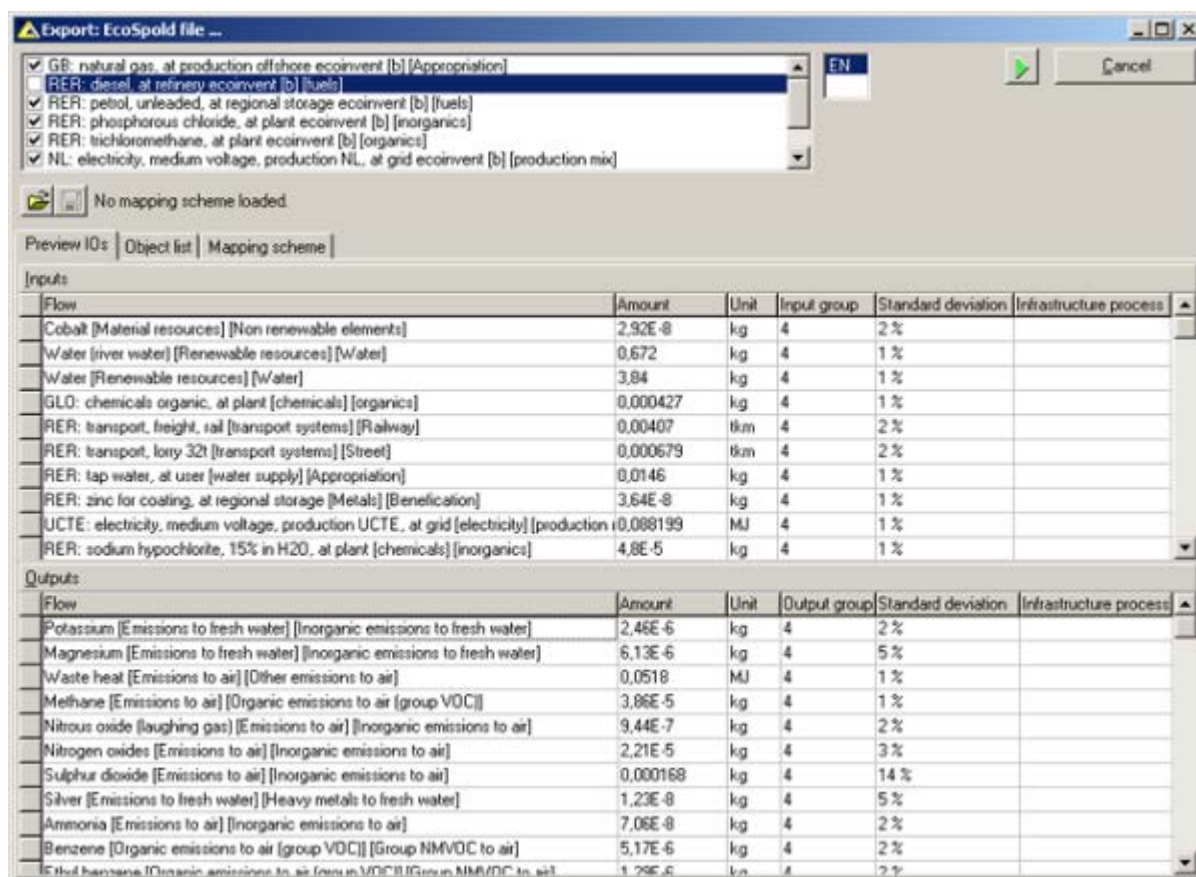


Figure: Window for exporting EcoSpold files (Object list)

The assignment of EcoSpold names for GaBi nomenclature is achieved through the reversed nature of the Export procedure. The user can, therefore, give assign a suitable EcoSpold nomenclature to the GaBi Objects shown in the Object list when exporting.

All documentation fields which are classified as EcoSpold fields in the EcoSpold tab of the exported process will be overtaken to the EcoSpold file.

After clicking the green arrow to start the Export, GaBi asks you to specify the file name of the file to be exported. Enter the chosen file name and press OK. Subsequently, the Export file will be automatically generated and confirmed with a success message.

Only information that exists in GaBi can be exported. Other information, such as detailed personnel data or data source references must be re-worked manually using an appropriate program.

7.17.1.4 Importing Processes from Excel

In order to be able to import *processes* from Microsoft Excel, the table format in Excel has to be modified to match GaBi requirements. Create this template simply **by copying an empty GaBi process to Microsoft Excel® (Section 7.17.1.5)**.

Follow these steps to import a process into an open GaBi process:

1. Open Excel and copy the entire process to be imported (already in GaBi unit process format).
2. Switch to GaBi and select a folder for the new *process*.
3. Create a new *process* in this folder.
4. Select the function "Insert total" in the "Object" menu of the process window.

The entire process is then inserted into the open GaBi process window.

Sometimes it is possible that objects used by the inserted process (i.e. *flows* and *quantities*) are not included in the database. GaBi will then display a query as to whether you want to insert this object or if you want to create a new

object to accommodate it.

If you want to create a new object it is generated automatically at the highest level of the corresponding object class in the DB manager hierarchy.

Important Note: *Newly created objects have to be assigned to the object group hierarchy by moving them to the correct location in the DB manager once the import process has been completed. If you neglect to assign the newly created object, GaBi will display the same prompt for newly created objects each and every time you import a process. If you confirm the prompt GaBi will create an identical object with a different creation date. This may be confusing and lead to mix-ups.*

If similar or identical object definitions already exist in the database you should **combine (Section 7.15.3)** these with the newly added definition.

7.17.1.5 Exporting Processes to Excel

Exporting GaBi processes to Excel is just as easy and fast as the import:

1. Select the function "Copy all" in the "Object" menu of the process window.
2. Switch to an open Excel worksheet.
3. In Excel, select "Paste".
4. Save the *process* in Excel.

7.17.2 GaBi Object Search

You can search for objects in the GaBi database automatically based on specific criteria. The GaBi object search supports you not only when searching in the DB manager but also helps you to make decisions in what to select in different object windows (*quantities, flows, processes, etc.*).

The GaBi object search function is based on the Windows Explorer® search functionality. Follow these steps to search for objects in the active database:

1. Open the database manager.
2. Click the arrow sign of the structure tree (database hierarchy) on the left section of database manager window until you can see the folder in which you want to search for an object. Select the folder and the system initially automatically searches through the first level, i.e. the object type level. It is not possible to search the entire database in one step. However, once an object type has been selected you can search all folders assigned to this object type in one step as well.
3. Click the desired folder.
4. Then click the "Search" icon in the toolbar.

The GaBi object search window opens. This window features four different options; click the tab to access the desired search option:

- Enter up to two character strings in the "Complete search" dialog, which the system then uses to search GaBi objects. Use Boolean operators such as "AND" (both character strings have to be included) and "OR" (one of the two character strings has to be included). The search result will then include all objects with these character strings.
- Enter a character string matching objects/folders in the "Description" field of the "Name/Place" dialog. Select the option to search all subfolders below the "Search" field.

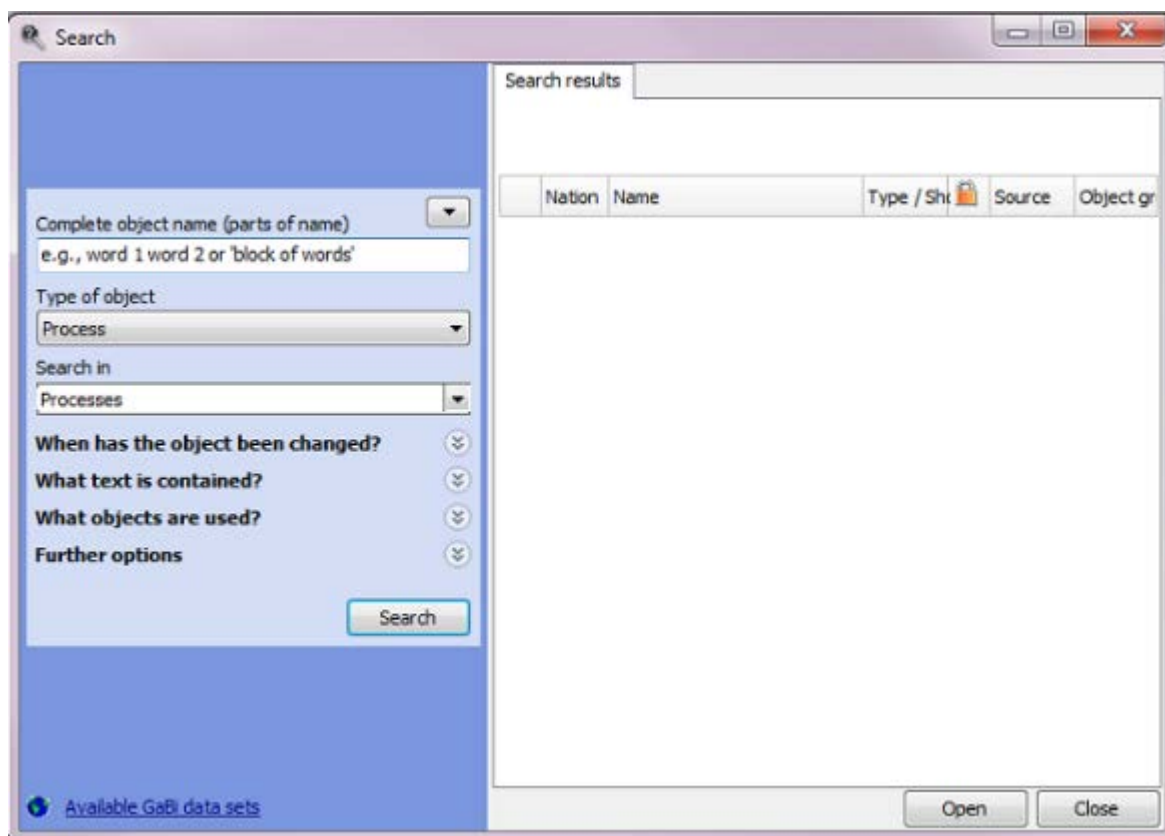


Fig: GaBi search tool options

- Indicate a specific time period as the search criterion in the "Modification date" dialogue. Searching will then return all objects saved within the specified period of time. Either enter the start or end date or the time period (from current session backward).
- Specify the location of object use in the "Use" dialogue.
- Once you have finished specifying your search criteria a click on the "Start" button.

GaBi now searches for all those objects that match your search criteria. The result is displayed in an object list below the input fields. Objects on this list can be used the same way as in the database manager: You can move or copy them, add them to *plans*, etc. The type of operation possible depends on the object type. Actions and operations are also described in detail in the respective chapters of this manual.

Start additional search options (interrupted flows, negative flows, in specific plans or object copies) with the menu option "Extras" in the search window.

7.17.3 Documentation

In GaBi you have several possibilities to document GaBi objects:

- You can assign any object used to any project and use the ISO documentation tab of the project to described the use of those objects.
- You can enter process information according to the ILCD standard
 - in the process documentation tab
 - in the flow documentation tab
 - in the quantity documentation tab

- You can link the documentation to:

- User
- Contacts
- Quality indicators
- References, Citations

- The linking of any object with one or several external files from any Windows application.

ExternalObject documentation is accessed by all GaBi objects the same way. This is done by a click on the documentation button next to the object's name field. The content and format of the documentation is determined by you, the GaBi user.

ISO 14041 requires documentation of modules (or in GaBi terminology: *processes*).

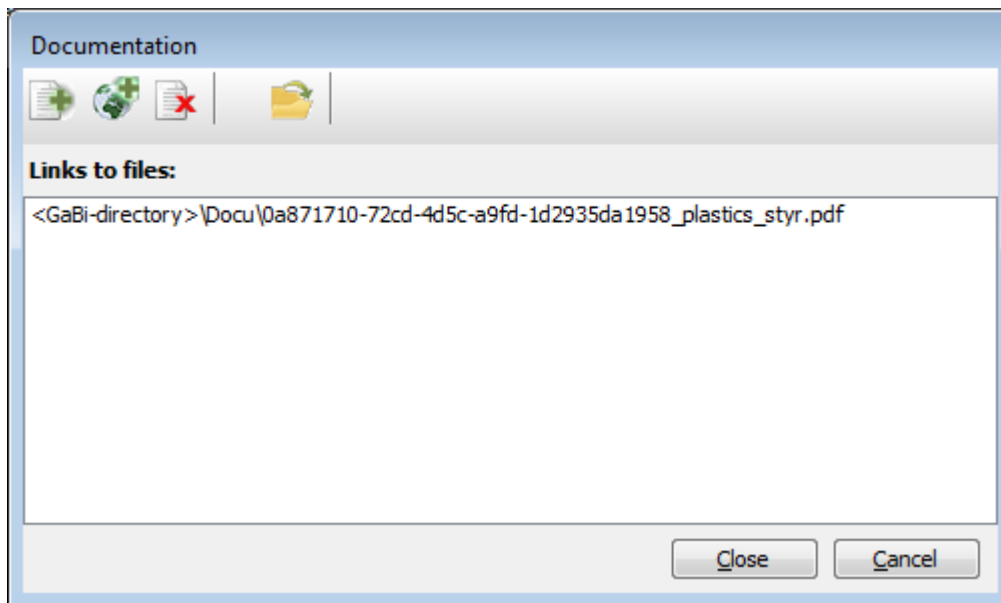


Figure: GaBi documentation window

Please follow these steps to link your own documentation files to a GaBi object:

1. Click on the "Documentation" button in the upper right corner of the current object window (just below the toolbar). The "Documentation" window opens.
2. Click the "Add" button.
3. Select a file from the system location, for example on your computer.
4. Click the "Open" button. This action accepts the selected file and adds it to the "File name" field.
5. Click "OK".

Click "Remove" to delete a file you no longer need.

To view a documentation file linked with the current object:

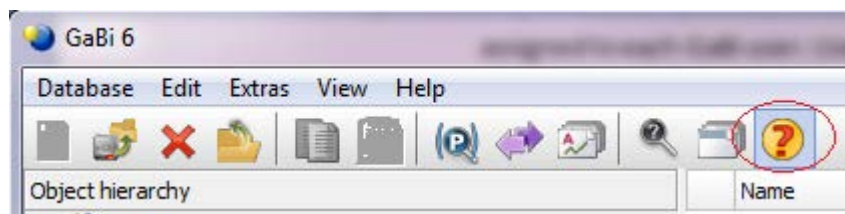
1. Click on the "Documentation" icon next to the object's name field. Select a documentation file in the "Documentation" window.
2. Click "Open".

This action starts the application of your operating system with which the file type is linked. However, to do so the file type has to point to a specific application and this application has to function properly on your computer.

Note: If you linked a documentation file and transfer the dataset/database to another computer, the file is not included in this transfer. External documentation must be copied manually and the link must be the same as on the source computer.

7.17.4 GaBi Online Help

GaBi features an integrated help system; click the help button located in the window of every GaBi object type and the database manager.



The help system provides an overview of the GaBi system and assists you during your first steps. The help system also offers detailed explanations for all object window functions as well as definitions of the associated basic terminology.

7.17.5 Configuring the View of GaBi Windows

Every GaBi window (except the overview window) may be customized to meet your specific needs. Use the grabber in the lower right corner to adjust the size of the window. The upper right corner of each window features the standard icons to minimize/maximize, restore and close the window.

These settings can be saved. The window will then always open with your specific configuration. Select "Save settings" in the "View" menu. Select "Load settings" in the "View" menu to restore previously saved settings.

7.18 Life Cycle Working Environment

"Life Cycle Working Environment" (LCWE) is a term describing the integration of workplace related socio-economic aspects into a life cycle model. This chapter explains this method in more detail.

The purpose of this method and its integration into GaBi software is to add socio-economic aspects to traditional LCA methods. The GaBi software system is the first complete sustainability software to integrate the three core areas of sustainability into one life cycle: ecological, economic, and social issues.

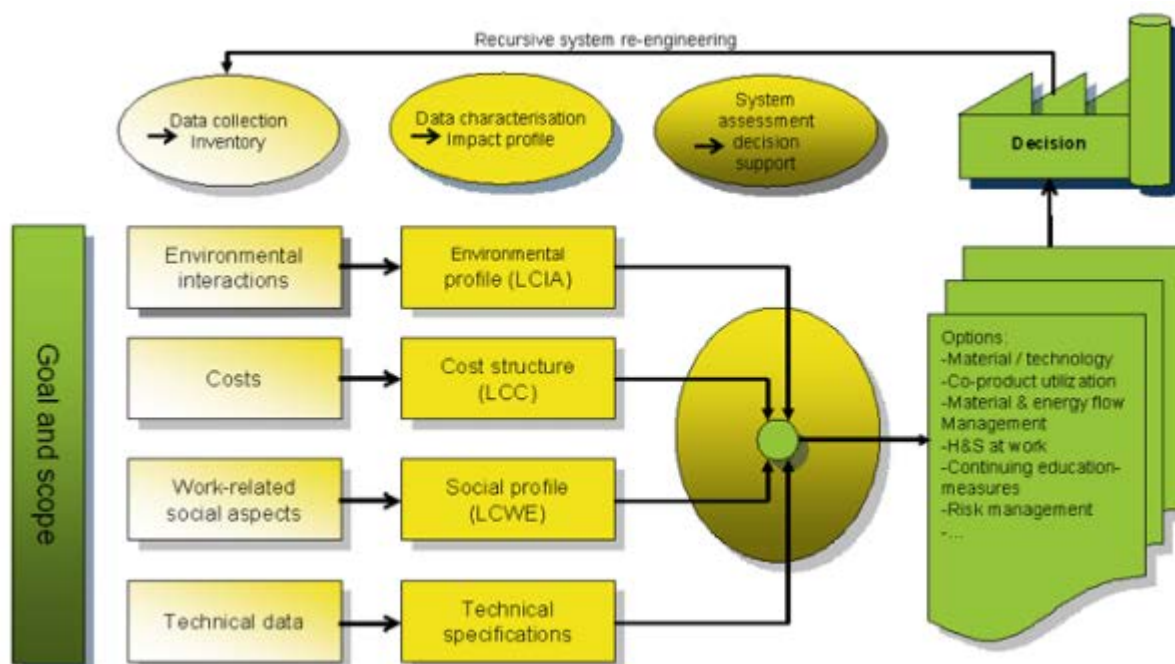


Figure: Core areas of sustainability integrated into product optimization

The **method** was developed and implemented within the scope of a project financially supported by the European Commission (Project No.: QLRT-1999-01298).

You can use the LCWE method to model and evaluate or simply to document socio-economic aspects. The following section describes the use of the features in the software and provides some important notes around data collection. You can use the method developed at the University of Stuttgart, LBP as a base model plus create and use additional custom indicators and quantities.

7.18.1 Utilizing the LCWE Functionality in GaBi

A sample of how to utilize the socio-economic indicators is available within the plan "DE: Case photocopier plastic parts" under Part Production. Processes and their values used in this plan are listed on the "LCWE" tab of the DB object. To view the results, calculate the balance of this plan and select the "LCWE" tab within the higher level Balance tab.

7.18.1.1 LCWE Modeling on Process Level

The socio-economic elementary flows developed at the LBP are used as the default settings. These socio-economic elementary flows are displayed in the LCWE tab of every basic process. They are read and imported by default since they are located under "Flows/Others/Socio-economic Process Information" directly in the three flow groups "Qualified Work Time (QWT)", "Health and Safety at the Workplace (HSWT)", and "Humane Working Conditions (HWT)".

Follow these steps to create your own elementary flows: Create additional flow groups in the DB Manager under the QWT, HSWT, or HWT flow groups and then add newly defined custom elementary flows to it. This procedure also applies when creating other flows in GaBi (see corresponding chapter). To maintain consistency, it is recommended to use either the quantities supplied by the software listed under "Quantities/Social Quantities" or the quantities specially created by you in this flow group as reference quantities. The same applies to the units of socio-economic quantities listed under "Units/Social Units".

Using socio-economic elementary flows: If you have created new flow groups and flows, select the flow groups (see Figure 3-64, bold table headers "Qualified Work Time (QWT) – Default Values", etc.) displayed in the pull-down menu of the table of the basic processes for which you want to enter socio-economic values. All *flows* of the flow group are then displayed in the corresponding *process* table. A QWT, HSWP, or HWC flow group thus also defines an associated set of *flows*. If LCWE information is indicated for a GaBi process this always has to be used together and saved with amount specifications. After the *process* has been saved, the flow groups you have selected will be listed again when re-opening the table. The default flow groups provided, QWT, HSWP, and HWC, are displayed if *processes* have not been edited or processed yet. (These are also displayed if you have yet to enter any values into the new elementary flows.)

Caution: *Never delete or move the flow groups or flows provided by PE and enclosed with the software!*

Different socio-economic elementary flows are determined. These flows are also separated into INTERNAL and EXTERNAL areas. The ratio and the conventions applied by us are described in further detail below.

To allow the LCWE inventories to have a connection available in the respective process of a parameterization, the fields "Alias/Factor" have been included. Here you can enter a number as a multiplication factor or a parameter previously created and calculated in the "Parameter" table. The value of the factor or parameter is multiplied with the values in the LCWE table.

The specified standard deviation range can be used by the GaBi Analyst for Monte Carlo error analysis.

Data origin information can be used the same way as with other *flows* (see corresponding chapters).

LCWE values are not displayed in process instances but are scaled according to the *flows*. They can also be changed with a modified local parameterization. Furthermore, the LCWE information of every process can be **allocated** (Section 7.7) according to criteria other than its LCA or LCC flows.

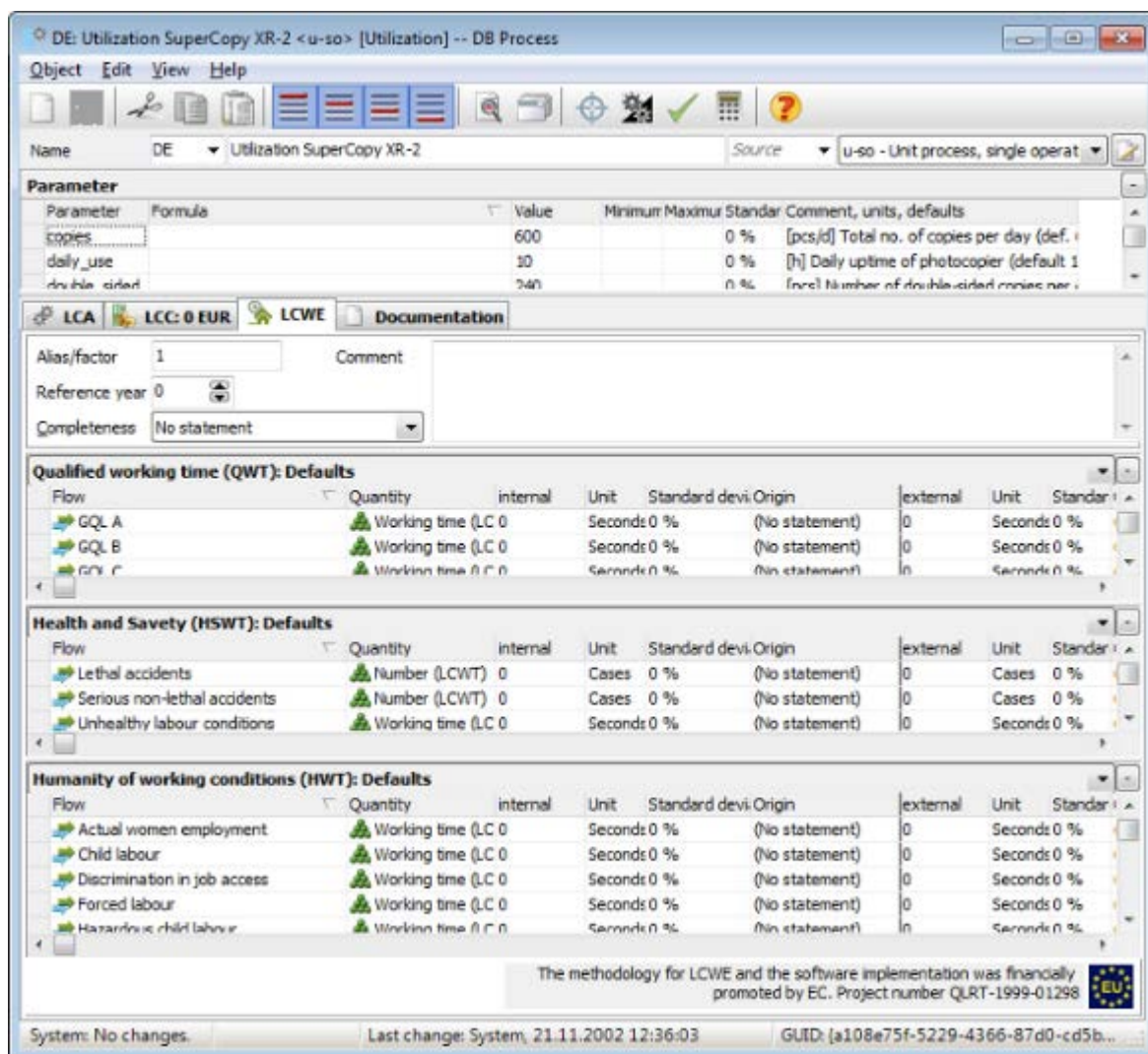


Figure: Object type "process" window (LCWE)

7.18.1.2 LCWE Balance Evaluation

The LCWE balancing calculation is performed automatically and in parallel with the general balance calculation. The aggregated socio-economic life cycle balances are listed on the LCWE tabs of the *balance tab*. These are analyzed and shown in line with the eco-balance. (Please consult additional sections of this chapter for further information about normalizing and weighting.) All balance functions are available in their entirety – from weak-point-analysis to diagrams to scenario analysis. However, there are a few small differences compared with the LCA balance: *Balance* displays the three areas QWT, HSWP, HWC in separate tables instead of in output and input tables. They are also separated into INTERNAL and EXTERNAL areas. However, these can also be aggregated into a total value. This requires checking the box in the upper area of the balance LCWE tab used to toggle between these options.

Tip: The LCWE tab can be shown first by default (DB Manager options setting) for processes and balances if you are working frequently with LCWE.

7.18.2 Information on Default Methodology Developed at LBP

7.18.2.1 Selection of Socio-economic Goals and Indicators

The key issue for the selection of socio-economic goals and indicators in the project was as follows: "Which objective, relevant, product- or process-related socio-economic criteria exist? And, which indicators are suitable to be integrated, aggregated and evaluated consistently into the life cycle modeling process?" Publications of numerous international and national organizations pertaining to the topic "Social and Socio-economic Sustainability" (UN-CED, ILO, FAO, WHO, UN-CSD, OECD, WWF, Enquête Commission "Protection of People and Environment", China's Agenda 21, Der Unternehmenstester [The Company Tester], CEPAA – SA 8000, DGB) were evaluated. The following table is a summary of socio-economic goals and indicators selected based on the criteria listed above and which are considered by the methodology and integrated into the database of socio-economic sustainability indicators:

Social Goal*	Indicator(s)*
Creating qualified workplace and fostering qualified working time (QWT)	• Paid working time (= basic indicator) • Qualification profile of workplace (divided into 5 qualification levels) • [Professional education and continuous training times]** • [Contract life, dismissal protection]** • [Adherence to collective minimum wages]**
Humanity and modifiability of the working time and conditions(HWT)	• Prohibition of especially heavy forms of child labor • Prohibition of child labor • Prohibition of forced labor • Equal access to work regardless of gender, country of origin, religion, skin color, disability, etc. • Equal pay for equal work of men and women • Actual share of women's labor • Right to unionize • Right to unionize • [Adherence to break times, daily and weekly max. work hours]** • [Work hour flexibility]** • [Participation culture and promotional opportunities]** • [Employee satisfaction]**
Protection and safeguarding of human health (H&S)	• Occupation accidents resulting in death • Occupation accidents not resulting in death • Severity of work (noise, dust, heat, cold, hazardous substances [MWC]) • [Illnesses caused by occupation]**

* If it seems as if goals or indicators are missing here or if actual goals and indicators are missing, please feel free to contact PE, as we are quite willing to explain and discuss these selections.

** Indicators in square brackets are either meaningless for average values or only of interest when considering individual companies or are (not yet) meaningfully quantifiable, i.e. they have to be methodically further developed or argumentatively, qualitatively integrated. Currently, we feel that the deliberate exclusion of individual indicators from the quantitative assessment (with simultaneous argumentative integration) results in a higher level of informational accuracy as well as transparency than if forcefully integrated.

7.18.2.2 Concept and Utilization of Socio-economic Flows

LCWE indicators are related to the performed work time within each respectively viewed *process*. Work time has the function of a basic reference quantity. This context is used when relating the indicators to the functional unit of the *process*. For example, the process of manufacturing 1 kg of tool steel has a basic "paid work time" indicator with the basic measurement quantity of "seconds of paid work per kg of tool steel".

This basic reference quantity is further specified with the help of other indicators. For example, the indicator "qualification profile of workplace" yields the measurement quantities "seconds of paid work at qualification level A per kg of tool steel" (with total of 5 qualification levels from A = "diploma and higher" to E = "untrained/trainee"). The indicator "occupational accidents not resulting in death" yields the rate of "occupation accidents not resulting in death per kg of tool steel", for example. All other indicators are used the same way.

If a reference to the performed work (measured in seconds) is created, it is initially possible to refer to the functional unit of the *process*. Furthermore, the values of the measurement quantities can be quantitatively aggregated across the entire life cycle of the products. Only this quantification (displayed in absolute number values that can be added) makes it possible to summarize the socio-economic indicators covering the product life cycle related to the product and thus allows for meaningful comparisons between products and *processes*. It is also possible to harmoniously embed the socio-economic sustainability indicators into the methods and software of the overall balancing and LCWE.

The selection of system limits, cut-off criteria, and allocation methods, as well as characterization, normalization, and (by expansion of the ISO standard possible) weightings of the active categories - as described in the eco-balancing according to ISO 14040 et seq. - follows the same steps as the selection of socio-economic indicators.

The difference between the LWCE and LCA results is that here, the active categories are identical to socio-economic elementary flows, i.e., are shown at a ratio of 1:1 to the active categories. (Contrary to the eco-balance where, e.g. the elementary flows "CO₂ in air" and "CH₄ in air" are weighted differently and summarized as greenhouse warming potential.) In addition to the principally harmful active categories such as "child labor", "occupational accidents", etc. there are also basically positive categories such as "qualified work seconds" or "share of women's labor".

The illustration shows a result displayed over the entire life cycle (here cradle-to-gate) of an aggregated socio-economic profile of a product (1 kg of a material). Selection of effective categories in the area of "qualified work time" (top), "Humane Working Conditions" (left bottom), and "Occupational Health and Safety" (right bottom). Those categories that are basically positive (creation of jobs) are shown in blue, those that are basically negative (child labor) in red.

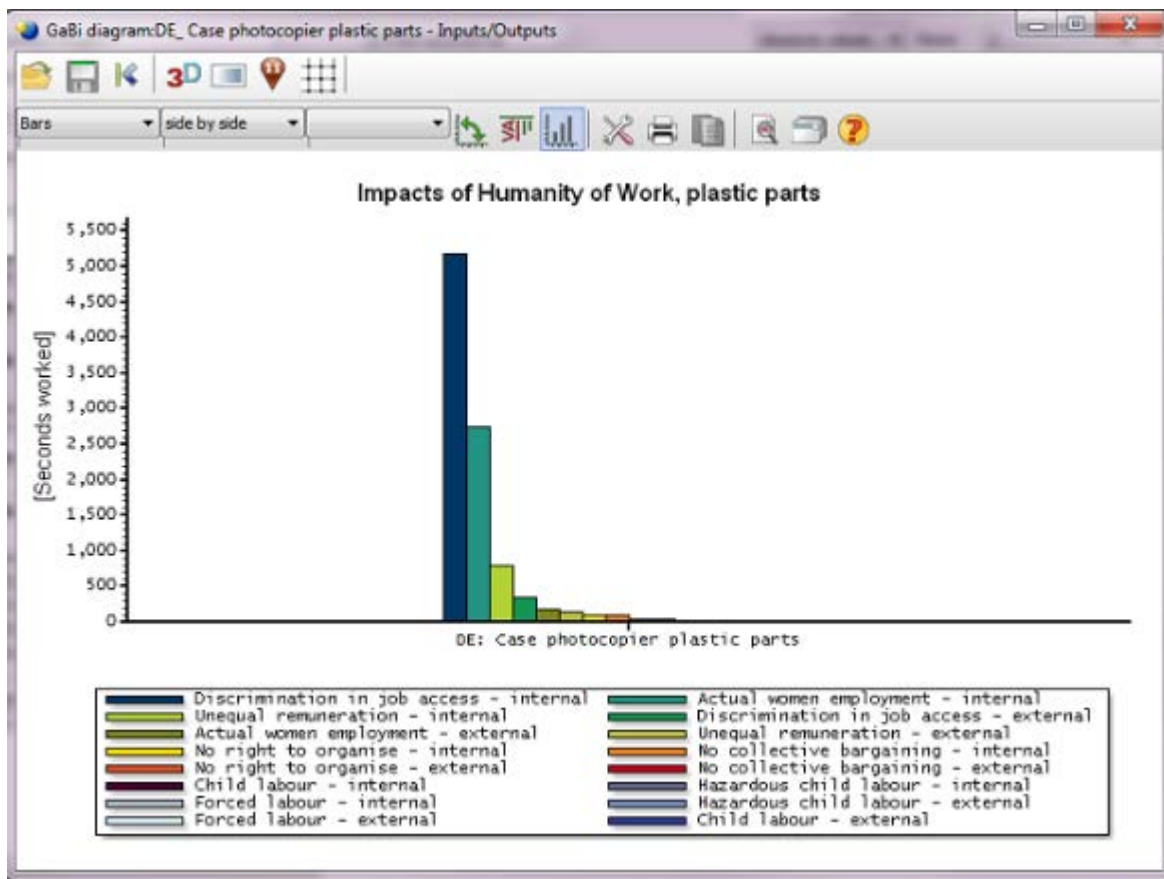


Figure: Profile of product aggregated socio-economic over the product life cycle

The **normalization factors** available with the next database upgrade are determined from the respective problem fields (e.g. unemployment in Germany, total number of occupational accidents in Germany resulting in death, etc.).

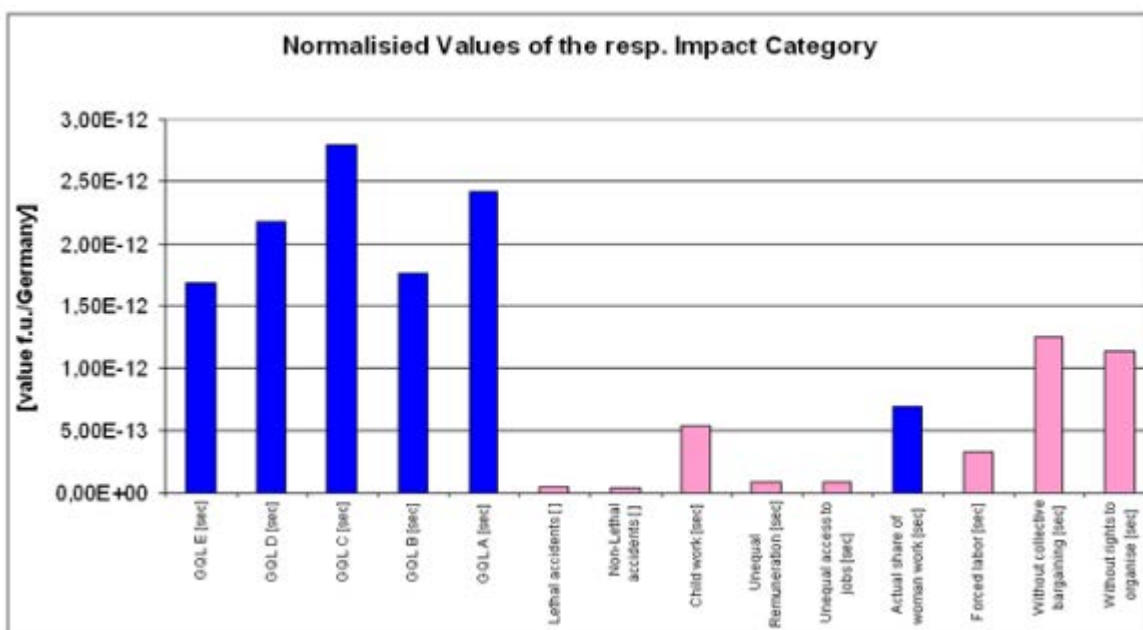


Figure: Normalized socio-economic indicators

Weighting: LCWE Quantities are available for analysis through the same balance and dashboard views as other GaBi quantities and flows. This requires weighting the normalized socio-economic indicators in comparison with

one another.

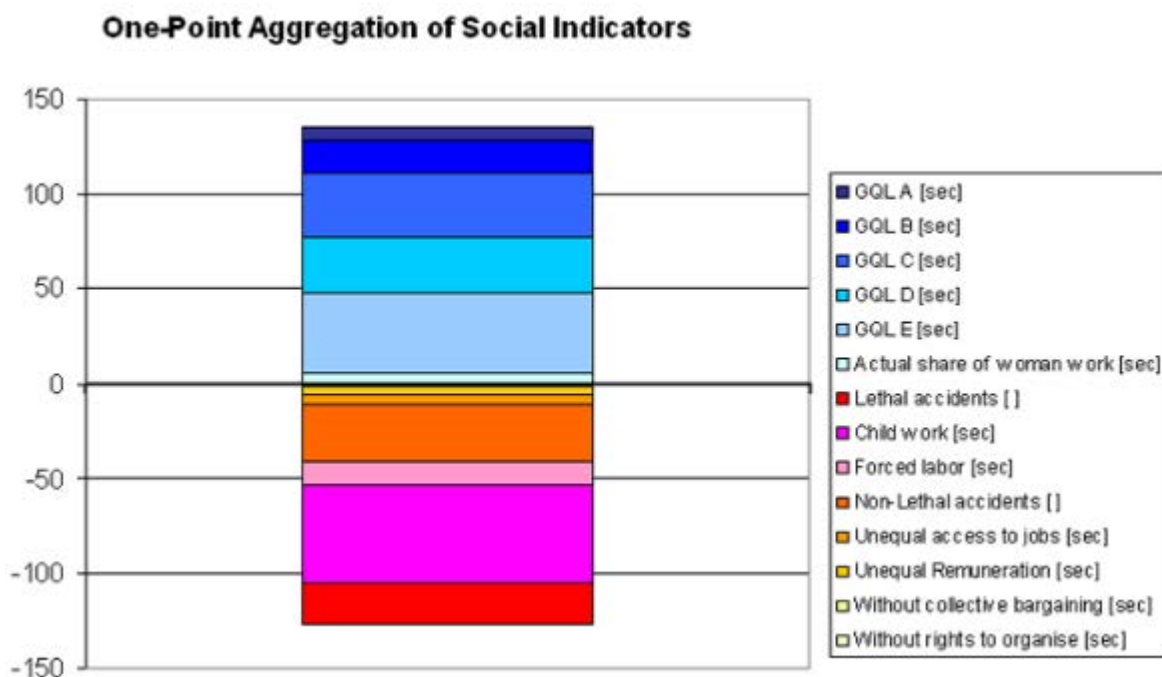


Figure: Socio-economic one-point aggregation

We suggest using positive as well as negative weighting factors to take into account the different quality of the indicators. The LBP will develop a suggestion and include with the database. However, we do not consider such a point aggregation practical for either the environmental or the socio-economic indicators due to the loss of transparency.

7.18.3 Description of the Socio-economic Flows Developed at the LBP

The following socio-economic elementary default flows (units in square brackets) are located in the "LCWE" tab of every basic process:

Qualified Work Time (QWT)

Qualification profile of workplace (divided into 5 "general qualification levels"):

GQL A: Diploma and higher or training/bachelor plus management [sec]

GQL B: Bachelor/training plus technical college required [sec]

GQL C: "Typical" vocational jobs, several years of education & training required [sec]

GQL D: Medium-term training and certain technical, mathematical, language skills required [sec]

GQL E: Workplace for untrained or trainee employees [sec]

Note: This structure is based on the 11 "Education and Training Levels" of the Occupational Employment Statistics as listed by the US Bureau of Labor Statistics. Detailed documentation will be included in the database when it ships.

Occupational Health and Safety (H&S)

Accidents resulting in death [number]

Accidents not resulting in death [number]

Work posing a health hazard

Note: We are currently checking whether accidents are to be measured in "disability adjusted life years lost". In "work posing a health risk", different stresses of a workplace are weighted with one another expressed as

weighted work seconds. Detailed documentation will be included in the database when it ships.

Humane Work Conditions (HWT)

- Especially heavy child labor [sec]
- Child labor [sec]
- Forced labor [sec]
- Inequalities concerning career/job choice [sec]
- Unequal remuneration [sec]
- Actual number of women hired [sec]
- Without the right to unionize [sec]
- Without the right for collective wage negotiations [sec]

Note: The "humane work conditions" elementary flows are based on compliance with the corresponding conventions of international labor organizations. The first three elementary flows record the seconds of actual child or forced labor (something practically irrelevant in OECD countries but applicable in many other countries.) "Actual women's work" counts the seconds of process-related work time actually performed by women. The elementary flow "inequalities concerning job choice" refers to groups who are being discriminated against based on gender, skin color, religion, political association, etc. If discrimination exists (=violation of corresponding ILO convention), all work seconds performed overall in the corresponding process are added in this elementary flow. The same applies to the elementary flows "without right to unionize" and "without right for collective wage negotiations". Finally, all process-related work seconds for "unequal compensation" are added and also multiplied with the quotient

Detailed documentation will be included in the database.

The socio-economic elementary flows are – as described above – read and imported by default since they are located under "Flows/Others/Socio-economic Process Information" directly in the three flow groups "Qualified Work Time (QWT)", "Health and Safety at the Workplace (HSWT)", and "Humane Working Conditions (HWT)".

7.18.4 Differentiation between INTERNAL and EXTERNAL

Different socio-economic elementary flows are determined. These flows are also divided into INTERNAL and EXTERNAL causes. The idea behind this differentiation is that reality will frequently exhibit clearly different system limits between the technical ecological life cycle modeling (here assumed to be the basis) and the socio-economic life cycle modeling.

For example, administrative overhead and equipment availability are frequently not very relevant in terms of the environment and are not considered due to LCA cut-off criteria. However, these areas are highly labor intensive and thus should be considered by the socio-economic life cycle analysis (cf. Figure 3-68 as an illustrative example). We use the following conventions in this case: All employees working for the company operating the respective process are considered INTERNAL; for example, plant workers, administration, lab, etc. All externally induced workplace-related effects, which are not registered in the socio-economic life cycle model, i.e. the aggregates of the socio-economic balances of non-modeled machines, external cleaning teams, etc. are considered EXTERNAL causes. EXTERNAL balances can be determined using economic input/output matrixes, for example. This is also the path that we are taking for the socio-economic database.

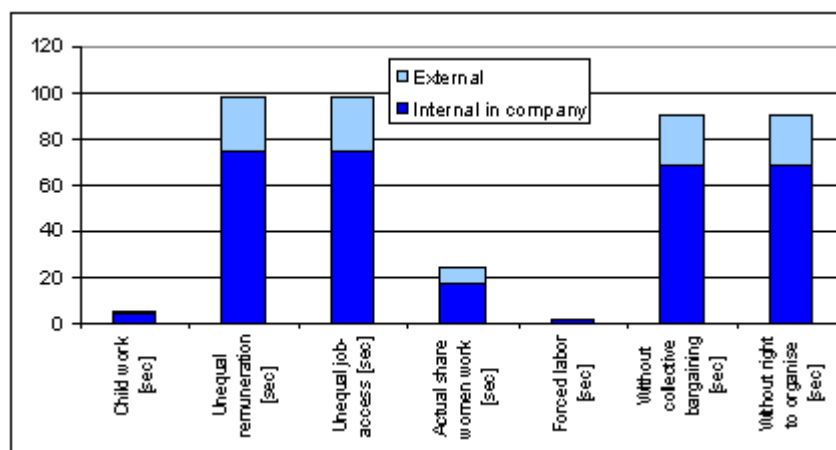


Figure: EXTERNAL and INTERNAL source of socio-economic indicators

+ ("sum of all work seconds performed directly on or with process")
 / ("quantity of work seconds of all other company or site employees")
 / ("value added by company or site")
 * ("net output by examined process")

The (in their result quantitative dominant)

INTERNAL balances are calculated as follows in case of an explicit data survey for a process in a company:

This will make sure all internal overheads are well taken into account. Background: The employees directly working on/with the *process* constitute only a portion (typically between 30 and 80%) of the work time performed intra-enterprise related to the process directly or indirectly. It therefore stands to reason that the internal overhead has to be included to avoid distortions when making comparisons – especially when comparing different industries with significantly different overheads.

7.19 GaBi Process Recording Tool

The GaBi process recording tool was developed to support data collection, especially from individuals not using GaBi software. It sends a small Windows application via e-mail, which can then be used by the recipient to enter data into one or several GaBi processes. Once data input is concluded, data is returned via e-mail and can then be imported directly into GaBi.

The steps to collect data with the GaBi process recording tool:

1. Create one or several processes in GaBi for which you would like to record data. You can either create completely empty processes or add flows so that the provider of the data may enter the corresponding flow quantities.
2. Select the desired *processes* in the DB Manager. Select several processes at once by pressing the Ctrl key when making your selection.
3. Select "Export" and then "GPR file" in the "Database" menu.
4. GaBi now opens a window where you enter the e-mail address of the recipient and the sender.

Export: GPR file

File name: GaBi_2011_08_30.gpr Create gpr file

Send to email: j.smith@user.com

My email: gabi@pe-international.com

Email text: Please replace this line with your email text (multiple lines are possible).

Nation	Name	Type / Source	Last change
DE	Power grid mix	agg	18.12.2002 16:46:42

Cancel

Fig: Entering address information in the GaBi process recording tool

5. Enter sender and recipient e-mail into the corresponding fields. Click "Send" to send the message via a MAPI compliant e-mail program (e.g. Microsoft Outlook®). GaBi now creates a new message to the previously entered recipient in the e-mail program. In addition to the automatically included and modifiable message text containing instructions of use for the recipient, this message has three files attachments as well:
 - a. The *.gpr file you generated containing the process data.
 - b. GaBiPR.exe as data input program.
 - c. GaBiPR.hlp, the data recording tool's online help.
6. Now send the files via e-mail.

Note: If you do not have access to a MAPI compliant e-mail system you can send the message manually as well using any other e-mail program. In the Export window (cf. Figure below) click "Generate gpr file". The desired file is now generated in the directory of your database. Now start your e-mail client, create a message to the recipient, and attach the three files. The *.GPR file is generated in the directory of your database. GaBiPR.exe and GaBiPR.hlp are located in the GaBi installation directory.

Steps to follow by the data provider:

- Create a new directory with Windows Explorer.
- Save all files attached to the e-mail in the newly created directory.
- Launch the "GaBiPR.exe" file in the newly created directory.

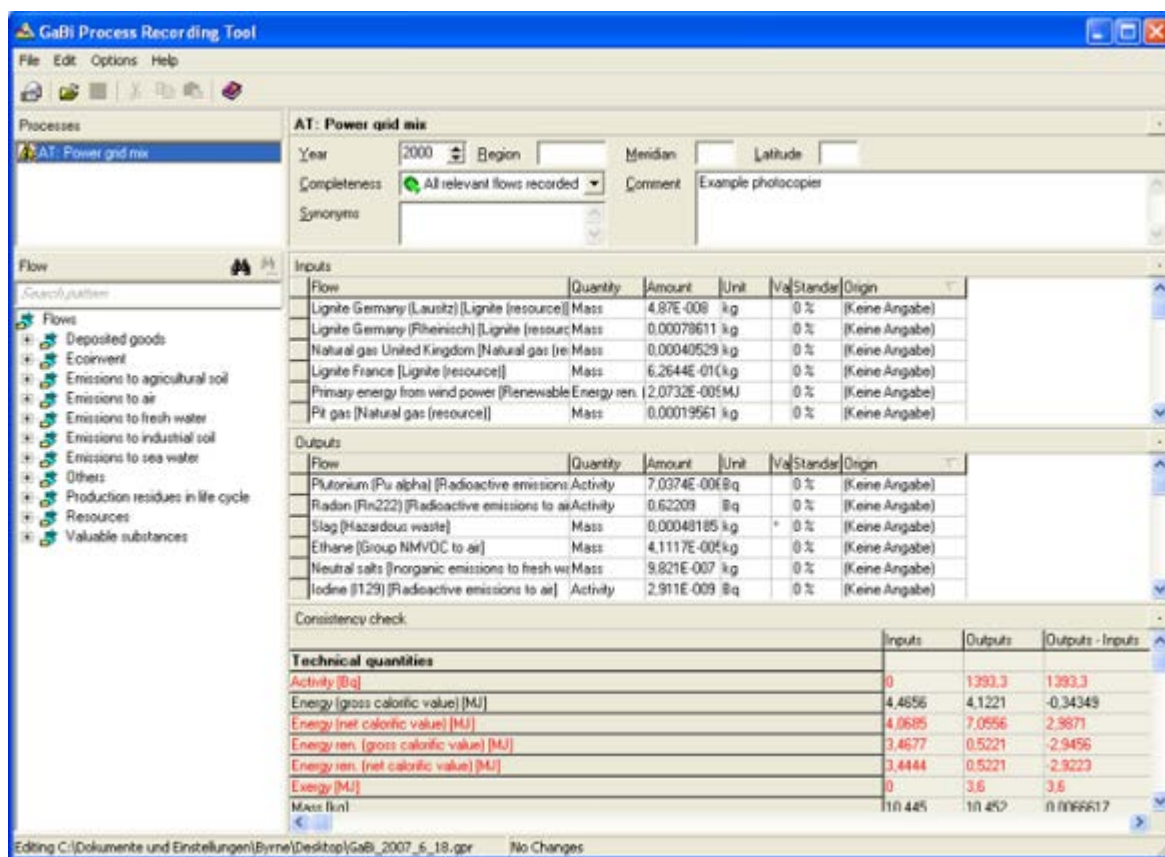


Figure: GaBi process recording tool

The exported GPR file is automatically loaded after the application is launched. As shown in the example in the Figure above the user only has to specify the corresponding quantities and return the mail ("File->Reply") to the sender. Of course, additional flows can be added from the flow list displayed in the left section of the window to the process using drag-and-drop. You can also create new processes in the "Process" field using the context menu of the right mouse button.

Importing externally recorded data:

Use the following menu to import the returned data:

"Database" -> "Import" -> "GPR file.."..

Note: GPR files can only be imported into the database from which they were exported. If possible, do not modify the database from which the GPR files have been exported to avoid data handling conflicts. An overview of the GPR exports and imports from a database are listed in the "Tools" -> "Manage GPR export" menu in the database manager.

7.20 GaBi History

GaBi saves every change made to any object in a database which can then be opened as the GaBi History of a DB object, a folder or an entire database. This allows to exactly track which user edited, created or deleted an object, at what time. It is therefore easier to understand what a modeler intended, than by only having a look at the finished object. Furthermore it helps to identify where mistakes might have been made and how they can be resolved.

The GaBi History allocates one of four statuses to each object in a database and three different statuses to history entries of objects (see the following chapters for more information about history entries).

No History: Each object that does not have a history simply has the object type as its icon. This status may appear for those objects that were part of the standard PE content that was delivered in your database or for those objects where the history has been deleted.

Added: Each object that was newly created or imported into the database shows a little green plus in the bottom right corner of the object icon. A history entry that shows the green plus marks the moment when an object was created.

Modified: Each object that was edited or modified shows a little blue circle in the bottom right corner of the object icon. Each history entry that shows the blue circle marks a moment where a change to this object was saved.

Deleted: You will not find any object with the "deleted" status in your database. You can however find history entries that show a little red minus in the bottom right corner of the object icon which mark the moment when an object was deleted.

Note: The history is only written when an object is edited, not when its instances are being edited. An example: The instance of Process A is deleted from Plan B. Now, the user saves the change he just made. The history of Plan B is going to show a change as the plan changed. The history of Process A remains untouched as only its instance was deleted from Plan B.

7.20.1 GaBi History of entire databases and folders

You can select either an entire database or any folder and subfolder to open its history. In order to do so, right-click on the respective entry in the Object hierarchy and select "History". A database has to be active to open its history.

A new window will open that shows a list of entries that mark the moments when objects have been added, modified (and saved) or deleted. Each object can only appear once in this overview.

The filter in the upper right corner of the window allows to only have certain objects displayed. Tick the box and a new window will open. In this window you can choose to show only the history that is contained in certain folders (which results in the same overview as directly opening the window for a certain folder). In the drop down menu Content Type it can be defined whether to show all content as well as only to show Protected content (delivered by PE) or Editable content. Finally the user can define a time frame that he is interested in. Unticking the "Filter" box will display the whole history.

The history can be cleared both for an entire database and for a particular folder. In order to do so, select "Clear history...". A new window will open in which you can select to delete all entries that are older than a certain number of days, all entries that were created before a certain date or the entire history. Please be aware that there is no way to undo deleting a history entry. Once it has been deleted it is inevitably lost.

7.20.2 GaBi History of objects

In order to have an exact look at the changes made to an object over time, you have two options:

1. Find the object in the database, right-click on it and select "History...".
2. Find the entry of this object in the object history of a folder or a database and double-click on the entry.

A new window will open that displays exactly when an object was added, modified and deleted. This overview has the great advantage that it also shows which history entry was generated by the actions of which user.

Please note that only the history of one object can be displayed at any point in time. The function is therefore greyed out when having several objects selected at the same time.

7.20.3 Exceptions for the GaBi History for GaBi Server and Service Pack Installations

The GaBi History behaves different for two functionalities: GaBi Server and Service Pack installation.

With GaBi Server the history of an object is deleted when the changes are submitted. This means that when another user updates his database, the history of the objects that are being updated will be lost.

After the installation of a Service Pack GaBi deletes all history entries as the changes that are applied to a database via a Service Pack are so numerous that the history would increase drastically and therefore the database size.

8 Technical Reference Manual for GaBi

GaBi's object orientated software design defines the system and characterizes its appearance. Object orientation originated as an interdisciplinary field from informatics and psychology and is based on the way humans think. Modular structures and a high degree of networking are characteristic for object-oriented thinking. You will encounter the terms 'GaBi object' and 'GaBi object class' frequently when working with the GaBi system.

GaBi objects encapsulate associated data and functions (called methods in connection with object orientation). The different types of GaBi objects are called object classes. We differentiate between 11 object classes: Balances, Plans, Processes, Flows, Quantities, Measuring Units, Users, Projects, Data Quality Indicators (DQIs), Weightings (Normalization, Evaluation) and Global Parameters.

Some important innovations of GaBi throughout the years are summarized below:

- **Global Parameters:** New object type used to manage global parameters. Here, you can create parameters that apply to the entire database. Different parts of your GaBi models can refer to global parameters and can be varied centrally.
- **Plan Parameters:** GaBi 6 plans may use parameters. This increases the options for flexible models that can be adapted easily with the local setting of available parameters.
- **Parameter Interconnections:** Parameters of different plan processes (called process instances) can be linked in GaBi 6. In connection with plan parameters, this may also be used to model interconnections across plan hierarchies.
- **Centralized Parameter Explorer:** Parameters of a model can be managed centrally within GaBi 6. The parameter explorer is also greatly suited to examine GaBi models across several layers of nested plans. A tree-like view allows for fast navigation within a GaBi model. Interconnections are thus clearly illustrated across different plan levels.
- **Life Cycle Costing (LCC):** GaBi 6 offers an improved function of collecting life cycle cost data. Cost information is assigned to flows and can be changed from within processes. This also includes additional GaBi balance evaluation options.
- **Life Cycle Working Environment (LCWE):** Functions to collect and evaluate human work times and aspects of quality across a complete life cycle are new GaBi 6 functions. Information pertaining to LCWE is input on the process level.
- **Improved Balances:** The evaluation of modeled life cycles is one of the most improved GaBi 6 areas. In addition to the basic improvement of LCC and LCWE aspects, there are also numerous new details: Such as category filter, balance view, weak point analysis, etc.
- **GaBi Analyst:** GaBi 6 features the analysis tool GaBi Analyst, offering four basic types of analyses: scenario analysis, parameter variation, sensitivity analysis, and the Monte Carlo analysis. The batch mode allows for the automatic consecutive calculation of several analyses.
- **Incorporation of GaBi i-report:** This feature, allows users to create interactive reports based on altering parameters.

8.1 Basic Information

GaBi is an object-oriented software system. The GaBi system uses object types to save and manage data in the GaBi DB Manager. A distinction is made between the following basic object types:

- **Balances:** Balances can be used to view the results of a GaBi model. Balances can be evaluated in a variety of different ways.
- **Plans:** Plans can be used to generate life cycle models in the form of flow charts. Here, so-called process instances and sub-plans are linked with one another.
- **Processes:** Processes are models of a step within a life cycle. GaBi processes can correspond with actual processes or with black box modules of a process chain, which in reality consists of several processes.
- **Flows:** Flows are also frequently referred to as elementary flows when used as part of the LCA terminology. This usually describes materials, emissions or types of energy but can also model more abstract objects exchanged

between processes.

Quantities: Properties of flows with behavior proportional to the mass (or the reference quantity as a more general value) are called quantities in the GaBi system. Here, you can model technical material properties (e.g. under calorific value) but also impacts (e.g. GWP).

Units: The GaBi system supports several measuring units (e.g. kg, g, t, etc.). Conversion factors (e.g. from g to kg = factor 1000) are stored in unit objects.

User: Database access requires logging on with a user name and the proper password. This data is stored in user objects.

Contacts: Detailed contact information, according to the ILCD, can be managed in the GaBi database. Processes, flows, and references, citations can be linked to contacts.

Projects: GaBi projects can be documented according to ISO standards. This is done with projects. A list of used objects can also be stored in a project.

Quality Indicators: So-called DQIs (Data Quality Indicators) are used by the GaBi system to document data quality.

- **Interpretation:** GaBi offers two types of interpretation: Normalization and Weighting. Both are used in balancing objects.

Global Parameters: Here, you can create global parameters that apply to the entire database. Different parts of your GaBi models can refer to global parameters and can be varied centrally.

- **Reference, Citation:** References and citations, according to the ILCD, can be managed in the Gabi database. References and Citations can be linked to process and flow documentation. External files as reports, office documents or pictures can be linked to the references and citations.

8.1.1 Dialog Element Table

GaBi tables generally consist of rows, row headers, columns and column headers. All entries in a row belong together. Column headers contain a name describing the column. Tables are input and output elements of a dialog window with input subject to a type validity check. Ranges of a table can be selected. The current selection can be removed, cut, copied, and pasted, with the insert operation triggering a type validity check. Tables can also be sorted.

Flow	Quantity	Amount	Factor	Unit	Tracked flows	Standard de	Origin
Case metal parts [Assemblies]	Mass	26,2	26,2	kg	X	0 %	Calculated
Aluminum chips [Waste for recovery]	Mass	0,24378	0,24378	kg	*	0 %	Measured
Aluminum scrap [Waste for recovery]	Mass	0,00051257	0,00051257	kg	*	0 %	Measured
Ash [Stockpile goods]	Mass	0,12919	0,12919	kg	*	0 %	Calculated
Blast furnace slag [Waste for recovery]	Mass	6,5089	6,5089	kg	*	0 %	Calculated
Boiler ash (unspecified) [Waste for recovery]	Mass	0,2251	0,2251	kg	*	0 %	Calculated

Figure: Dialog element table

Working with Tables:

Navigating in a table:	Individual cells of a list can be accessed using the arrow or tab button or by using the mouse.
Modifying the field entry:	Keyboard input or double-clicking with the mouse will switch a table to editing mode. The ENTER key, arrow keys or a mouse click on another cell also switches a table to navigation mode and triggers a type validity check
Discarding change:	Press the ESC key to discard the current change of the active cell and restore the cell's original content.
New table entries:	Tables that can be expanded by the user with new entries (new rows) feature empty rows at the very bottom. Here you can enter new input and the table automatically adds new empty rows to the bottom.
Marking ranges:	Move the mouse over several cells while keeping the mouse button depressed to select a range in the table.
Cut:	Moves the current selection to the clipboard.
Copy:	Copies the current selection to the clipboard.
Paste:	Pastes the contents of the clipboard to the active or selected cell(s).
Sorting tables:	Tables can be sorted by means of a mouse click on the corresponding column header. Click again on the column header to generate the reverse sort order. A mouse click on the field in the top left-hand corner of a table creates a sort using the default sort field for the table.

8.1.2 List of Windows

The GaBi system features a Multi Display Interface (MDI). This means that the user interface consists of several application windows opened at once. Individual windows thus have a button used to access the list of currently open windows.

Use this list to view the names and symbols of the currently open windows of the GaBi system. Select the list entry by clicking on it and select OK or you may double-click on entry as well.

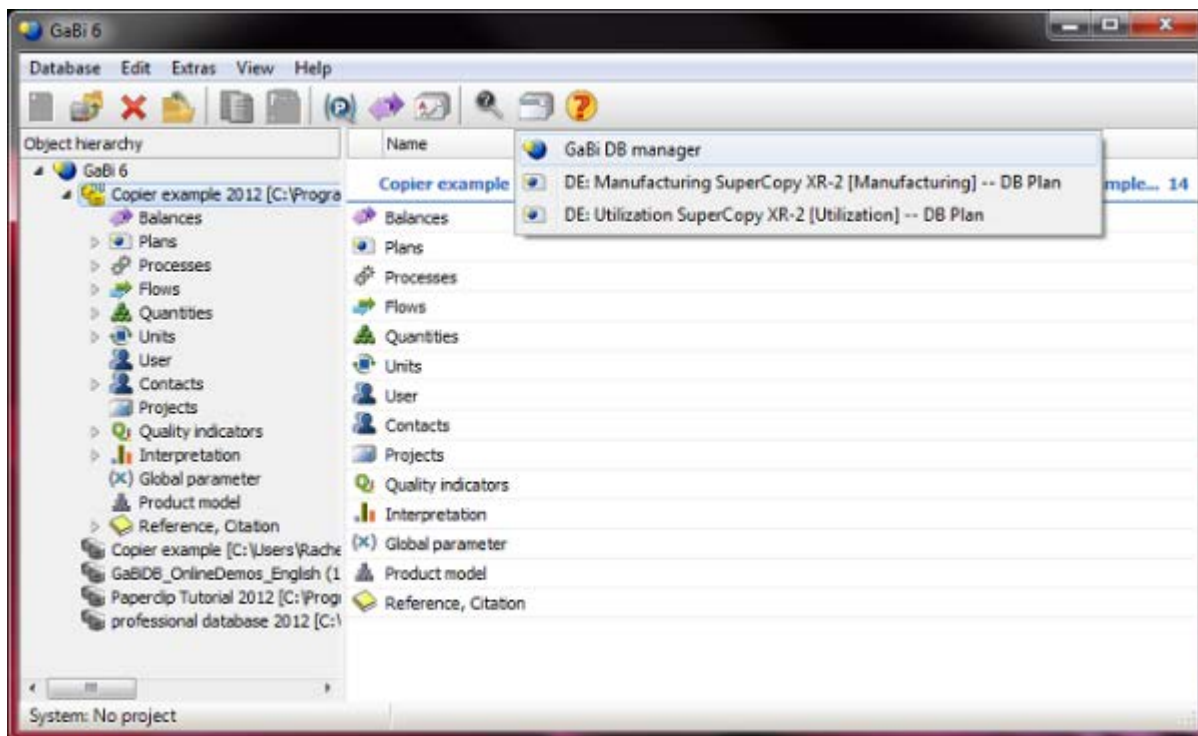


Figure: GaBi list of windows

8.1.3 Object Documentation

Additional information is of great significance to the transparency of a life cycle model (or a phase within). Assumptions, cut-off criteria, data origin and many other factors are necessary to obtain reliable balancing results. The GaBi system therefore offers an object documentation function.

External documentation:

Each object window in the GaBi system has a button linking to the documentation file. By clicking this button, the user can access the *documentation* window. It is possible to set up references to any files (e.g. MS-Word documents, PowerPoint, Excel files, etc.). In this way, users are able to document GaBi objects according to their preferences.

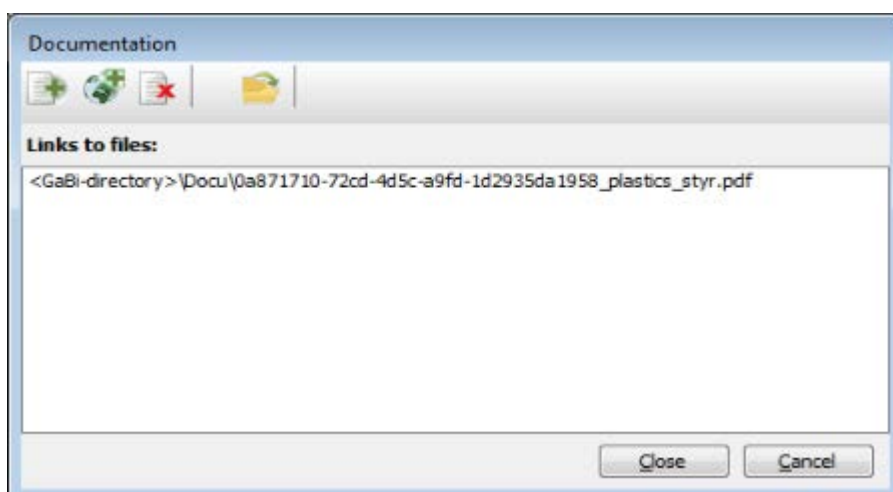


Figure: Object documentation window

Command buttons: (From top to bottom)

Open	Opens any application to edit the selected file.
New	Opens the file selection dialog box for creating a new reference.
Change	Opens the file selection dialog box to modify an existing reference.
Delete	Deletes an existing reference.
Save	Saves changes in the database.
OK	Closes the dialog and saves the changes.

Special Features:

Files located in the subdirectory of your GaBi directory are saved using the alias <GaBi directory>. This makes it possible to exchange data documentation between different computers.

8.1.4 Options

Use the menu item Options located in the Extras menu of the GaBi DB Manager to open the GaBi options window. Here, you can specify central settings used by different areas of the GaBi system such as the display accuracy of floating point numbers, for example.

The Options window is divided into three tabs: "General," "Plans," and "Balance." Settings are saved automatically and are thus at your disposal after restarting the GaBi system as well.

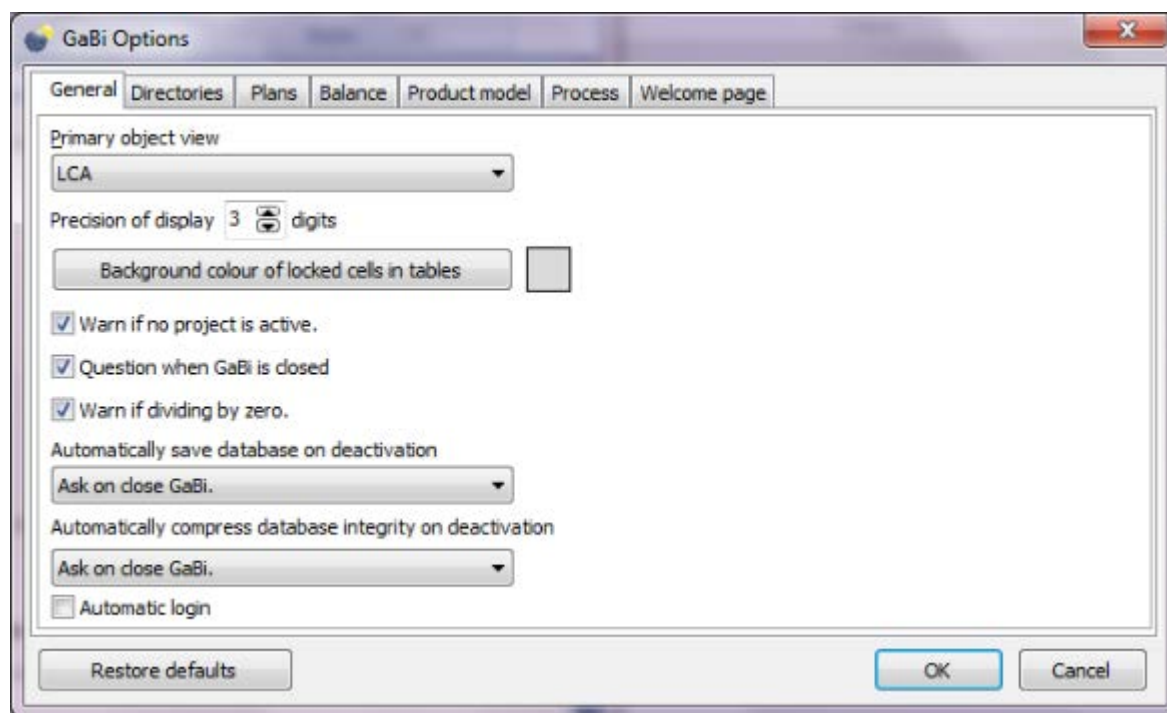


Figure: GaBi options window

Command buttons:

General	
Primary object view	Defines the first viewed tab within a GaBi balance. LCA; LCC or LCWE can be selected.
Precision of display	Number of displayed positions of floating point numbers. This does not mean the decimal places after the decimal point. For example, a display accuracy of 5 positions means the number 1234.5678 is displayed as 1234.6
Background color of locked cells in tables	Some cells of different user interface tables of the GaBi system cannot be modified and serve only to display certain information. These cells are colored and thus easily recognized. We recommend using a somewhat lighter background color than the standard window color (e.g. light grey). The automatic default value depends on the current Windows screen settings but can be the same as the default screen color. We recommend a manual adjustment in this case.
Warning if no project is active	A message is displayed when first saving an object of a DB if this option has been activated but no project is active.
Question when GaBi is closed	The confirmation prompt "Do you really want to exit GaBi?" is displayed if this option has been activated. This is to prevent accidentally exiting the program instead of just closing a window when several windows are open simultaneously.
Automatically save database on deactivation	Use this option to create an automatic backup copy of a DB when this database is being deactivated (e.g. when exiting GaBi). The backup copy is created in the subdirectory "database_name_backup_date" of the DB directory.
Compress database on deactivation	Use this option to compress databases automatically or after a user prompt when databases are being deactivated (e.g. when exiting GaBi).
Directories	
GaBi	This is the directory of your GaBi installation
Common data	This directory contains program files which are valid for all users.
Databases	Databases are stored in this directory
Backup databases	Automatic backups are stored in this folder.
GBV	
GBX	This is the default directory to store
GBP	i-report templates are stored in this directory
GBMX	GaBi model files for GaBi Envision and the web based i-report are stored in this directory
GPR	Processes exported for the gpr tool are stored in this directory
Other	Other data.

Temp	Directory for temporary files
Plans	
Grid size	Moved objects of a GaBi plan are automatically aligned with a grid. The grid size defines the distance between two lines of this grid. (Tip: Keep the Alt key depressed while moving an object for a smoother operation.)
Font (Plan)	Font type for displaying the plan name.
Font (Process)	Font type for displaying the process instance names.
Font (Flow)	Font type for displaying the flow names and quantities of the display options are activated accordingly. We recommend using a relatively small font.
Font (Comment)	Font type for displaying the comments listed on plans.
Viewed quantity	Default value for the visualization of flow quantities on plans using the indicated line thickness (Applies only to newly generated plans.)
Maximum width of flows	Max. line thickness of flow connections (applies only to newly generated plans).
Background	Background color of plans (applies only to newly generated plans).

Balance	
Precision of displayed percent values	Number of displayed decimal points of percentages. This does not mean the decimal places after the decimal point. For example, a display accuracy of 3 positions means the number 12.345% is displayed as 12.3%.
Weak point analysis	The GaBi system colors relatively large and relatively small numbers and hides figures with a very small amount when searching for weak points in a balance. Use the options on this tab to configure the weak point analysis.
Emphasized colour	Text color for relatively large balance figures
Emphasized threshold value	Value in percent; all balance figures exceeding this threshold value are color ed as relatively large numbers.
Normal colour	Text color for balance figures that are neither relatively large nor relatively small (usually shown in black).
Reduced colour	Text color for relatively small balance figures
Reduced threshold value	Value in percent; all balance figures below this threshold value are colored as relatively small numbers.
Switched off threshold value	Value in percent; all balance figures below this threshold value are hidden as very small numbers.
Completely switch off lines without viewed values	Option to hide balance rows if completely empty.
Completely switch off columns without viewed values	Option to hide balance columns if completely empty.

8.2 GaBi DB Manager

The GaBi DB Manager is a clearly structured user interface linking with the database. The structure and functionality of the GaBi DB Manager are similar to the MicrosoftTM management tool, Windows Explorer. A GaBi database opened in the DB Manager has a tree structure, which means that different branches originate from a root to further branches.

A GaBi DB is initially divided into 13 different fixed object types. These are as follows: Balances, Plans, Processes, Flows, Quantities, Units, User, Contacts, Projects, Quality indicators, Interpretation, Global parameter and Reference, Citation. However, all further sub-divisions can be modified. The GaBi DB Manager is an extremely important tool for the users as it provides direct access to all data objects (assuming the corresponding user rights have been assigned).

8.2.1 Startup Screen

The left side of the window displays the GaBi portal if the root is selected in the object hierarchy of the depicted tree. Located here are links to the user manual, the DB documentation, and Internet addresses. Just click on one of these links to open the corresponding window or page.

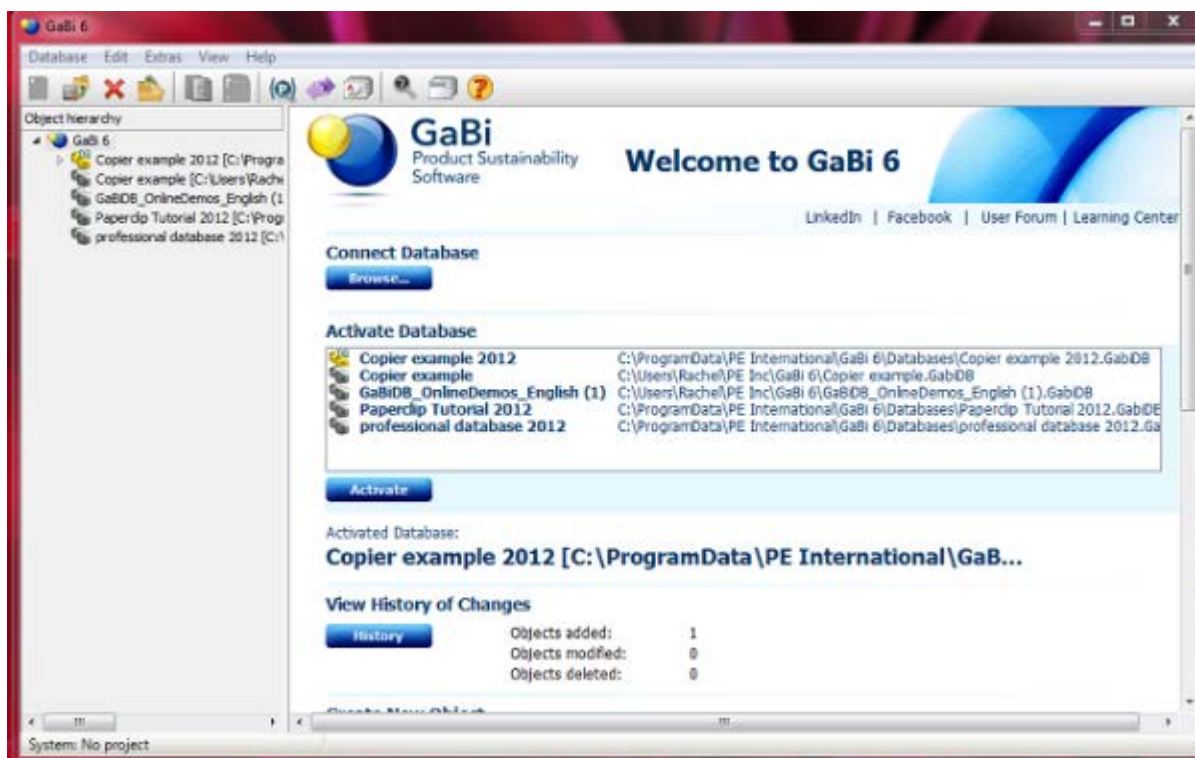


Figure: GaBi DB Manager windows (startup screen)

The lower section of the GaBi portal features an overview over the databases currently linked with the GaBi system as well as links to common database management functions. These functions can also be found under the corresponding menu function explained in more detail later.

8.2.2 Object Management View

Individual object types and their subfolders listed in the object management view can be expanded or collapsed as desired. The flow type "inorganic emissions to air" is selected in the object hierarchy in the following screenshot. This type of GaBi objects are displayed in the object list on the right side of the window.

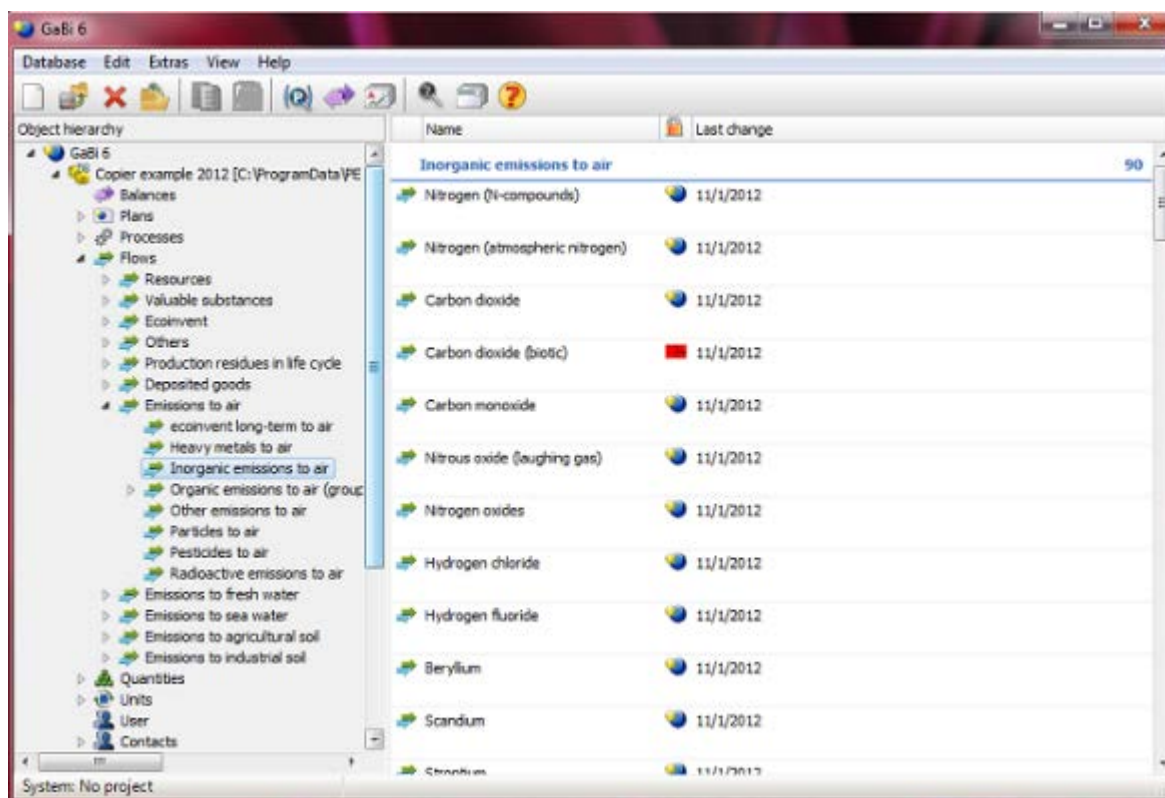


Figure: GaBi DB Manager (GaBi object management view)

The GaBi DB Manager consists of the following:

Menu bar, tool bar, display of the currently selected object hierarchy, object hierarchy display, object display, status line.

Command buttons: (From left to right)

New	Opens an empty form for creating a new object of the type currently selected in the object hierarchy.
Open	Opens an object window for each object selected in the object view.
Delete	Deletes the objects selected in the object view after a prompt.
Folder Up	Jumps a level back and to the left within the object hierarchy.
Copy	Copies the current object selection to the clipboard.
Paste	Pastes the contents of the clipboard as a new object to the object type selection.
Parameter Explorer	Opens the window of the GaBi Parameter Explorer with the currently selected process plan (only process plans).
Calculate balance	Calculates the balance of the selected objects (only processes and process plans).
Analysis Manager	Opens the Analyses Manager, several analyses can be performed consecutively, access to previously saved individual analyses.
Search	Switches to the GaBi Database search window.
Windows	Displays the selection of currently opened GaBi windows.
Help	Opens the on-line Help.

Menu commands:

Database	Commands for managing GaBi databases.
Activate	Opens a database to be worked on.
Send db to zip archive	Saves the database as zip file. This zip file has to be unzipped with the GaBi software when reconnecting.
Copy	Copies the current database to another directory.
Disconnect	Breaks the connection to a GaBi DB
Delete	Deletes a database from the hard disk.
Connect database	Establishes the connection to a GaBi DB.
Create db from zip archive	Connects GaBi with a DB which has been saved as zip file.
Create new database	Creates a new GaBi DB.
Refresh	Automatically ensures consistency.
Install db service pack	Installs the service packs of the active database located in the GaBi directory.

Install db upgrades	Installs the database upgrades of the active database located in the GaBi directory
Translate	Provides an interactive translation of the current database. Starts the tool GaBi LA included with the GaBi system.
Export-GaBi eXchange file (*.gbx)	Exports data as a .gbx file for data exchange between GaBi databases.
Export- GaBi model file (*.gbm)	Exports a plan or process as a .gbm file which can be viewed in GaBi Envision or in the web based i-report.
Export- gpr file	A .gpr-file can be exported from a database to be edited in the external tool GaBiPr. A reimport of the edited .gpr file is only possible into the same DB it was exported from.
Export- ILCD	Exports data in the ILCD format (International reference Life Cycle Data System). Data will be saved in a zip folder containing several .xml files.
Export- EPD	Exports data in an zip-file containing several .xml-files.
Export- EcoSpold	Exports processes as an .xml file in the EcoSpold format. The EcoSpold fields of the process documentation tab will be exported with the data set.
Import- GaBi eXchange file (*.gbx)	Imports data from a *.gbx file.
Import- GPR file	A .gpr-file can be exported from a database to be edited in the external tool GaBiPr. A reimport of the edited .gpr file is only possible into the same DB it was exported from.
Import- EcoSpold file	Imports an .xml file in the EcoSpold format.
Deactivate	Deactivates the currently active DB.
Close	Closes the GaBi DB Manager window.

Edit	Commands for editing the current database.
New	Opens an empty form for creating a new object of the type currently selected in the object hierarchy.
Open	Opens an object window for each object selected in the object view.
Delete	Deletes the objects selected in the object view after a prompt.
Copy	Copies the current object selection to the clipboard.
Paste	Pastes the contents of the clipboard as a new object to the object type selection. after a type validity check has been performed.
Grouping	Displays the overview window for process instances groupings on plans.
Search	Switches to the GaBi Database search window.

Usage	Searches for all objects referring to the selected object.
Replace	Allows you to replace and combine several objects into one object.
Parameter Explorer	Opens the window of the GaBi Parameter Explorer with the currently selected process plan (only process plans).
Calculate balance	Calculates the balance of the selected objects (only processes and process plans).
Extras	Additional commands of the GaBi system.
Language	Sub-item of this menu option changes the language of the GaBi user interface.
Compare assistant...	Opens the GaBi compare assistant window.
Manage GPR exports.	Opens the GPR Export Management window.
Options	Displays the GaBi options window used to specify additional GaBi system options.
View	Commands for the user screen layout.
Window	Displays a selection of currently opened GaBi windows.
Details	Displays information about objects on the screen.
Analysis Manager	Opens the Analysis Manager, several analyses can be performed consecutively, access to previously saved individual analyses.
Load settings	Restores user default window settings.
Save settings	Saves current window settings as user default.
Help	Commands for displaying Help.
GaBi help	Opens the online Help for the current window.
Index	Opens the Help index.
www.gabi-software.com	Link to the GaBi system Homepage.
Check for updates	Searches for new GaBi updates
Info	Displays program information.

Right mouse click menu:

Database	Commands for managing GaBi databases.
Activate/Deactivate	Opens/Closes a DB to be worked on
Send DB to zip archive	Saves database as a zip file. This zip file has to be unzipped with GsaBi, when reconnected.
Copy	Copies the current database to another directory

Rename	Renames the current Db, if the user has the right to do so.
Connect/Disconnect	(Dis)connects a GaBi database with GaBi. DB will be added or removed from the GaBi database list.
Delete	Deletes a database from the hard disk.
Create DB from zip archive	Connects a database which had been saved as a zip file in GaBi before.
Create new database	Creates a new GaBi DB
Database information	Displays a window listing information about a DB
Objects, types	Commands for editing the current object/object type.
Open	Opens an object window for each object selected in the object view.
New	Opens an empty form for creating a new object of the type currently selected in the object hierarchy.
Rename	Renames the selected object.
Default color	Used to specify a default color for flow groups relevant when re-linking process instances in process plans (only flow groups).
Mark as waste	Converts recyclables selections for flows of the selected flow group into inputs and outputs of processes in waste selections. This requires that the corresponding processes are not allocated anywhere (only flow groups).
Adopt default colors	Adopts the default colors specified for the selected process plans of the flow groups (only process plans).
Parameter Explorer	Opens the window of the GaBi Parameter Explorer with the currently selected process plan (only process plans).
Balance calculation	Calculates the balance of the selected objects (only processes and process plans).
Search	Switches to the GaBi Database search window.
Usage	Searches for all objects referring to the selected object.
Copy	Copies the current object selection to the clipboard.
Paste	Pastes the contents of the clipboard as a new object to the object type selection. after a type validity check has been performed.
Delete	Deletes the objects selected in the object view after a prompt.
New folder	Creates a new folder in the tree hierarchy.
Activate Project	When a project is selected, it can be activated with the right click menu.
Sort Order	With a right click on an object folder the sort order of its subfolders can be set.

Drag and Drop:

GaBi objects can be moved in the GaBi DB Manager using the mouse just as in MS-Windows Explorer TM. GaBi

objects may only be saved as a compatible object type. For example, if a GaBi transport process has to be moved, it cannot be saved to a "Flows" or "Quantities" subfolder but only to any processes subfolder, for example, the subfolder "Utilization processes." GaBi objects can also be saved using drag and drop in dialog elements able to record these objects (e.g. flows in input or output table for a process or processes in the plan area).

Special Features:

The name for the objects displayed in the GaBi DB Manager can be changed without opening the corresponding object. Open the "Change Mode" by clicking on a selected object with a long held mouse click; a text cursor is then displayed in the corresponding object name.

The object list in the right half of the window can be sorted in the detail view according to the individual columns. To do this, click on the respective column heading.

8.2.3 Database Information

Use the right click menu in the DB Manager to open the database information window.

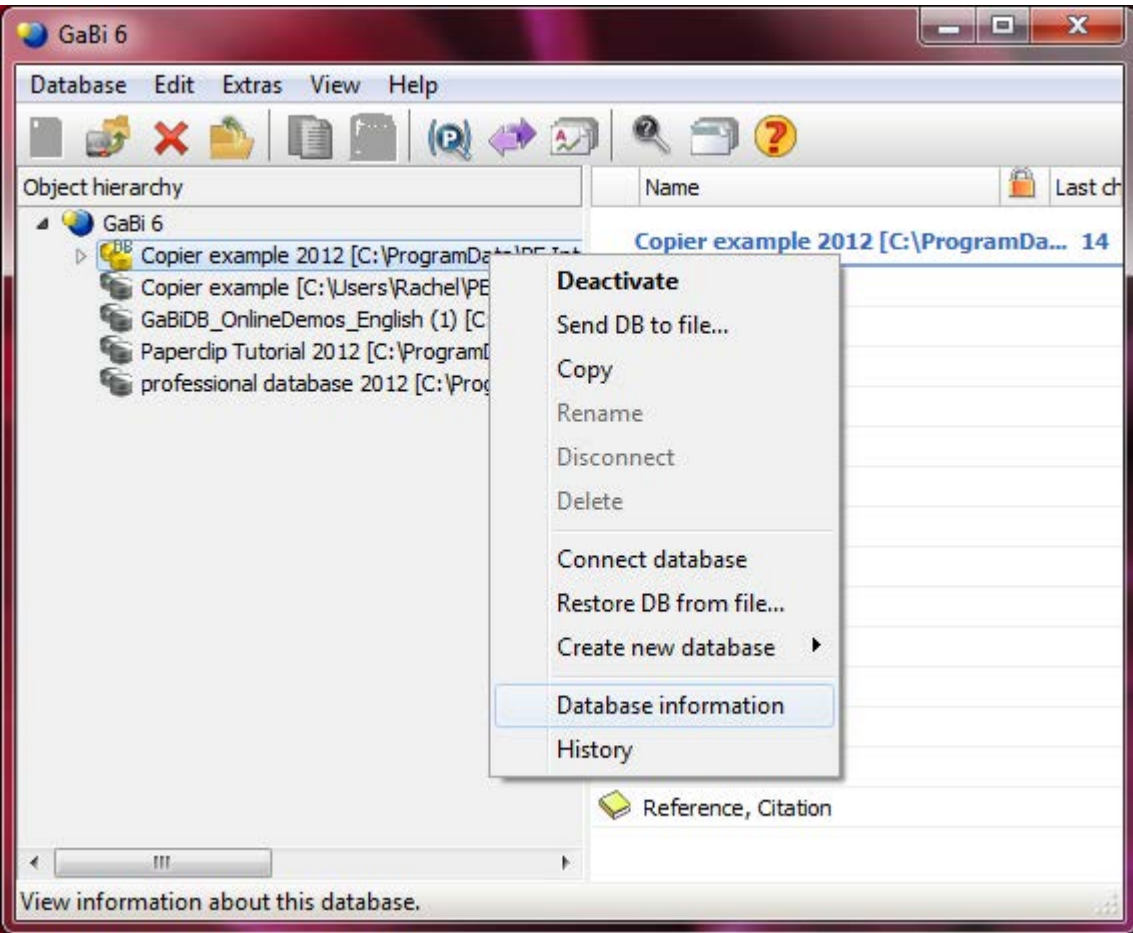


Figure. How to access the DB information

The following database information is displayed:

GaBi version	Format information
Last service pack	Service pack info
Restrictions	e.g. demo database

Language	Language abbreviation
Number of objects list	Database scope information

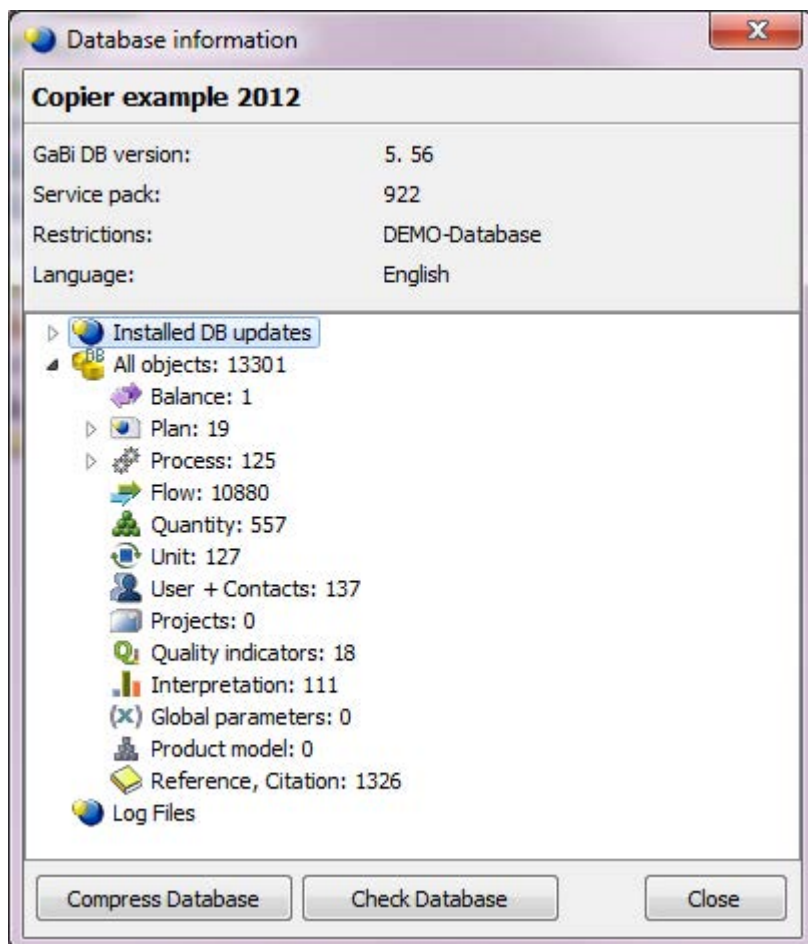


Figure: Database information output window

8.2.4 Categorization Information

Use the Edit -> Grouping menu item in the DB Manager or from the balancing window to open the grouping information window.

The GaBi system allows for the grouping of process instances in process plans using four different categories: "Nation," "Type," "Enterprise," and "User defined." View the category information window for an overview of the categories used across databases or for various balancing operations.

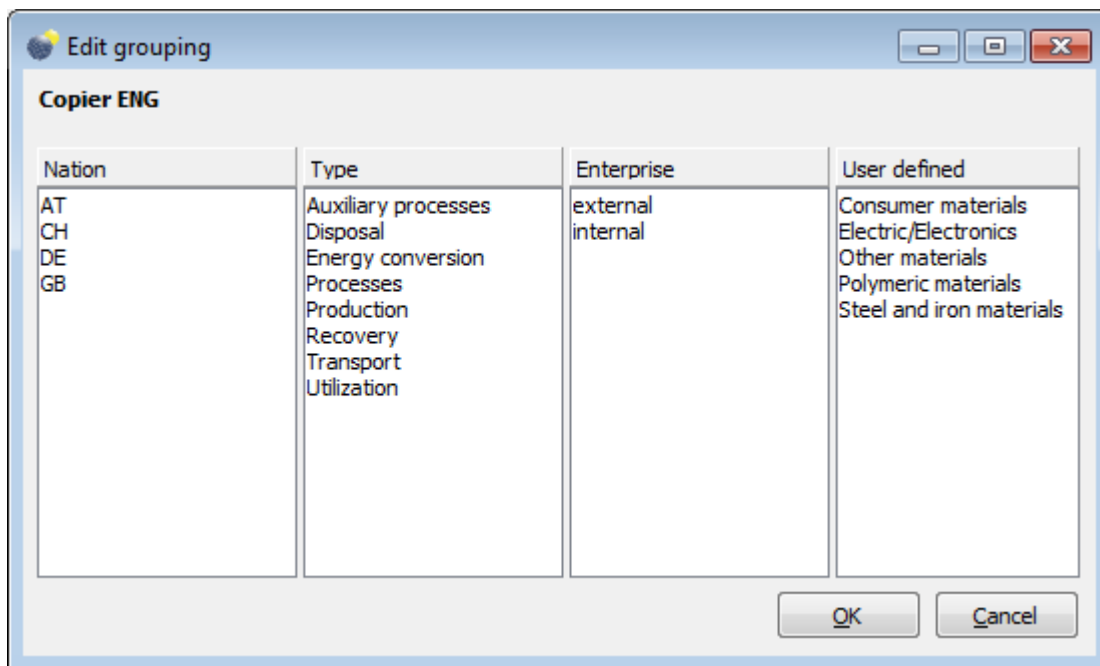


Figure: Category information management window

Use the right click button to rename categories. Two categories may also be combined by giving both the same name. Accept changes with the OK button or reject them by clicking on Cancel.

8.2.5 Recording External Data with GaBiPR (Process Recording)

The GaBi system includes the external process recording tool GaBiPR.exe. Together with information from the "empty" process forms prepared by the GaBi user, this tool sends data to an external location (GaBiPR.exe [also available on the GaBi homepage] may be freely distributed to non-GaBi users for the purpose of external data recording). An external data processor or clerk can enter data into the prepared process shell and transmit them back to GaBi users. This data can then be imported to the GaBi system.

External data acquisition consists of the following steps:

Step 1	Preparing the Processes to be Recorded An external data processor or clerk is best supported by creating the processes for the data to be requested with the GaBi system and by entering as much data as possible beforehand (e.g. "component A" flow with 1 kg as quantity already entered into the output list). The comment field also offers the opportunity to notify the external data processor or clerk about any unusual circumstances, constraints, or compatibility issues.
Step 2	Exporting the Prepared Processes The function to export GPR files is located in the "DB Manager," "Search window" and "Projects" menus. Highlight the processes to be exported in the object list and then select the "Export -> GPR file" function in the corresponding menu. Additional information about the window that is subsequently opened when exporting GPR files including sending the data request via email are listed further below.
Step 3	External Data Recording Details about the external data recording are listed in the manual of the online help of the external process recording tool GaBiPR.

Step 4**Importing the Externally Recorded Process Data**

If you receive a GPR file from an external data processor, use the "Import GPR file" menu item to import the data back into the database you previously used to generate the GPR file to sent to the external data processor.

Note: If possible, do not delete or change the names of flows and quantities between export and import of a GPR file since these objects might have to be recreated after import.

8.2.5.1 Exporting GPR Files

The "Export -> GPR file" menu item located in the DB Manager, search window, or project window opens the GPR file export window.

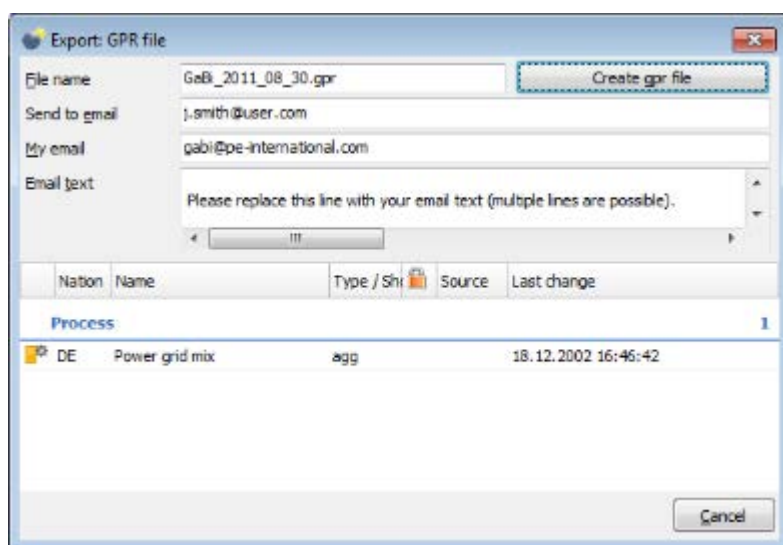


Fig: GPR file export window

Data fields:

File name	The GaBi system automatically suggests a file name that can be accepted without further change. The file extension has to be "gpr" so that the file to be exported can be read into the external process recording tool GaBiPR and later imported back into the GaBi system using the import function.
To email address	Email address of the recipient.
Own email address	Email address of the sender. This field has to be completed for the "Create gpr file," and "Send" buttons to be activated.
Email text	This text is entered into the email to the recipient and contains a brief instruction to the external process recording tool GaBiPR. Supplement this text with suitable information.
Object list	The object list serves to check the processes to be exported.

Command buttons:

Create GPR file	Creates the file described by the file name and saves it in the folder of the active database.
Send	Sends an email to the indicated recipient. The files "GaBiPR.exe," "GaBiPR.hlp," and the corresponding GPR file are attached to this email (as an attachment). The Send function requires a program with MAPI interface (e.g. Outlook). You can also send the files listed above manually with your own email program or copy them to a diskette and ship them via postal mail if you should encounter problems when sending from within the GaBi system.
Cancel	Closes the GPR file export window.

8.2.5.2 Managing GPR Exports

Use the "Extras -> Manage GPR Exports" menu item to view a list of GPR exports of a database.

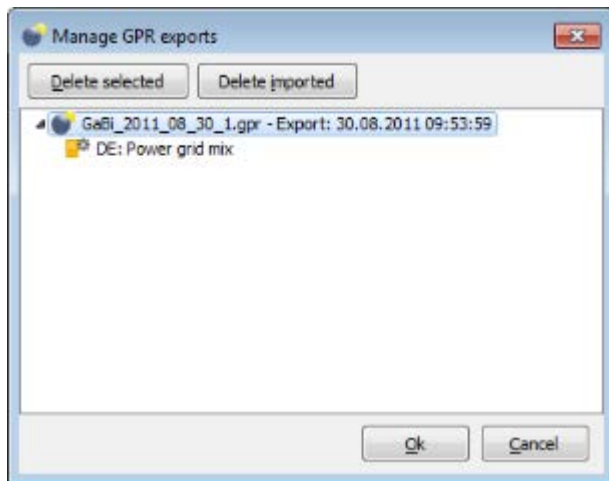


Figure: GPR export list

The date of an export or import is listed to the right of the name of an exported GPR file. The GaBi processes of the corresponding file are listed as a sub-item.

Use the "Delete selected" and "Delete imported" buttons to remove individual GPR files from this list. However, remember that any deleted files can no longer be imported into the GaBi system.

Use the "Cancel" button if you accidentally removed GPR exports from this list; otherwise click OK.

8.2.5.3 Importing GPR Files

Select individual processes from a GPR file to import from Database > Import > GPR file...

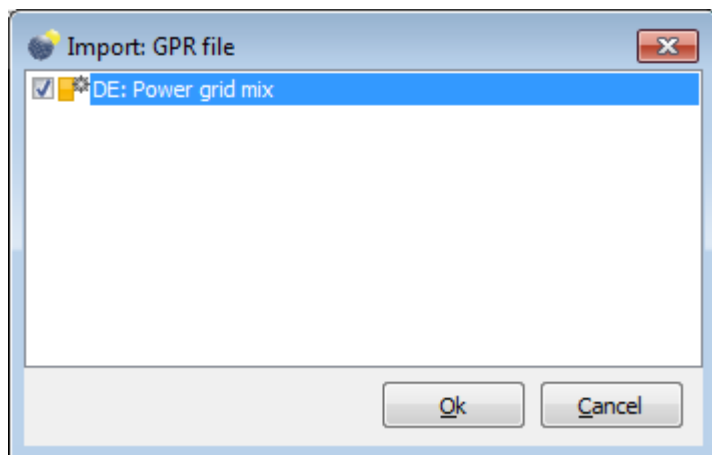


Figure: Importing GPR file window

All processes of the list with a checkmark are imported to the active DB after clicking on "Import." If flows or quantities were deleted or renamed since the export of the corresponding GPR file these are also imported, if the imported processes refer to them.

The import is followed by a log listing all imported objects.

8.3 Object Type: Balance

The GaBi system calculates balances using the data provided in processes or process plans and allows you to perform various analyses of the balance. A balance calculation is activated by marking processes or plans in the GaBi DB-Manager followed by a click on the *Balance* button. A GaBi balance compares all inputs for one or several balance objects with its outputs.

The balance object type was fundamentally reworked. An added feature is the assessment of LCC and LCWE information and many useful functions such as the hierarchal view according to categories or customizable balance views.

A GaBi balance consists of:

Name	Maximum of 50 characters
Quantity list	Selection list for different balances
Selection list	Selection list for different balances evaluated
Unit list	Selection list for displaying different units.
Standardization list	Selection list for different standardization
In-out-set-off	Yes/No
Relative contributions	Yes/No
Additional balance options	
Inputs	Table (Flows[Flowgroups]x Processes[Plans])
Outputs	Table (Flows[Flowgroups]x Processes[Plans])
Inputs/Outputs	Table (Flows[Flowgroups]x Processes[Plans]) uncheck "separate IO tables" box for single table
Flow costs	Table (Flows[Flowgroups]x Processes[Plans])
Machines costs	Table (Machines[Flowgroups]x Processes[Plans])
Personnel costs	Table (Personnel[Flowgroups]x Processes[Plans])
QWT	Table (QWT flows[Flowgroups]x Processes[Plans])
HSWT	Table (HSWT flows[Flowgroups]x Processes[Plans])
HWT	Table (HWT flows[Flowgroups]x Processes[Plans])

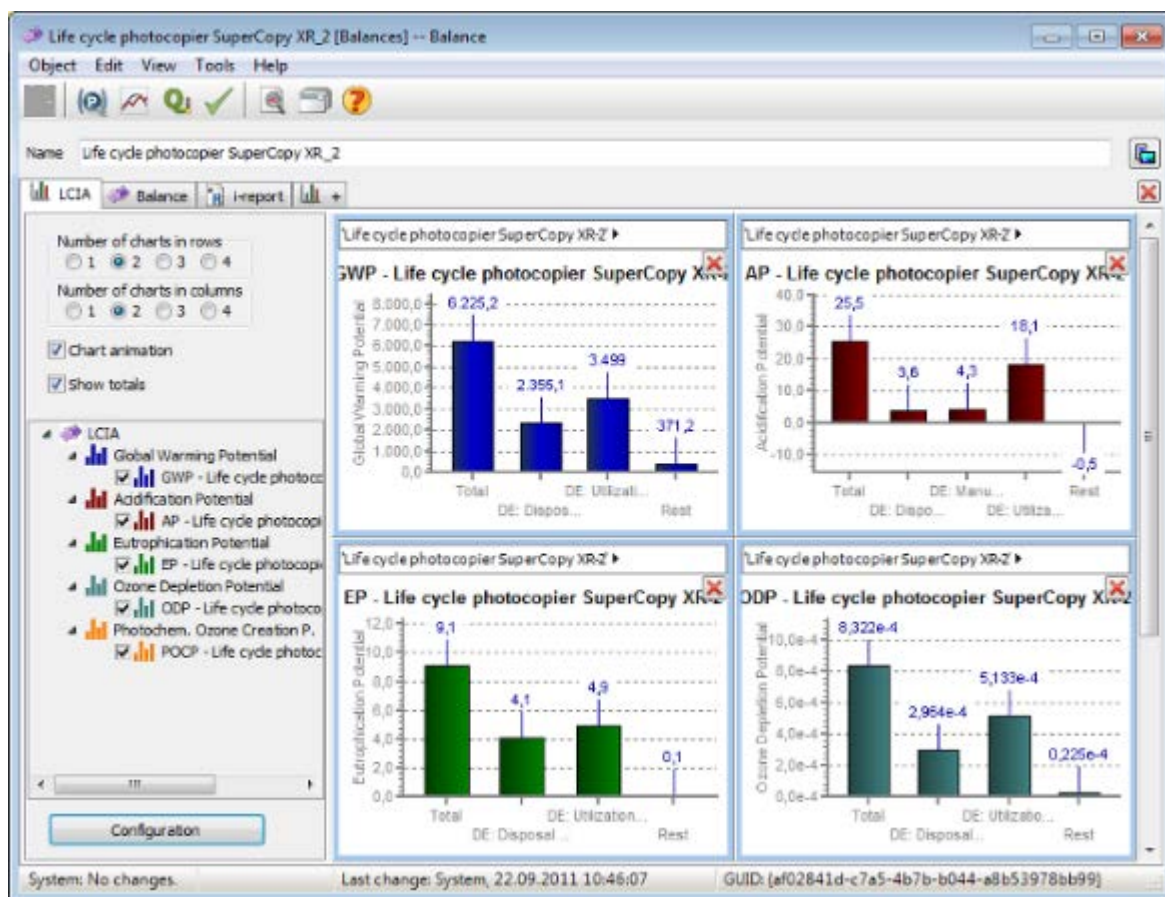


Figure: Object type balance window

Command buttons: (from left to right)

New	Deactivated.
Restore	Deactivated.
Save	Saves current balance in the database.
Cut	Deactivated.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard into the active field.
Table 1 (in)visible	Show and hide the first table (from above).
Table2 (in)visible	Show and hide the second table (from above).
Table3 (in)visible	Show and hide the third table (from above).
Balance view	Opens the window for user-defined balance views.
Grouping filter	Opens the window for grouping filters.
Weak point analysis	Activates the support for a weak point analysis. (Colors and hidden lines)
Parameter Explorer	Opens the GaBi Parameter Explorer with the currently selected process plan (only process plans).

GaBi Analyst	Opens the GaBi Analyst window
Data quality	Opens the window for statistical DQI evaluation of a balance.
Consistency check	Searches the balanced model for interrupted flows and non-connected material inputs and outputs
Balance navigator	Opens the balance navigator window.
GaBi DB-Manager	Switches to the GaBi DB-Manager.
Window	Displays a list of the currently open GaBi windows.
Help	Opens the on-line Help for the current window.
Documentation	Shows a documentation list for the current balance.

Menu commands:

Object	Commands for the management of the current unit.
New	Deactivated.
Restore	Restores changes to the current balance.
Save	Saves current balance in the database.
Copy view	Copies the current balance as displayed in full to the clipboard. (Possible choices LCA/LCC/LCWE)
Insert total	Deactivated.
Close	Closes the current window after a confirmation prompt in case balances have not been saved.
Edit	Commands for editing the current object.
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard into the active field.
Grouping	Displays the overview window for groupings of process instances on planes.
View	Commands for arranging the user screen.
Balance view	Opens the window for user-defined balance views.
Grouping filter	Opens the window for grouping filters.
Weak point analysis	Activates the support for a weak point analysis. (Colors and hidden lines)
Options	Allows program-wide options to be set.
DB-Manager	Switches to the GaBi DB-Manager.
Storage location	Displays the type of the current balance in the GaBi DB-Manager

Window	Displays a list of the currently open windows.
Load settings	Restores user default window settings.
Save settings	Saves current window settings as the user default.
Tools	Commands for the display of balance tools
Parameter Explorer	Opens the GaBi Parameter Explorer with the currently selected process plan (only process plans).
GaBi Analyst	Opens the GaBi Analyst window
Data quality	Opens the window for statistical DQI evaluation of a balance.
Consistency check	Searches the balanced model for interrupted flows and non-connected material inputs and outputs
Balance navigator	Opens the balance navigator window.
Help	Commands for displaying Help
GaBi Help	Opens the on-line Help for the current window.
Index	Opens the Help index.
Info	Displays program information.

Right mouse button menu:

Record for analysis	Transfers the selected balance cell to the GaBi Analyst as a new resulting value
Copy	Copies the current selection to the clipboard.
Mark all	Marks all rows and columns in the table.
Optimal column widths	Sets the column widths of all tables so that the total column header can be displayed.
Standard column widths	Sets the column widths of all tables onto the standard width.
Set as 100% column	Sets the reference column for relative views.
Show	Shows the individual columns of a balance.
Show all	Shows all hidden columns of a balance again.
Hide	Hides the individual columns of a balance.
Hide others	Hides all columns of a balance except the selected columns (incl. sub-systems).

8.3.1 Balance: LCIA

A GaBi balance contains values both for individual flows and also for aggregated values for flow groups. The user can select the depth of detail required in a balance view. A double-click on a row header causes the flow group details to be displayed or, when details are already displayed, to hide the flow group details.

Similar to flows, in the rows of a balance, processes and process plans are hierarchically structured in columns. Consequently, aggregated values are provided for process plans, as well as individual details for the unit processes in a GaBi *balance*. These values can be displayed using the same method as for flows; by double clicking on the column headings.

The pull down lists on the upper right of the window (next to the balance name) can be used to display the details of all flow groups, individual flows, process plans and processes down to a certain level. There are entries for the individual levels there.

Different balances can be created using the flow quantity list. The corresponding flow amount is selected there to obtain mass, energy, impact, or other balances. If a flow quantity has several assigned units (e.g. mass: kg, t, etc.), they can be selected for view as well. Evaluated and standardized balances can be shown in the same way as balances of different sizes. In theory, evaluations and standardizations can be combined in any way. In general, however, the evaluation key is created in such a way that it only should be used with standardization.

The In/out aggregation option selects between two different types of balances. When In/out aggregation is not selected all inputs and all outputs (including linked flows) are summarized when selected the difference between the input and output flows (no linked flows displayed) are examined.

GaBi has the ability to allow the user to view balance data in both absolute (output, for example, in kg) and relative values (output for example in %). It is possible to switch between these using the drop down menu under the balance level buttons.

A special feature of GaBi balances is the quantity view. Here the total quantities of the individual columns are converted into all available flow amounts and are displayed one under the other.

In addition, category filters can be used to just show the contributions of process instances that are subject to a certain condition in terms of their categories. A hierarchical view can be created from the category information on process instances, which is called a category view, which enables the contributions of all different categories to be compared.

8.3.2 Balance: LCC

Like the input and output table of LCA balances, the tables “Flow costs”, “Machine costs” and “Personnel costs” of the LCC area of GaBi balances are shown. The viewing options are controlled the same way for the most part. There are differences in just a few details:

During the cost determination in GaBi, a distinction is generally made between costs and overhead costs. These costs can be shown separate from each other in balances as well. If the two values are shown as a total, however, the optional button “Overhead costs” must be checked.

8.3.3 Balance: LCWE

Like the input and output table of LCA balances, the tables “QWT”, “HSWT” and “HWT” of the LCC area of GaBi balances are shown. The viewing options here are controlled in more or less the same way. There are differences in just a few details:

When determining the work time model in GaBi, a distinction is generally made between work time occurring internally and work time occurring externally. These values can be shown separate from each other in balances as well. If the two values are shown as a total, however, the optional button “Internal/external” must be checked.

8.3.4 Balance Navigator

In general, not all columns of a balance can be displayed on the screen next to each other simultaneously. To maintain the overview of large balances when navigating, however, it is possible to switch to the Balance Navigator. Here the balanced plans and processes are displayed one under the other in a tree view.

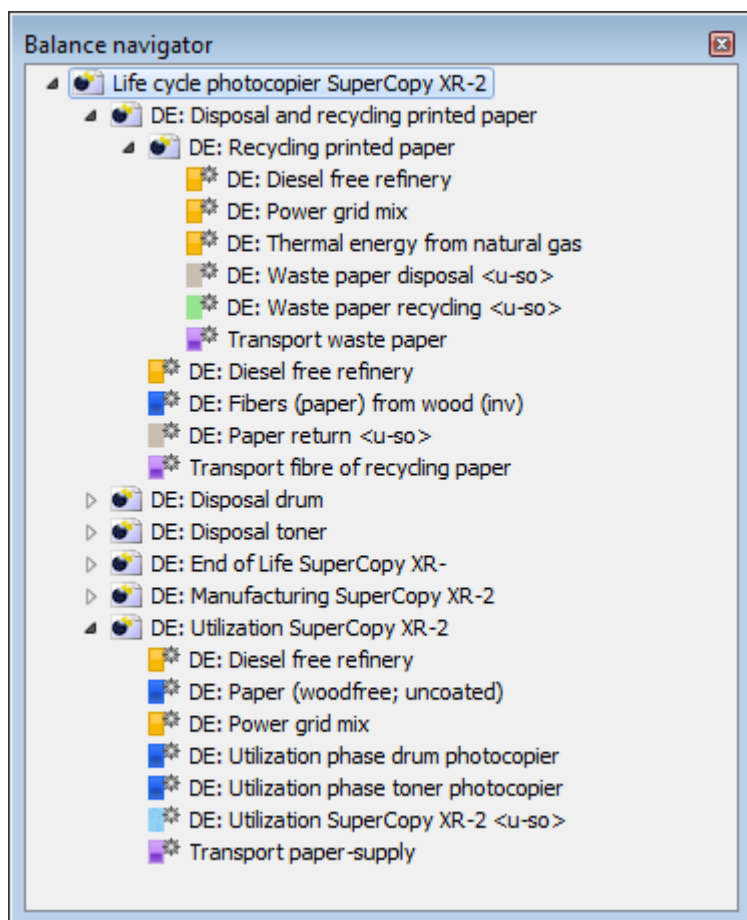


Figure: Balance navigator window

Individual plans and processes can be selected in the Balance Navigator and localized in the balance.

8.3.5 Charts

Balance results in GaBi can also be visualized as charts. GaBi offers a variety of chart types and formatting options. Charts are displayed in a separate chart window, where the properties of the chart can be modified. The GaBi i-report also supports the visualization of balance results as charts.

To create a chart out of balance results, the desired values can be selected in the balance table of interest. It is also possible to select only a part of the values in a balance table. After the selection of the values a click on the "Chart" button in the header of the balance table opens a new window to show the chart. Columns or rows without value entries are not shown. Aggregated values are also not shown if the details of those values are selected. The chart type and style used is always the style of the last shown chart, so the settings don't have to be readjusted each time new values are selected.

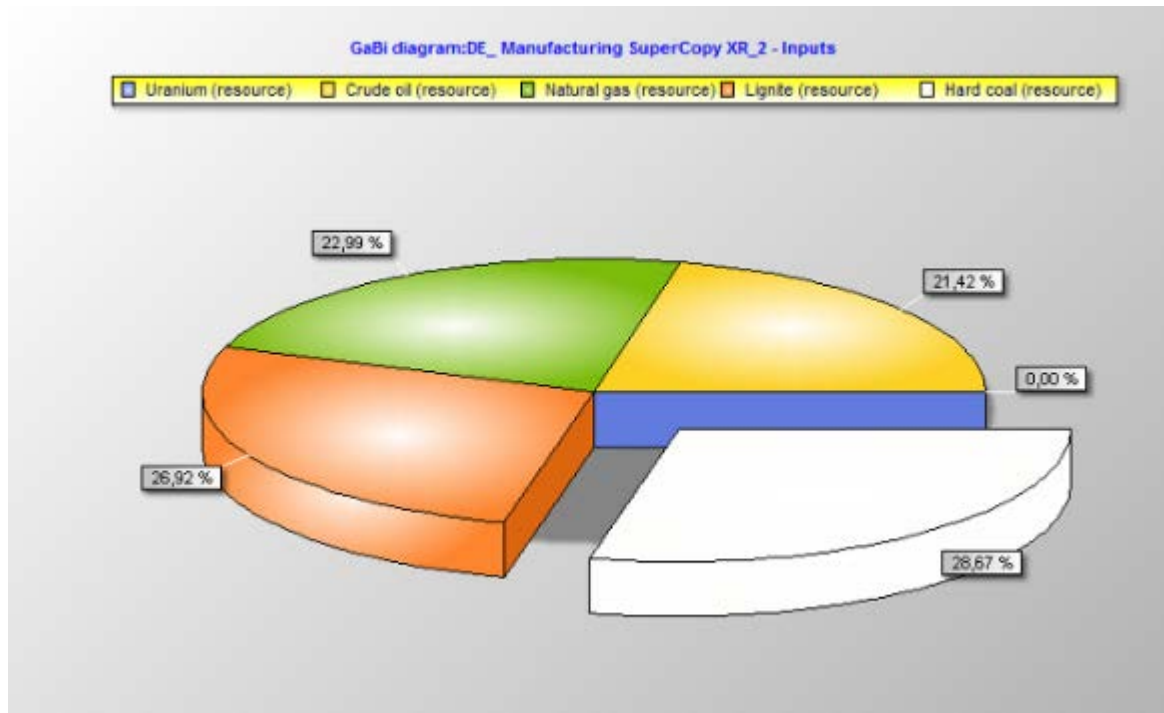


Figure: Pie chart

Command buttons: (from left to right)

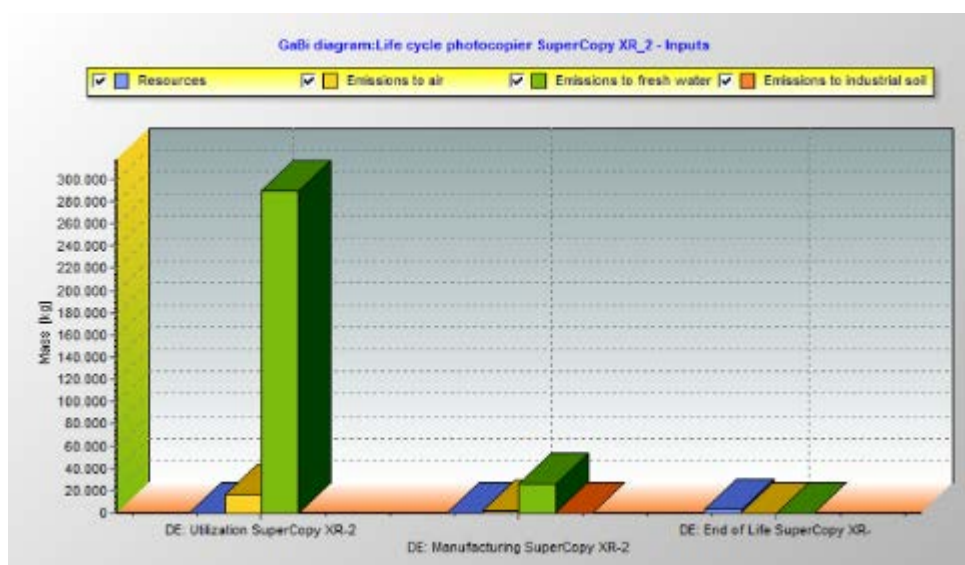
Open	Opens and applies a chart template to the current chart
Save	Saves the current chart settings as template. All settings can later be used for other charts by loading the template
Reset	Resets the chart to the default settings. The modifications to a chart can be very comprehensive. So sometimes it is useful to reset the chart and not try to undo all modifications manually
3D	Switch between 2D and 3D visualization of the chart
Gradient	Switches the gradient on the chart series on and off
Markers	Adds Markers with the values to the chart
Grid	Adds a Grid in the background of the chart
Style	Drop down box to select the style of the chart. Possible chart styles are bar, horizontal bar, line, area, pie, donut and radar
Arrangement	Drop down box to select the arrangement of the chart series. Series can be displayed behind each other, next to each other, stacked or stacked to 100%
Theme	Drop down box to select a color theme for the chart. Predefined color themes that can be applied with one click
Transpose	Switches the columns and rows of the chart
x-Axis labels	There are three different states for the x-Axis labels. They can be displayed horizontally, horizontally with alternating vertical offset or vertical
Other options	Advanced options. Nearly every detail of a chart can be modified with the

	complex chart editor that is explained in detail below
Print	Opens the print settings for the chart
Copy	Saves a copy of the current chart image to the clipboard
Gabi DB-Manager	Sets the focus to the DB-Manager
List of windows	Shows a list of currently active GaBi Window
Help	Activates the online help system

8.3.5.1 Chart types

Balance Results in GaBi can be visualized with different series types. Below examples of each type are shown.

Chart type bars:



This chart type can be useful for most kinds of values. The data points are visualized as vertical bars.

Chart type horizontal Bars:

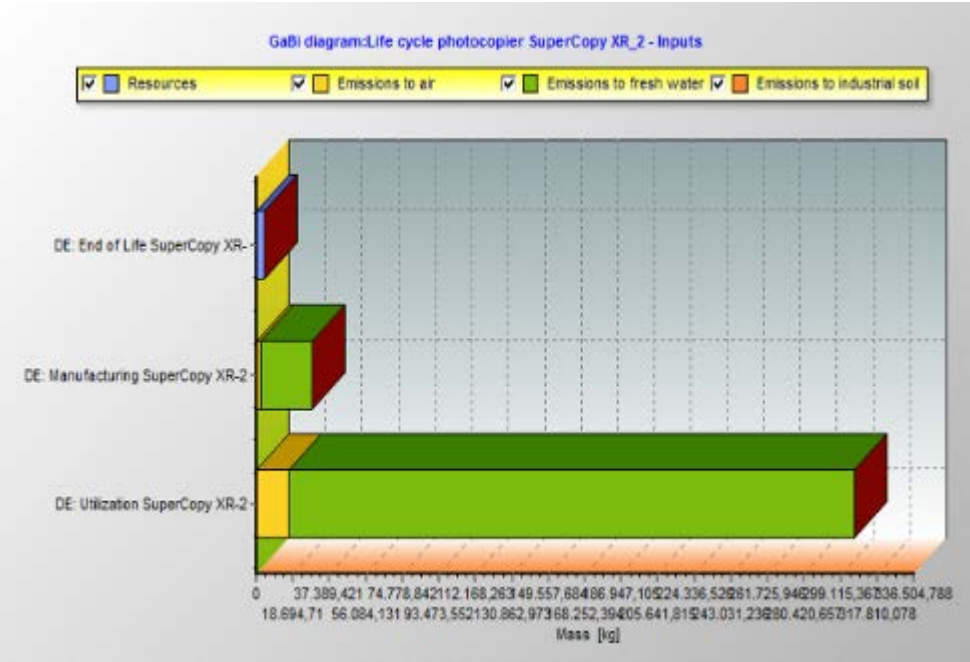


Chart type lines:

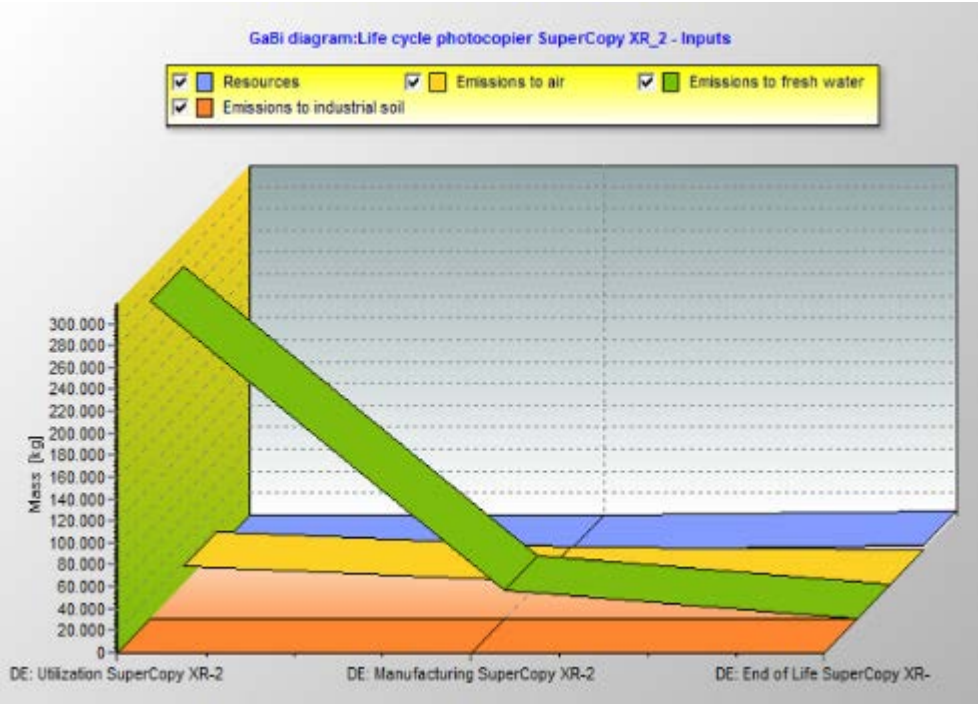


Chart type areas:

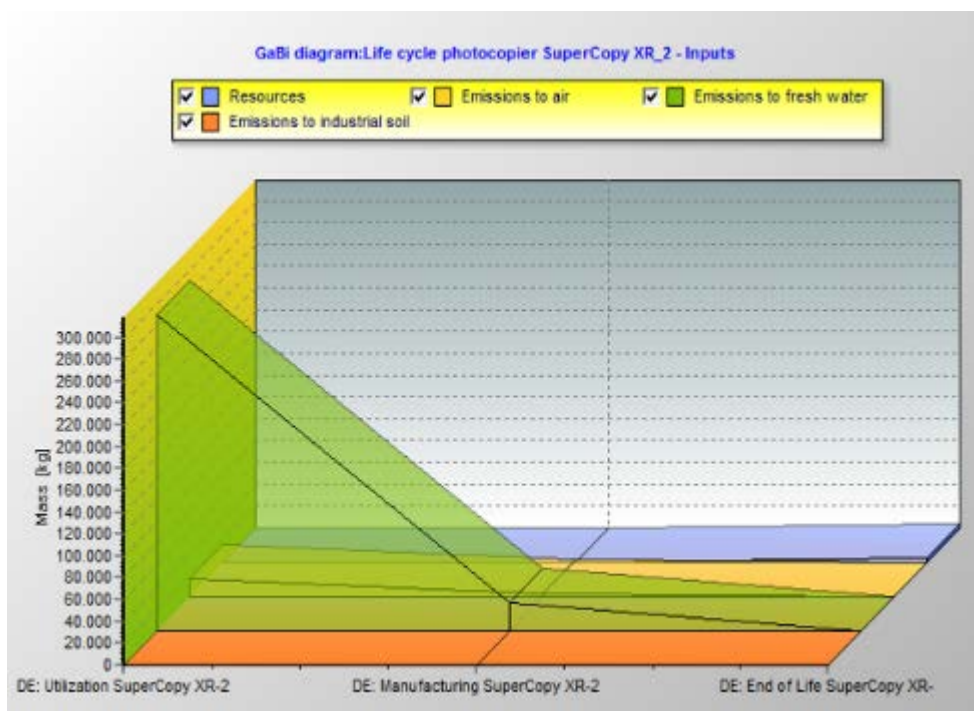
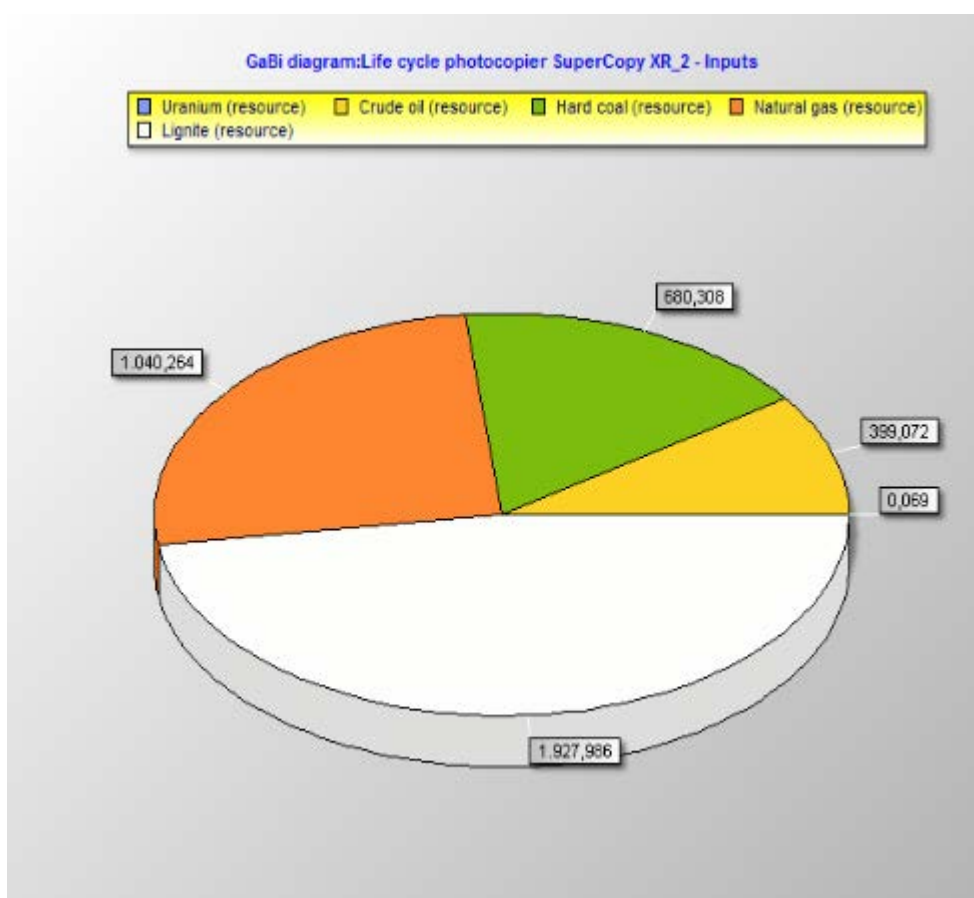
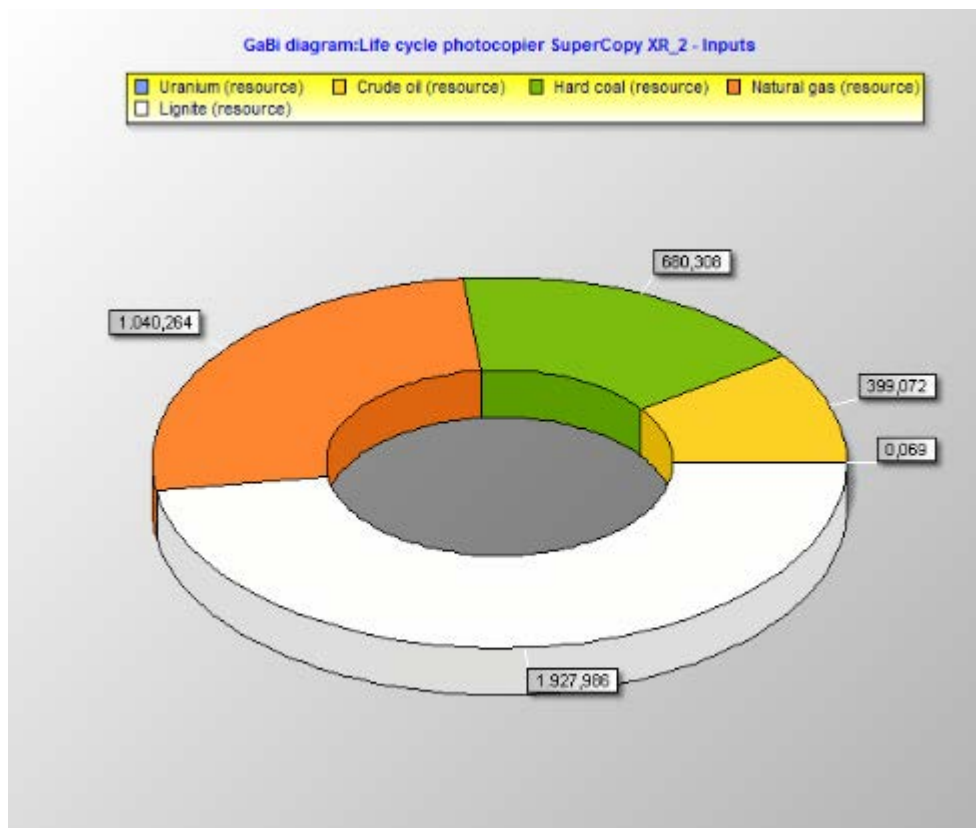


Chart type pie:



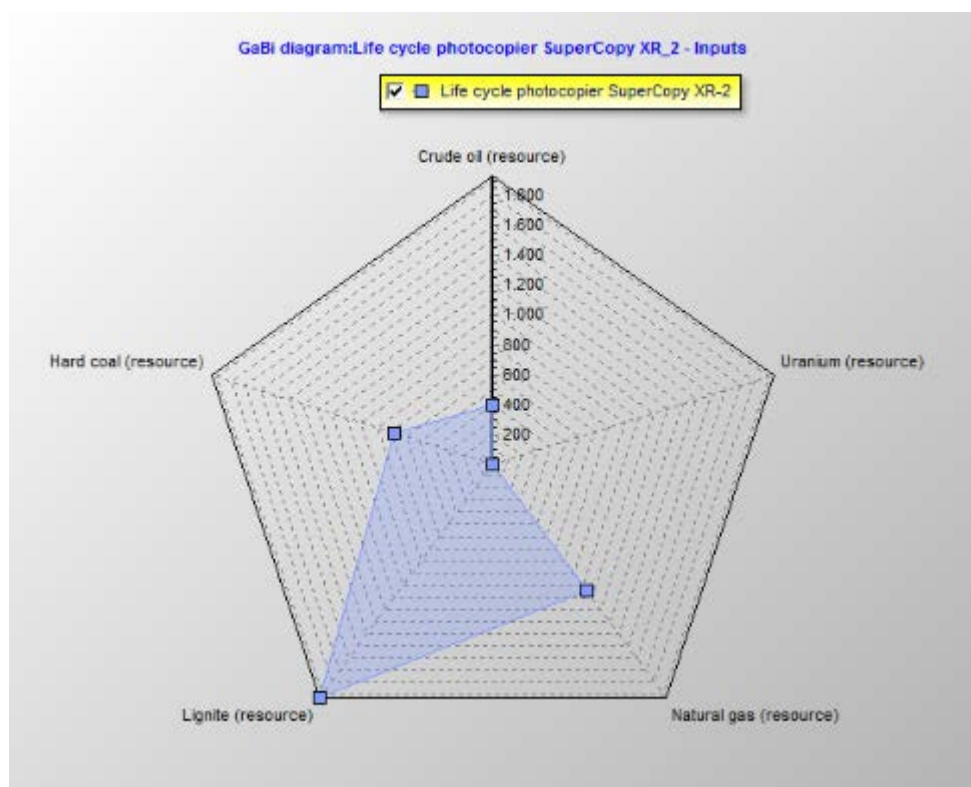
Pie charts can be used best if only one row or column of data values should be visualized and no negative values appear. In the standard setting for pie charts the pie segments are ordered by value.

Chart type donut:



Donut charts are analogue to the pie charts, with a donut-like shape

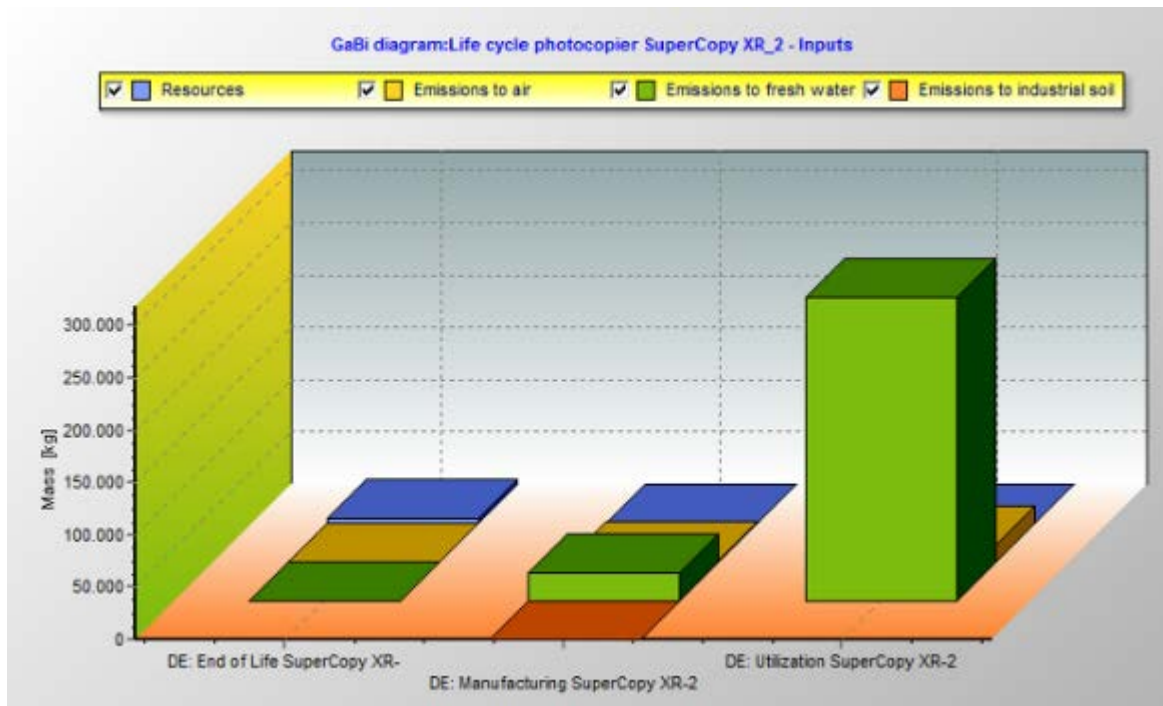
Chart type radar:



8.3.5.2 Chart series arrangement

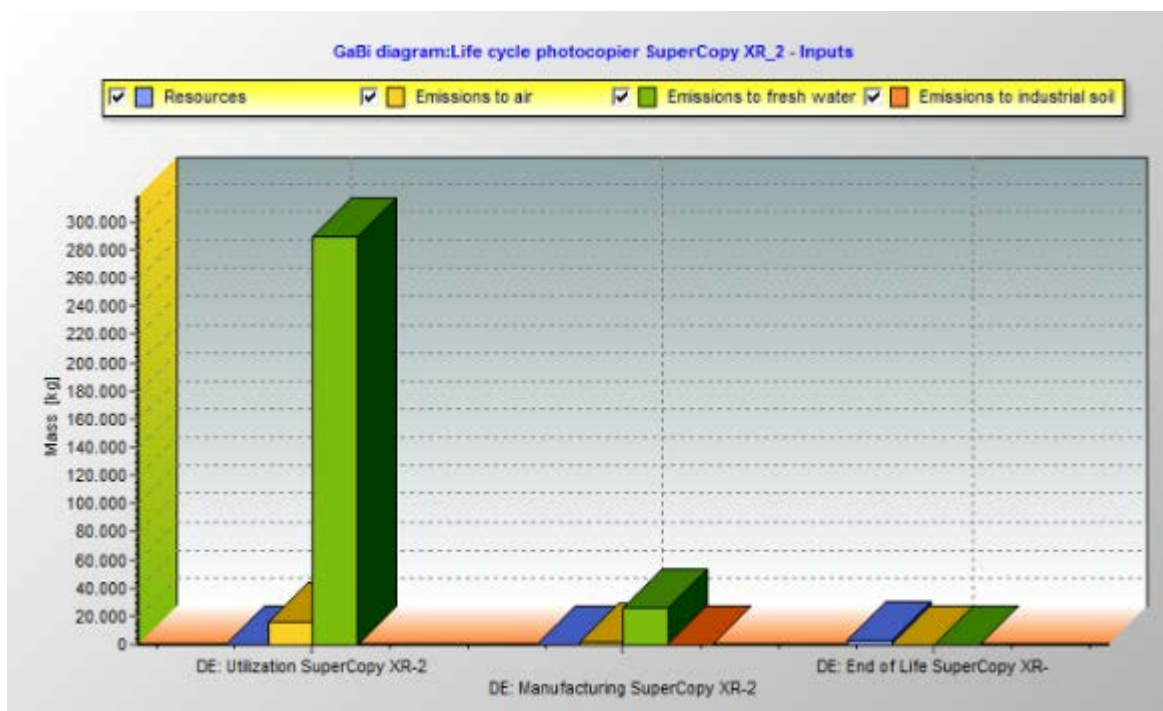
Chart series can be arranged in various ways.

Behind:



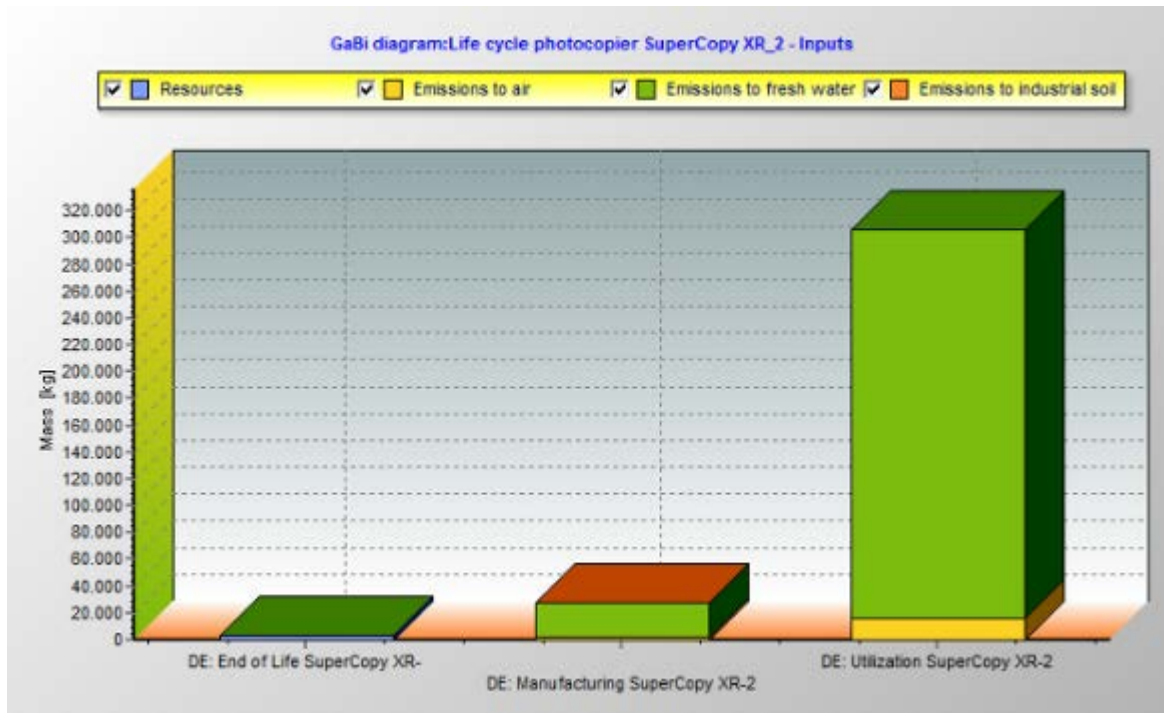
The chart series are arranged behind each other. This arrangement is only possible if the chart is displayed in 3D

Side by side:



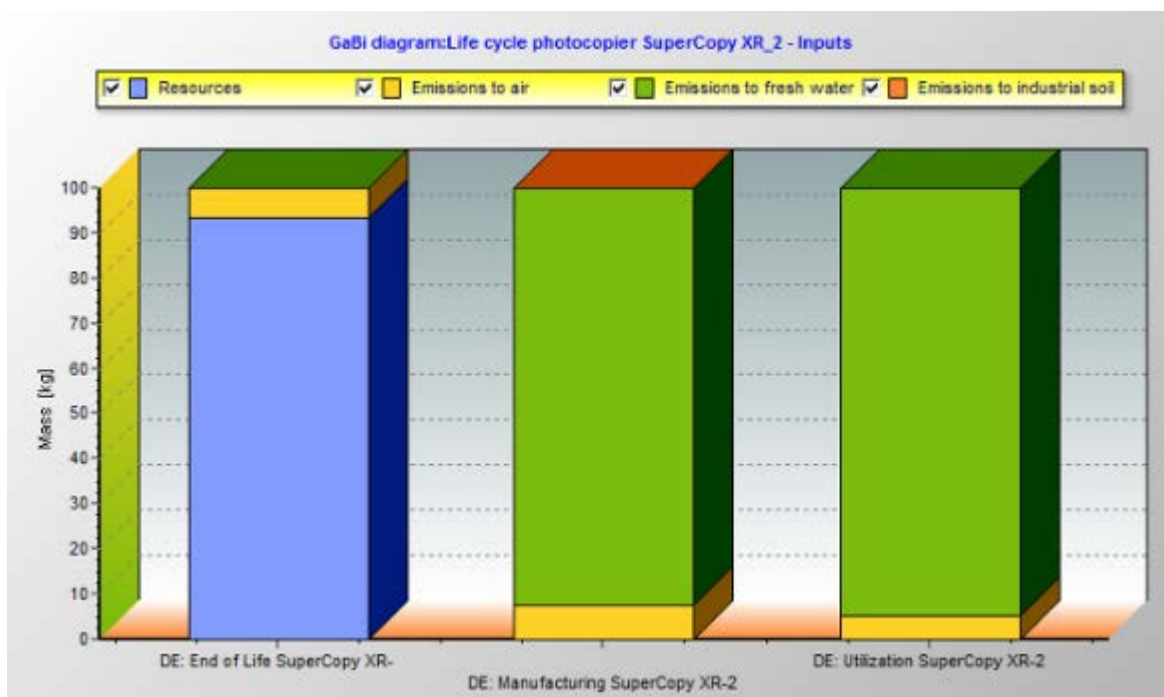
The chart series are arranged next to each other.

Stacked:



The chart series are stacked on top of each other.

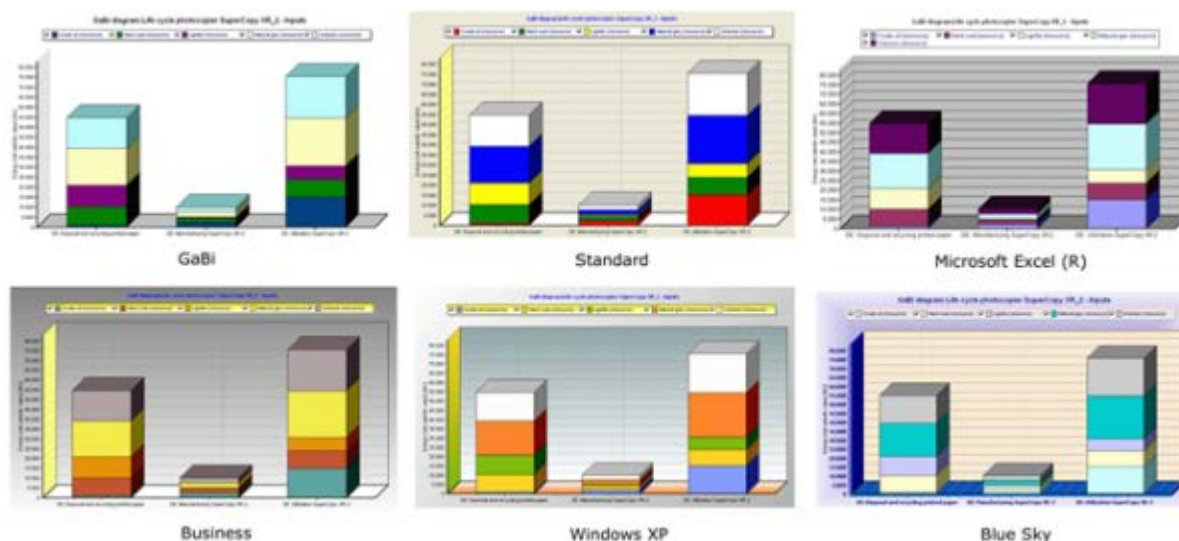
Stacked 100%:



The chart series are stacked on top of each other and show the share of each series to the corresponding data point

8.3.5.3 Chart themes

There are several predefined color themes that can be selected for the chart. The themes change the colors of the series, background, chart walls, legends, titles etc. with one click.



8.3.6 DQI Statistic

Processes, process instances and process plans provide different possibilities for the documentation of data quality. The quality of this data can be evaluated statistically at the level of the balance. The collective DQI entries of the plans and processes used in a balance are summarized in the window for statistical evaluation of a balance and displayed as tables.

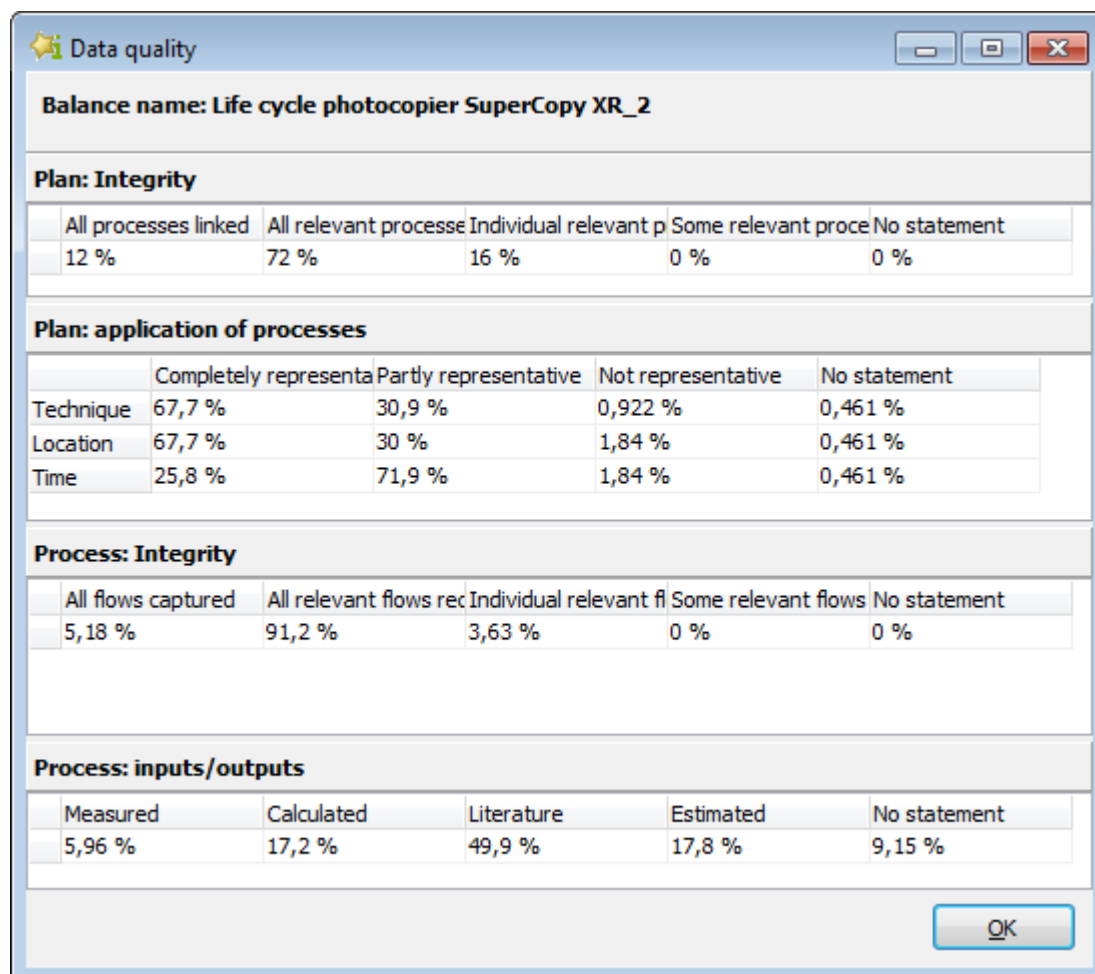


Figure: Window for the output of the DQI statistic for balances

8.3.7 Balance View

To effectively compare different balances, you can use user-defined balance view. Here the list of flows/flow groups and sizes can be configured and saved. A saved balance view can be loaded later for another balance view and assures that the same lines of both balances will be showed. This feature is very helpful with the automated further processing of GaBi balances with Excel macros.

The tree-like hierarchy of the input flows (and flow groups), output flows (and flow groups) as well as the sizes of the inputs and outputs are displayed on the left according to the pressed command button in the window for balance views. Objects which should be hidden permanently in the balance appear with a grey symbol.

Command buttons:

Abort	Rejects the changes in the user defined balance view and closes the window.
OK	Accepts the changes in the user defined balance view and closes the window.
,> (Hide permanently)	Hides permanently the selected object in the left hand tree view.
,> (Display permanently)	Displays permanently the object selected in the right hand object list.
Load	Loads an already saved, user defined balance view (data with the ending .gbv)
Save	Saves the actual, user defined balance view.
Create hierarchy	Creates a tree like hierarchy according to choice.

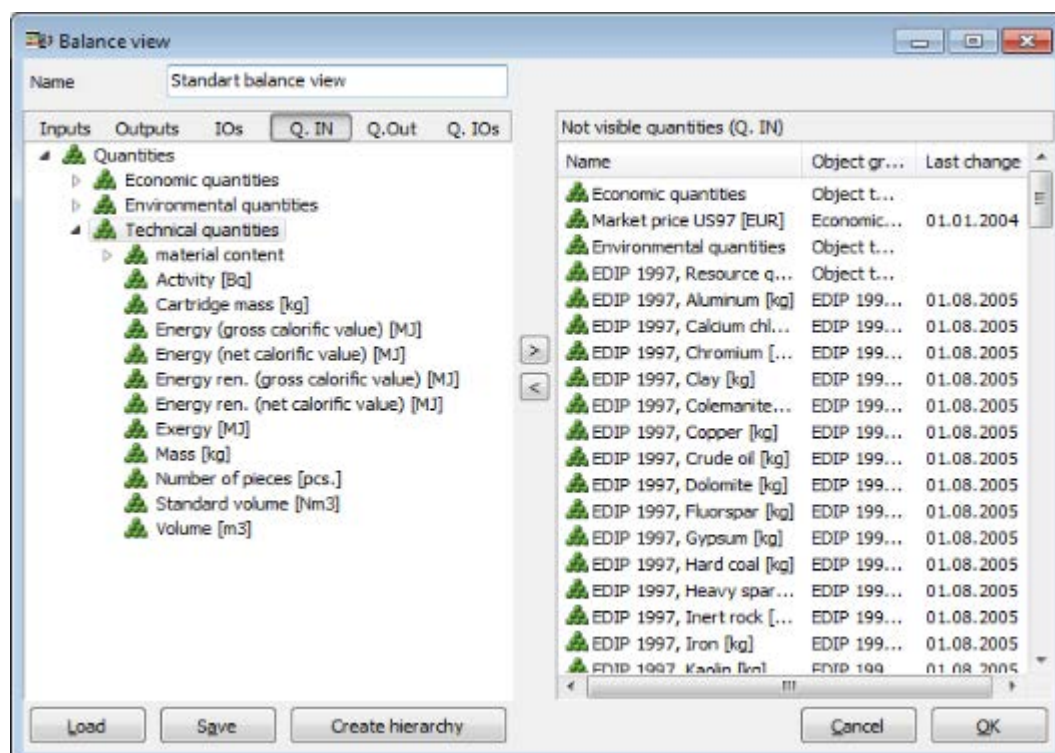


Figure: Window for the definition of user-defined balance views

Menu right mouse button

New Folder	Create a new folder in the tree-like hierarchy.
Rename	Enables the renaming of a newly created folder in the tree-like hierarchy.
Hide permanently	Hides the selected object permanently.
Display permanently	Displays the selected object permanently.
Display all subfolders	Unfolds all the subfolders of the selected object in the tree-like hierarchy.
Hide all subfolders	Folds up all the subfolders of the selected object in the tree-like hierarchy.

8.3.8 Category Filter

Category filters are conditions that process instances must satisfy for their values to be taken into account in the balance calculation. There are the four category characteristics (the categories 'Country', 'Type', 'Enterprise' and 'User defined') that can be assigned to the process instance at the plan level.

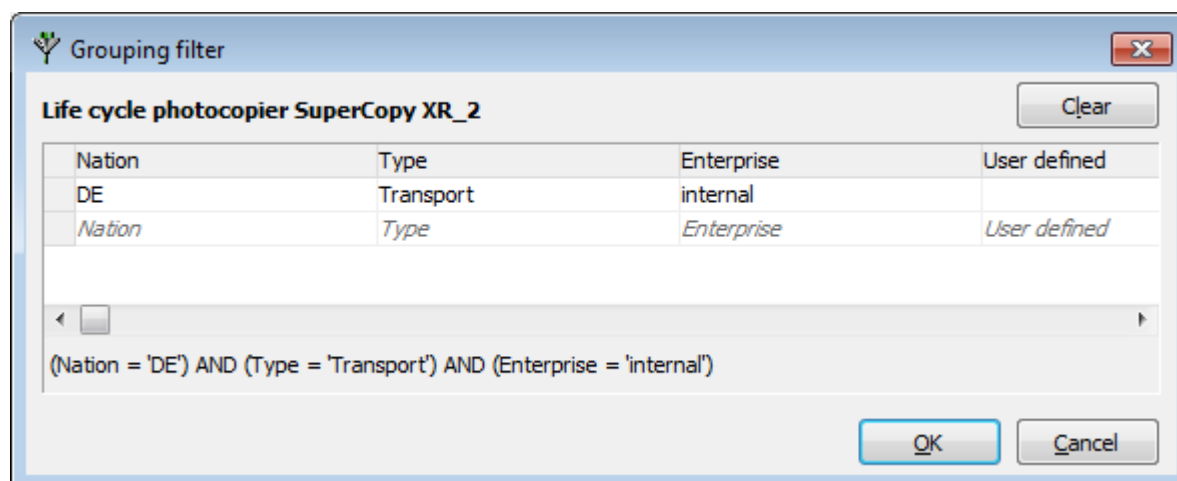


Figure: Window for setting the category filters

Conditions in a single line must be fulfilled in combination; conditions in different lines can be fulfilled alternatively. For example in the first line 'FRG' is in the column 'country' and, in the second line, 'recycling' in the column 'type' and 'internal' in the column 'operation', then all process instances in the balance calculation are considered, which are classified with 'country=FRG' (or with 'type=recycling' and 'enterprise=internal').

8.3.9 Category View

In the category view of GaBi balances, the four categories 'country', 'type', 'enterprise' and 'user defined' are used to create a hierarchical display. Thus, the order in which the categories are considered can be set by the user. In the same way, the user has the choice of which category to use for the creation of the hierarchy.

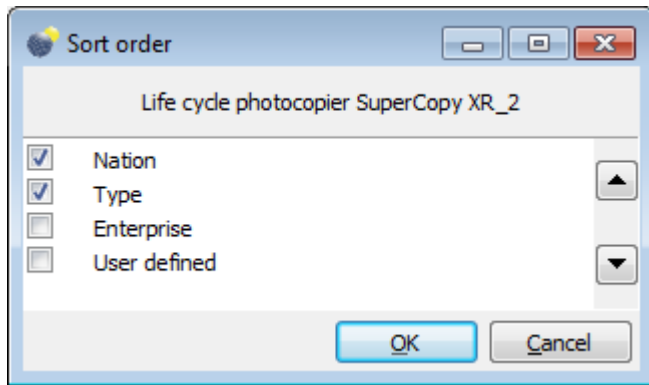


Figure: Window for setting the category view of balances

If 'country' and 'type' are selected under each other, then this means that a hierarchy is created on whose uppermost level all the features of the category 'country' are located. On the second level, for each 'country', follow-ups consisting of all the features of the category are created. Thus, for example, the following hierarchy emerges:

FRG Production Recycling no entry		
	USA Production Recycling no entry	
		no entry Production Recycling No entry

8.4 Object Type: Plan

GaBi has an easy-to-use process plan editor for modeling life cycles. Processes relating to corresponding input and output flows (with identification of valuable materials and waste) are connected to one another on a process plan and represented in the form of Sankey diagrams.

Processes can be dragged and dropped directly on to a process plan from the GaBi DB-Manager, after which they become a process instance. That means that in the plan they exist as only references to processes in the database, for which the scaling and any parameters can be modified at plan level (double-click using the right mouse button, "process instance" menu item), without changing the database definition. You can reach the database process upon which it is based by holding down the "Ctrl"-key and double clicking on a process instance, or right-clicking and selecting "Details".

The graphic size/appearance of processes can be changed by dragging the small black squares, called handles, which appear after clicking on a process instance. When moving the handle, they jump to a certain grid in order to facilitate the orientation of graphical plan elements. The grid size can be set with the GaBi options. Hold down the "Alt" key to turn off the grid.

Processes can be connected to one another by using the mouse. Start from the input or output bar (bright red IN, dark red OUT) of a selected process instance to connect to the next process instance or flow in the process chain. If there is no immediate correlation between the outputs of a source process and the inputs of a sink process, a dialog box will appear showing options to connect the two different flows. The dialog box has the effect of redefining a process input, or process output. In the example above the refinery delivers the *heating oil* flow and the truck transport waits for the *Cargo* flow. So that both processes can be connected to one another, the corresponding input for the truck transport is redefined at plan level, and truck-heating oil transport is created as a result.

Tracked material flows of a process instance appear as small points on the left (input) and right (output) edge of a process instance. Flows which are connected to another process instance appear as a black point; flows which are not connected, appear as a red point. This option may be toggled on or off from the options menu.

The scaling of connected process instances is automatically adjusted to one another by scaling and “fixing” a unit process on the plan. For process networks this takes place by resolving a linear equation system (LES), which can be obtained from a process plan.

The LES can be under-specified if too few processes are attached, i.e. are attached as a reference point. In this case, scaling of processes continues and is determined in an iterative manner until the LES can be finally resolved.

In unfavorable cases the LES will be over-specified. In such cases connections will be broken. This means that the source supplies/produces a larger or smaller amount of a flow, than the sink processes need. As a result, a surplus or additional demand for the connecting flow is created. The amount is displayed in the balance of the process plan, and should be resolved by correcting the model definition.

Flow instances, i.e. connections between two processes, are displayed so that the flow quantity determines the thickness of the connections and an arrowhead indicates the flow direction. Thus, it is possible to choose at plan level which flow quantity determines the connection width. It is possible, to display the flows in terms of mass, energy and cost.

Flow instances, like process instances, are marked with handles.

Clicking on these handles enables alignment and arrangement of these flows for easier interpretation of the plan. New handles can be created, by dragging with the mouse from a connection segment. Handles automatically disappear when two are superimposed on one another, which are made easier by means of magnetic behavior ('snap to object').

For a greater understanding and thus to improve the degree to which process plans can be interpreted, it is possible to provide comments on them. Comment fields are created by clicking on the command button and can be edited by double-clicking them. Background color and text color can be selected as well.

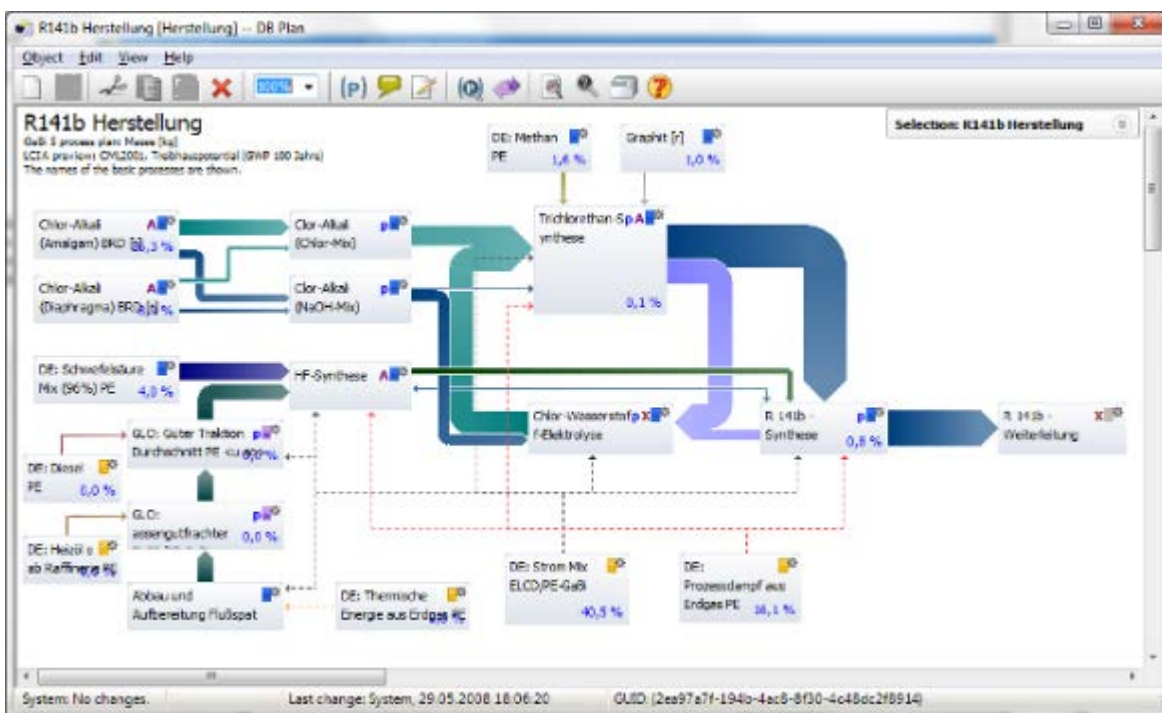


Figure: Plan object type window

A GaBi process plan consists of:

Menu bar, tool bar, plan area, text field for name, status bar.

Command buttons: (from left to right)

New	Opens an empty form for creating a new plan.
Restore	Undoes changes made to the current plan.
Save	Saves changes made to the current plan in the database.
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard into the active field.
Delete	Deletes the selected processes and flows
Zoom factor	Influences the display size of process plans.
Plan parameter	Opens the plan parameter window.
Comments field	Pastes a new comments field into the process plan.
Documentation	Displays a documentation list for the current plan.
Parameter explorer	Opens the Parameter Explorer window with the current plan.
Calculate balance	Calculates a total balance of the current process plan.
GaBi DB-Manager	Switches to the GaBi DB-Manager.
Search	Switches to the GaBi database search window.
Window	Displays a list of the currently open GaBi windows.
Help	Opens the on-line Help for the current window.

Menu commands :

Object	Commands for the management of the current process plan.
New	Opens an empty form for creating a new process plan.
Restore	Undoes changes made to the current process plan.
Save	Saves changes made to the current process plan in the database.
Create copy	Creates a copy of the current object.
Save as process	Saves the current plan as a GaBi process.
Copy all	Copies the current process plan in full to the clipboard (you can choose between the formats Windows metafile and bitmap).
Close	Closes the current window after a confirmation prompt in case changes have been made.
Edit	Commands for editing the current object.
Cut	Moves the current selection to the clipboard.

Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard into the active field.
Delete	Deletes the current selection from the process plan.
Mark all	Selects all process and comments on the process plan.
Properties	Allows you to edit the object properties.
Parameter	Opens the plan parameter window.
Adopt default colors	Sets the flow colors to the default settings.
New process	Opens a window to input a new database process and then positions it on the process plan surface.
View	Commands for arranging the user screen.
DB-Manager	Switches to the GaBi DB-Manager.
Storage location	Displays the type of the current plan in the GaBi DB-Manager
Window	Displays a list of the currently open windows.
Display in/outputs	Displays connected in/outputs in black, vacant ones in red.
Display flow names	Displays flow names on the connections between process instances.
Display flow amounts	Displays the flow quantities and the start and/or end points of connecting arrows.
Display basic names	Process instances can include a name which is distinct from the basic processing names This option controls the display of a process instance name or basic process name on the plan.
Display process images	If references to image files are saved in the individual process instances, they are displayed.
Warnings	Allow you to set the warning level for the plan design.
If flow is broken	Shows warning message if process net is over-specified.
If assumption is made	Shows warning message if variable is set randomized.
Load settings	Restores user default window settings.
Save settings	Saves current window settings as the user default.
Help	Commands for displaying Help
GaBi Help	Opens the on-line Help for the current window.
Index	Opens the Help index.
Info	Displays program information.

Right mouse button menu (process plan):

Plan name	Displays that the plan was clicked on with the right mouse button.
Properties	Opens the plan properties window.
Parameter	Opens the plan parameter window.
Adopt default colors	Sets the flow colors to the default settings.
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard into the active field.
Delete	Deletes the current selection from the process plan.
New process	Opens a window to input a new database process and then positions it on the process plan surface.

Right mouse button menu (process instance):

Process instance name	Displays the name of the process instance which was clicked on with the right mouse button.
Properties	Opens the process instance window
Location of storage	Displays the type of the current process in the GaBi DB-Manager
Details	Opens the window of the basic process/plan upon which it is based (can be accessed using Ctrl + double click).
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard into the active field.
Delete	Deletes the current selection from the process plan.
Consistency check	Opens the consistency check window.

Right mouse button menu (flow instance):

Flow name	Displays the name of the process instance which was clicked on with the right mouse button.
Properties	Opens the flow instance window
Details	Opens the window of the basic process/plan upon which it is based (can be accessed using Ctrl+ double click).
Location of storage	Displays the type of the current process in the GaBi DB-Manager

Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard into the active field.
Delete	Deletes the current selection from the process plan.

8.4.1 Plan properties

The window for plan properties is accessed by double-clicking on the plan area or from the right mouse menu by clicking. Plan color, illustrated quantities maximum flow width can be entered here and the details of its completeness may be entered here as well (see also DQI).

The screenshot shows the 'Plan properties' window for a selection named 'Life cycle photocopier'. The window is organized into several sections:

- Selection:** Life cycle photocopier [...]
- Completeness:** A dropdown menu set to 'All relevant processes linked'.
- Colour:** A color selection box and a 'Change...' button.
- Image:** A small image icon with a red 'X' and the text 'No image'.
- Quantity:** A dropdown menu set to 'Mass'.
- Unit:** A dropdown menu set to 'kg'.
- Maximum flow width:** A numeric input field set to '42' with a zoom icon.
- Pixels per unit [%]:** A numeric input field set to '1' with a zoom icon.
- LCIA preview:** A checked checkbox and a dropdown menu set to 'CML2001, Global Warming Potential'.
- Instance Colour:** A dropdown menu set to '-- none --' and an 'Edit...' button.

Figure: Plan properties window

Otherwise it is possible to read off in the property window for a plan, how many process inputs and outputs exist and how many of them are still not connected.

Reference to an image file is not to display a background image. Analogous to image references in processes, this reference is only used if the plan is used as an instance on another (higher-level) plan (and the option to display process images is activated here).

8.4.2 Plan parameter

In the plan parameter window it is possible to edit both plan parameters and process and plan instance parameters. Using the drop down menu, you may choose to either display all parameters simultaneously or only the process plan parameter or one of its process instances.

It is possible to recreate plan parameters. Parameters of process and plan instances are specified by the basic processes and plans and can also include certain values and formulas for the current plan in the plan parameter window. The parameters of other process instances can be used in a formula. Here the corresponding process name must precede the parameter name and be separated by a point. Process instances which contain other characters than letters (even spaces) must be put into quotation marks.

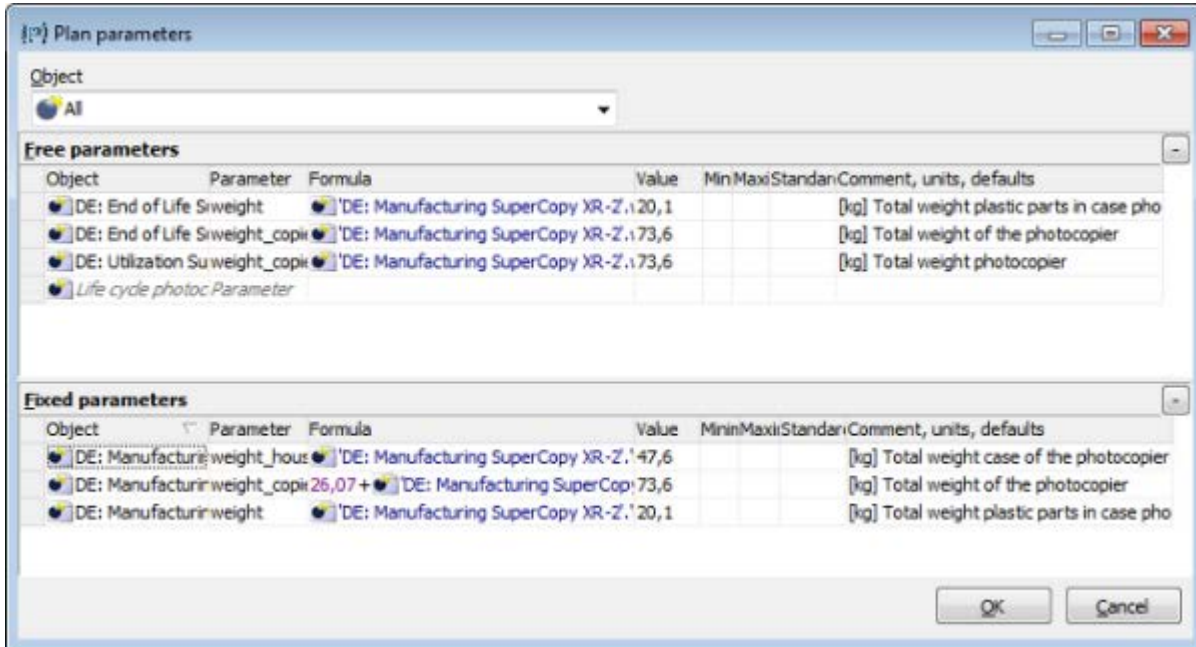


Figure: Plan parameter window

Right mouse button menu:

Insert parameter	Insert selectable local variables or global variables (only in the form field of the “free parameter” table).
Insert function	Insert selectable mathematical function (only in the form field of the “free parameter” table).
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard into the active field.
Mark all	Marks all rows and columns in the table.

8.4.3 Process Instances

If a GaBi process is dragged on to a process plan, it becomes a copy of a database process and is now a process instance. Process instances can be differentiated by means of various parameter settings and the scaling factor of the associated database process, without changing the original definition of the process in the DB Manager. However, only those parameters can be changed, for which no function has been defined for calculating them at process level (independent parameters). Dependent parameters are automatically calculated using their functional dependence.

A reference to an image file can be saved for a process instance. This image may be toggled with the plan option “Display process images”. If reference is already made to an image file on the basic process level, this reference can be overwritten on the process instance level.

A process instance can be fixed, it then serves throughout the plan as a reference point. Other processes connected

are adjusted to this in terms of amounts. If the R141b input of a corresponding sink process (see figure above) should have a weight of 1 kg as a reference basis, the *Fixed* button must be checked.

If an allocation is performed, the quantity ratio of the recoverable materials for a process is broken (unconnected recoverable materials are set to 0). Inputs and outputs arising in addition to the recoverable materials are worked out appropriately using the allocation key. All outputs designated as waste are treated as non recoverable materials in a standard allocation. In the extended allocation, the allocation relevance of wastes can optionally be selected.

8.4.3.1 Local Settings

At the process instance level, processes representativeness in terms of its use is documented on the process plan. In the three fields at the bottom of the dialog window in each case for technology, location and time the GaBi DQIs for the subtype representativeness are provided for selection.

In addition, process instances can be grouped by assigning certain characteristics to the categories “Country”, “Type”, “Enterprise” and “User defined”.

If the amount of an input or output changes, the scaling factor of a process instance is automatically changed. By default, inputs and outputs identified as valuable materials and as waste are displayed in the corresponding lists of the process instance window. Using the optional “Display all” button, it is possible to display the complete input and output lists of a process instance.

The screenshot shows the 'Truck-trailer/38t total cap./26t payload/long dist [External hauler service] -- DB Process' window. The 'Parameter' table is as follows:

Parameter	Formula	Value	Minimum	Maximum	Standard	Comment, units, defaults
Auslast		0,85			0 %	[...] average utilisation ratio (85%)
Distanz		100			0 %	[km] distance start - destination
lcwt_faktor	$Distanz / (Tonnage * 1000)$	0,00452				[...] LCWT factor of adaption (more km = more l
Spez_Verbr	$Verbrauch / (Tonnage * 1000)$	0,00131				[kg] Diesel per kg cargo
Tonnage	$Auslast * 26$	22,1				[t] compl. load forward
Verbrauch	$(0,0116 * Auslast + 0,768 * Distanz * 26 * Auslast)$	29				[kg] Diesel total consumption

The 'Inputs' table is as follows:

Flow	Quantity	Amount	Unit	1% Standard	Origin	Comment
Cargo [Others]	Mass	1	kg	X 0 %	Calculated	
Diesel [Crude oil products]	Mass	0,00152	kg	X 0 %	Calculated	

The 'Outputs' table is as follows:

Flow	Quantity	Amount	Unit	1% Standard	Origin	Comment
Cargo [Others]	Mass	1	kg	X 0 %	Calculated	
Carbon dioxide [Inorganic emissions to air]	Mass	0,00821	kg	0 %	Calculated	
Carbon monoxide [Inorganic emissions to air]	Mass	7,57E-006	kg	0 %	Calculated	
Dust (unspecified) [Particulates to air]	Mass	2,89E-006	kg	0 %	Calculated	
Methane [Organic emissions to air (gross)]	Mass	4,39E-009	kg	0 %	Calculated	
Nitrogen oxides [Inorganic emissions to air]	Mass	5,73E-005	kg	0 %	Calculated	
NM VOC (unspecified) [Group NM VOC to air]	Mass	3,64E-006	kg	0 %	Calculated	
Sulphur dioxide [Inorganic emissions to air]	Mass	3,13E-006	kg	0 %	Literature	

System: No changes. PE-GaBi 2006 Last change: System, 18.12.2002 16:43:53 GUID: {d8f317fa-52bf-4870-bd68-ed51...}

Figure: Process instances window (LCA)

8.4.3.2 Plan: LCC

The page which can be selected using the “LCC” tab can only be used to display values. Here you can view the effects of the local parameter settings and the scaling factor on the cost information of a process instance.

Local name: DE: Manufacturing SuperCopy XR-2

Local settings: LCC: 0 EUR

Flow costs

Alias	Flow	Inputs	Inputs	Inputs	Inputs	Inputs	Inputs	Inputs
Fl	Lignite Gre	Lignite Spain [Lignite (resource)]	Lignite USA [Lignite Austr	Natural gas	Hard coal	Hard coal Po	Crude oil Ar	Natural
Am	0,515 kg	0,134 kg	0,000138 kg	0,359 kg	0,000401 kg	0,197 kg	0,00041 kg	0,0392 kg

Machine costs

Alias	Machine	Cycle tinUnit	Direct cost plUnit	Overhead raCost	Unit
Total				0	EUR

Personnel costs

Alias	Inputs	Inputs	Inputs	Inputs	Inputs	Inputs
Ali						

Cancel OK

Figure: Process instances window (LCC)

The total of all flow costs, machine costs and personnel costs are displayed in the “LCC” table tab.

8.4.3.3 Extended Allocation (ref.)

In the case of extended allocation, LCA information, cost information and LCWE information can be allocated according to different keys. You can also choose whether on the outputs identified as recoverable material are relevant to allocations or the outputs identified as waste.

Individual inputs and (allocation-irrelevant) outputs can be allocated according to different keys. As a rule, the LCA standard allocation is used. Inputs and outputs should be allocated according to different keys only in well thought-out exceptional cases.

In addition to the existing GaBi amounts, manual allocation keys can be created. With a manual allocation key, the ratio numbers according to which the input and (allocation irrelevant) outputs are allocated are manually entered in the tale “Allocation relevant materials”.

DE: hard coal power plant <u-so> -- Process instance

Local name: DE: hard coal power plant <u-so> No image

Local settings | VF | LCC | **Extended allocation**

LCA standard allocation: Energy (net calorific value) ☐ Include wastes in allocation

LCC allocation: Energy (net calorific value) LCWE allocation: Energy (net calorific value)

Allocation relevant outputs Manual allocation

Alias	Flow	Quantity	Amount	Unit	Trz	Energy (net calorific value)
stromverh	Power [Electric power]	Energy (net calorific 0,4		MJ	X	40 %
Waermeerz	Thermal energy (MJ) [Thermal energy]	Energy (net calorific 0,6		MJ	X	60 %

Allocated inputs

Alias	Flow	Quantity	Amount	Unit	Trz	Allocation
Kohle	Hard coal [Hard coal products]	Mass	0,0387	kg	X	LCA standard allocation

Allocated outputs

Alias	Flow	Quantity	Amount	Unit	Trz	Allocation
m_CO2	Carbon dioxide [Inorganic emissions to air]	Mass	0,107	kg		LCA standard allocation
NOx_nach	Nitrogen oxides [Inorganic emissions to air]	Mass	0,000191	kg		LCA standard allocation
	Sulphur dioxide [Inorganic emissions to air]	Mass	6E-005	kg		LCA standard allocation
staub_em	Dust (unspecified) [Particles to air]	Mass	2,65E-006	kg		LCA standard allocation

Cancel OK

Figure: Process instances window (extended allocation).

The use of extended allocation requires very detailed knowledge of the key value allocation method and its effects (e.g. on the mass balance). Therefore, it is recommended to use the simple allocation on GaBi amounts whenever possible.

8.4.4 Flow Instances

Flows which connect process instances on a GaBi process plan are named in the same way as these flow instances. In general, flow instances specify the scaling factors of the source and sink processes so that the sources deliver exactly the flow quantity which reduces the sinks. If this condition does not apply, the flow instance is *interrupted*.

Selection: Diesel

Broken ☐

Colour Change...

Quantity
Mass

Sources
DE: Diesel fr 0,559 kg

Sinks
Transport pr 0,559 kg

Difference: 0 kg

Instance Colour Edit...
-- none --

Figure: Flow instances window

Flow instances can each be quantified according to defined conversion factors with different amounts. However, the flow amount can only be viewed and cannot be changed in this window. The color of a flow instance can be set as well.

8.4.5 Comments

It is recommended to provide comments for process plans. The use of comments for process plans makes them understandable to third parties and simplifies future changes to the process plan.

A comment field in the process plan can be created using the comment button. The comment text can be changed at any time with a double click on the comment box.



Figure: Comments window on the plan level

You can also choose the background color and the font color in the window for comments on the plan level. In addition, a plan comment can be displayed with frames (in the font color) or without frames.

8.5 Object Type: Process

GaBi manages processes (often referred to as modules) in a tree structure, using *process categories*. In their simplest form, processes have an input list and an output list, in which reference is made in each case to GaBi flows by indicating quantities and amounts. In addition, process parameters and process equations can be defined, which determine one or several flow amounts on the input- or output side.

GaBi contains the process information on the cost structure (LCC) and for the working environment model (LCWE). The different areas LCA, LCC, LCWE can be accessed via a table in the window for GaBi processes.

A GaBi Process consists of the following information:

Country	Maximum of 5 characters		
Name	Maximum of 100 characters		
Source	Maximum of 20 characters		
Process type	Maximum of 10 characters		
Parameter	List	Parameter	Maximum of 15 characters
		Formula	Maximum of 255 characters
		Value	$5.0 * 10^{-324} .. 1.7 * 10^{308}$
		Standard deviation	0% .. 65535%
		Comment	Maximum of 100 characters
LCA information	5.10.1		
LCC information	5.10.2		
LCWT information	5.10.3		

The parameter of a GaBi process can be used in all three areas (LCA, LCC, and LCWE). Reference can be made in the process formula to other parameters of the same process or to global parameters with the nomenclature “*Abbreviation.parameter name*”

The functions defined in the parameter table are not allowed to contain any circular references (e.g. a=b; b=c; c=a). Consequently it must ensure that a **non-iterative** calculation sequence is enforced. A mouse click on the field in the top, left hand corner of the parameter table sorts this according to the calculation sequence.

8.5.1 Process: LCA

The LCA information of a GaBi process consists of:

Inputs	Alias	Parameter name, max. 15 characters
	Flow	GaBi <i>flow</i>
	Quantity	GaBi <i>quantity</i>
	Amount	$5.0 * 10^{-324} .. 1.7 * 10^{308}$
	Factor	$5.0 * 10^{-324} .. 1.7 * 10^{308}$
	Unit	GaBi <i>unit</i>
	Tracked flows	{X, *, “empty”} X = Valuable substance; * = Waste;

		“empty” = other
	Standard deviation	0%-1000% (0,00-10,00)
	Origin	GaBi <i>DQI</i> (data origin)
	Comment	Comment regarding flow information
Outputs	Alias	Parameter name, max. 15 characters
	Flow	GaBi <i>flow</i>
	Quantity	GaBi <i>quantity</i>
	Amount	$5.0 * 10^{-324} .. 1.7 * 10^{308}$
	Factor	$5.0 * 10^{-324} .. 1.7 * 10^{308}$
	Unit	GaBi <i>unit</i>
	Tracked flows	{X, *, “empty”} X = Valuable substance; * = waste; “empty” = other
	Standard deviation	0%-1000% (0,00-10,00)
	Origin	GaBi <i>DQI</i> (data origin)
	Comment	Comment regarding flow information
Parameter	Parameter	Parameter name, max. 15 characters, cannot be numerical and must not contain +-* or / or spaces. Is referred to as "Alias" in the flow rows.
	Formula	Formulas, values and other process parameters or global parameter can be entered. If a fix value is entered here it cannot be changed on plan parameter value
	Value	Values that are calculated in the Formula field appear in grey. When the formula field is not used values can be entered here. Values entered in the value field can be overwritten in scenarios, on instance level and on plan parameter level.
	Minimum	Minimum value for the parameter
	Maximum	Maximum value for the parameter
	Standard deviation	Standard deviation of the parameter value
	Comment	Comment regarding parameter

DE: Thermal energy from natural gas [Thermal energy generation] -- DB Process

Object Edit View Help

Name: DE Thermal energy from natural gas Source: agg - LCI result

Parameter: LCA LCC: 0 EUR LCWE Documentation

Completeness: All relevant flows recorded

Inputs

Flow	Quantity	Amount	Unit	% Standard	Origin	Comment
Air [Renewable resources]	Mass	0,432	kg	0 %	Calculated	
Bentonite [Non renewable resources]	Mass	3,26E-006	kg	0 %	Literature	
Crude oil [Crude oil (resource)]	Mass	4,26E-005	kg	0 %	Calculated	
Crude oil Central Africa [Crude oil (res	Mass	2,27E-006	kg	0 %	Calculated	
Crude oil Central America [Crude oil (r	Mass	1,18E-006	kg	0 %	Calculated	
Crude oil CIS [Crude oil (resource)]	Mass	3,91E-006	kg	0 %	Calculated	
Crude oil France [Crude oil (resource)]	Mass	7,55E-010	kg	0 %	Calculated	

Outputs

Flow	Quantity	Amount	Unit	% Standard	Origin	Comment
Thermal energy (MJ) [Thermal e	Energy (net ca 1	MJ	X	0 %	Calculated	
Ash [Stockpile goods]	Mass	1,78E-007	kg	0 %	Calculated	
CaF2 (low radioactive) [Radioactive w	Mass	6,26E-012	kg	0 %	Calculated	
Gypsum [Waste for recovery]	Mass	6,34E-008	kg	0 %	Calculated	
Hazardous waste (unspec.) [Hazardou	Mass	3,34E-012	kg	0 %	Calculated	
Highly-active fission product solution [	Mass	5,48E-012	kg	0 %	Calculated	
Industrial waste for municipal disposal	Mass	7,58E-008	kg	0 %	Calculated	
Jacket and body material [Radioactive	Mass	3,29E-012	kg	0 %	Calculated	
Line of hazardous waste [Hazardous w	Mass	7,06E-010	kg	0 %	Calculated	

System: No changes. PE-GaBi 2006 Last change: System, 18.12.2002 16:46:09 GUID: {009f27a6-f336-4200-81c0...}

Figure: Object type process window (LCA, without parameters)

Parameters in processes are optional. The table columns “alias” and “factor” are blanked out for processes which do not have any parameters. The sub-window is folded up for process parameters.

If the parameters are defined in a GaBi process, the table columns alias and factor are visible. The amount of an input or output flow can be calculated from the product of factor and alias, for which the alias refers to a parameter defined in the parameter table. For non-parameterized processes no alias should be indicated, in this case factor and amount are equivalent.

Inputs and outputs that are value added or require further processing should be visible and link to other processes on plans, and should be marked with an “X” in the tracked flows column. This mark is used to check for completeness in regard to process links and is required for allocation.

Entries in the Origin column refer to the GaBi *DQIs data origin* (pre-setting *Literature, estimated, calculated, measured*). In addition, *(no statement)* is also possible and a proportional statement is possible: e.g. 10% literature, 8% estimated, 29% calculated, 53% measured. This option is particularly useful for processes linked to resources. In this case the largest proportion is displayed in brackets, in other words in the case of the above example: *(Literature)*.

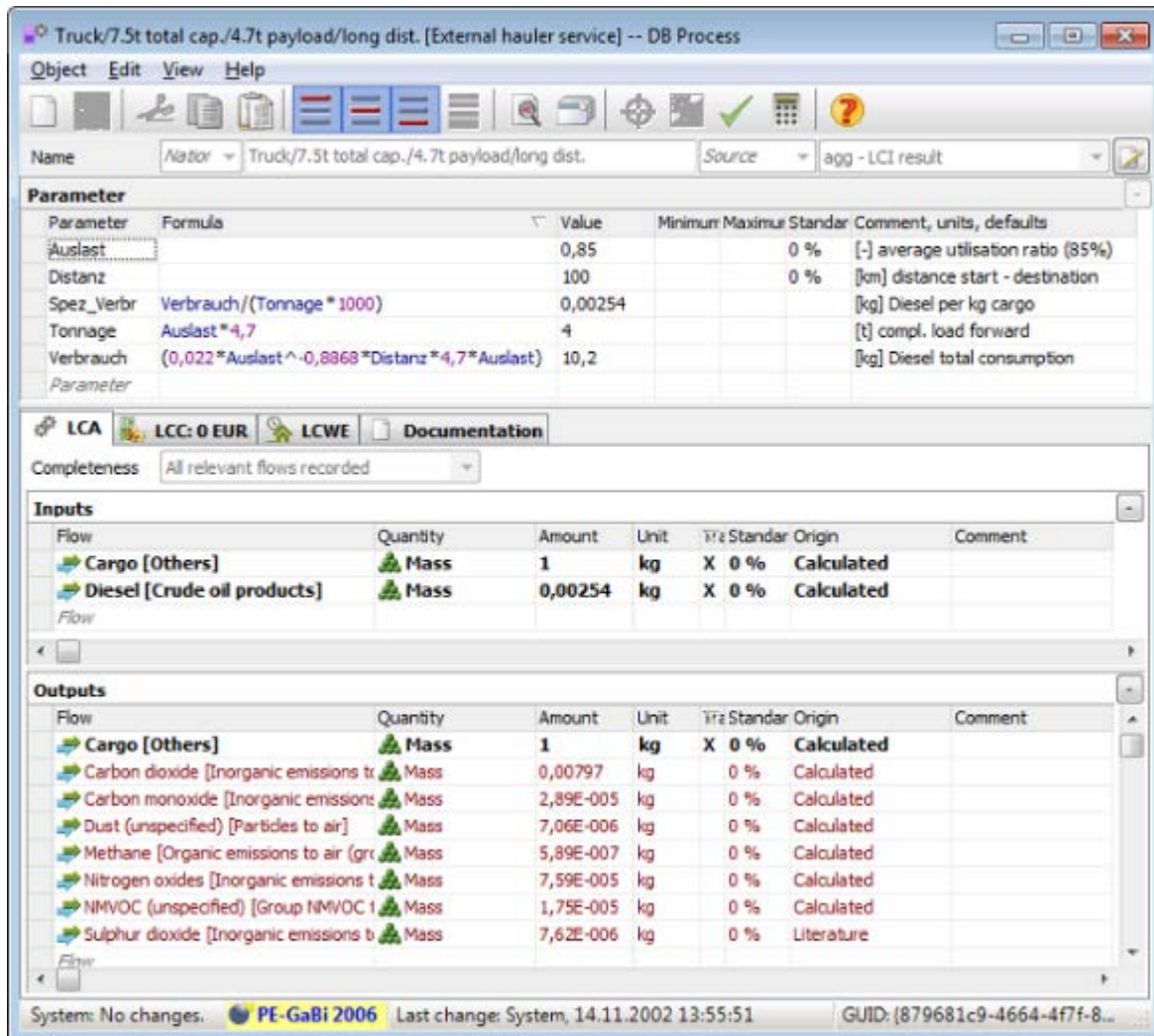


Figure: Object type process window (LCA, with parameters)

Command buttons: (from left to right)

New	Opens an empty form for creating a new process.
Save	Saves changes made to the current process in the database.
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard into the active field.
Table1 (in)visible	Show and hide the first table (from above).
Table2 (in)visible	Show and hide the second table (from above).
Table3 (in)visible	Show and hide the third table (from above).
Table4 (in)visible	Show and hide the forth table (from above).
GaBi DB-Manager	Switches to the GaBi DB-Manager.
List of windows	Displays a list of the currently open GaBi windows.

Focus Assistant	Opens the window for the focus assistant
Invert	Inverts a process, so that in- and outputs are swapped over.
Consistency Check	Allows you to compare input- and output amounts.
Pocket calculator	Rapid start of the Windows pocket calculator.
Help	Opens the on-line Help for the current window.
Documentation	Displays a list of the documentation for the current process.

Menu commands :

Object	Commands for the management of the current process.
New	Opens an empty form for creating a new process.
Restore	Undoes changes made to the current process.
Save	Saves changes made to the current process in the database.
Consistency Check	Allows you to compare input- and output amounts.
Copy all	Copies the current process in full to the clipboard.
Insert total	Pastes the contents of the clipboard as a complete process.
Close	Closes the current window after a confirmation prompt in case changes have been made.
Edit	Commands for editing the current object.
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard into the active field.
Delete	Deletes marked rows from the table.
View	Commands for arranging the user screen.
DB-Manager	Switches to the GaBi DB-Manager.
Location of storage	Displays the type of the current process in the GaBi DB-Manager
Windows	Displays a list of the currently open windows.
Load settings	Restores user default window settings.
Save settings	Saves current window settings as the user default.
Help	Commands for displaying Help
GaBi Help	Opens the on-line Help for the current window.

Index	Opens the Help index.
Info	Displays program information.

Right mouse button menu:

Insert Parameter	Add selected local variables or global variables (only form field of the parameter table).
Insert function	Add a selected mathematical function (only the formula field of the parameter table).
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard into the active field.
Delete	Deletes marked rows from the table.
Details	Opens the window of the marked GaBi flow (not parameter table).
Location of storage	Displays the type of the current flow in the GaBi DB-Manager.
Select all	Marks all rows and columns in the table.

8.5.1.1 The Focus Assistant for Processes

To display the details of a table entry the GaBi system provides the Focus Assistant for processes (). Here, the amount and factor can be modified to change a flow or to scale the entire process to a given quantity. In addition the DQI proportions (measured, calculated, estimated, literature) are displayed for black-box modules

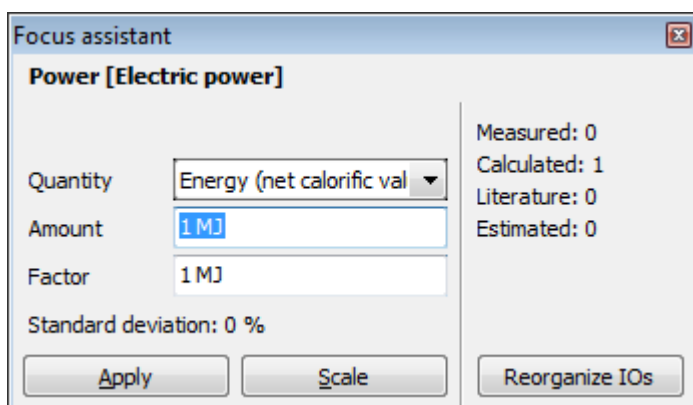
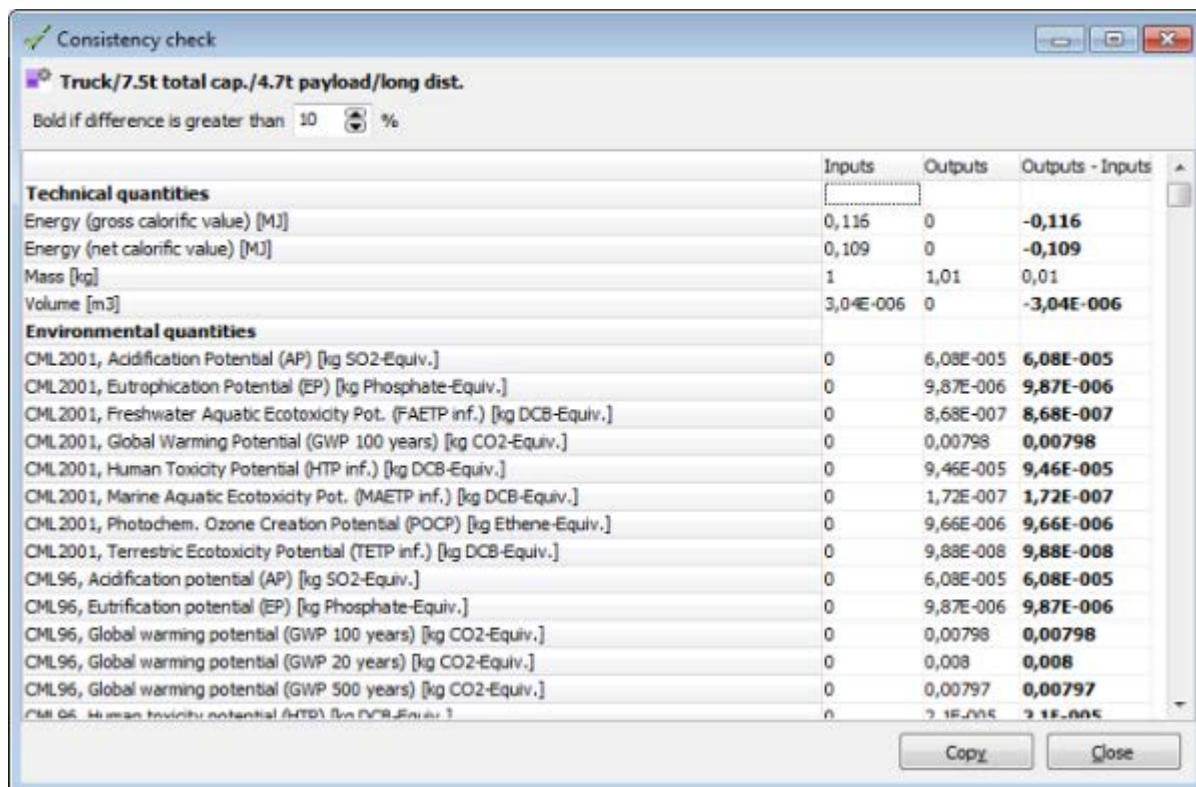


Figure: Focus Assistant window for processes

The Focus Assistant also has a function for scaling processes. If, for example, the amount is doubled in the Focus Assistant and then the command button *Scale* is pushed, then all inputs and outputs for the process are doubled.

8.5.1.2 The Consistency Check for Processes

The mass balance provides an indication of the consistency of a process. Inputs and outputs of a process can be compared with one another using the GaBi consistency check.



	Inputs	Outputs	Outputs - Inputs
Technical quantities			
Energy (gross calorific value) [MJ]	0,116	0	-0,116
Energy (net calorific value) [MJ]	0,109	0	-0,109
Mass [kg]	1	1,01	0,01
Volume [m3]	3,04E-006	0	-3,04E-006
Environmental quantities			
CML2001, Acidification Potential (AP) [kg SO2-Equiv.]	0	6,08E-005	6,08E-005
CML2001, Eutrophication Potential (EP) [kg Phosphate-Equiv.]	0	9,87E-006	9,87E-006
CML2001, Freshwater Aquatic Ecotoxicity Pot. (FAETP inf.) [kg DCB-Equiv.]	0	8,68E-007	8,68E-007
CML2001, Global Warming Potential (GWP 100 years) [kg CO2-Equiv.]	0	0,00798	0,00798
CML2001, Human Toxicity Potential (HTP inf.) [kg DCB-Equiv.]	0	9,46E-005	9,46E-005
CML2001, Marine Aquatic Ecotoxicity Pot. (MAETP inf.) [kg DCB-Equiv.]	0	1,72E-007	1,72E-007
CML2001, Photochem. Ozone Creation Potential (POCP) [kg Ethene-Equiv.]	0	9,66E-006	9,66E-006
CML2001, Terrestrial Ecotoxicity Potential (TETP inf.) [kg DCB-Equiv.]	0	9,88E-008	9,88E-008
CML96, Acidification potential (AP) [kg SO2-Equiv.]	0	6,08E-005	6,08E-005
CML96, Eutrophication potential (EP) [kg Phosphate-Equiv.]	0	9,87E-006	9,87E-006
CML96, Global warming potential (GWP 100 years) [kg CO2-Equiv.]	0	0,00798	0,00798
CML96, Global warming potential (GWP 20 years) [kg CO2-Equiv.]	0	0,008	0,008
CML96, Global warming potential (GWP 500 years) [kg CO2-Equiv.]	0	0,00797	0,00797
CML96, Human toxicity potential (HTP) [kg DCB-Equiv.]	0	9,46E-005	9,46E-005

Figure: Process consistency check window

In addition to mass, any quantity can be selected for a consistency check. The prerequisite for this, is that the corresponding conversion factors are defined for flows. The difference between an output amount and an input amount is displayed in bold font if it exceeds the adjustable threshold value.

8.5.2 Process: Documentation

As every object in GaBi, flows can be linked to external data using the documentation button next to the field of the name.

Additionally GaBi features a documentation form in the documentation tab, which allows a documentation according to the ILCD standard.

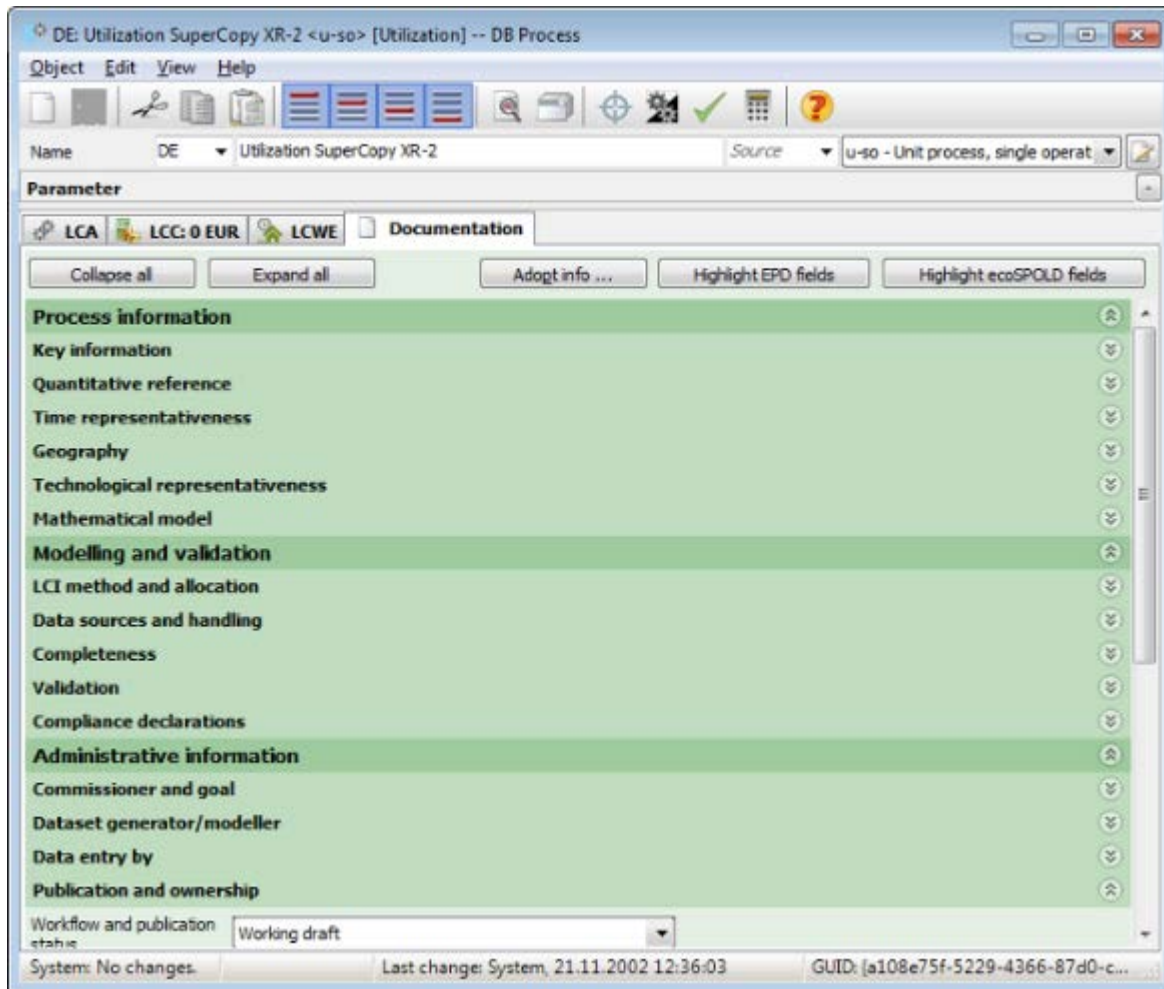


Figure: Documentation tab of the process window

The documentation tab of GaBi processes is divided into three major sections:

Process information	In this section metadata regarding the process data can be specified to
Modeling and validation	Expands all rows of the documentation tab
Administrative information	All information specified in the documentation fields can be adopted from another process

Command buttons : (From left to right)

Collapse all	Collapses all rows of the documentation tab
Expand all	Expands all rows of the documentation tab
Adopt info...	All information specified in the documentation fields can be adopted from another process
Highlight EPD fields	Highlights all documentation fields which are overtaken when the process is imported/exported with the EPD export function.
Highlight ecoSPOLD fields	Highlights all documentation fields which are overtaken when the process is imported/exported with the EPD export function.

Documentation fields for the documentation of the process information:

DE: Utilization SuperCopy XR-2 <u-so> [Utilization] -- DB Process

Object Edit View Help

Name DE Utilization SuperCopy XR-2 Source u-so - Unit process, single operat

Parameter

LCA LCC: 0 EUR LCWE Documentation

Collapse all Expand all Adopt info ... Highlight EPD fields Highlight ecoSPOLD fields

Process information

Key information

Treatment, standards, routes

Mix and location types

Further quantitative specifications

Synonyms

Complementing processes Add

Statistical classification

General comment Example photocopier

Quantitative reference

Type of quantitative reference Reference flow(s)

Reference flow(s)

- ☐ input: Drum [Other parts]
- ☐ input: Paper woodfree uncoated (t94) [Materials from renewable raw materials]
- ☐ input: Photocopier [Assemblies]
- ☐ input: Power [Electric power]
- ☐ input: Toner cartridge [Other parts]
- ☐ output: Drum (used) [Waste for recovery]

Time representativeness

Reference year 2000 Data set valid until 0

Time representativeness

Geography

Meridian Latitude

Geographical representativeness

Technological representativeness

System: No changes. Last change: System, 21.11.2002 12:36:03 GUID: {a108e75f-5229-4366-87d0-cd...}

Figure: Process information fields of the Process documentation tab

Process information	Documentation regarding the process data
Treatment, standards, routes	Here the treatment received, the standards fulfilled and the name of the the production route can be specified
Mix and location type	Specifications on production mix or consumption mix and the location type of availability (e.g. production mix, at plant), separated by commata
Further quantitative specifications	Additional quantitative information on the flow e.g. energy content, density ... Separated by commata.
Synonyms	Other synonyms for the process or product produced can be specified.
Complementing processes	With a click on the binoculars other processes can be linked to the documentation in order to link
Statistical classification	Optional statistical or other classification of the data set.
General comment	General comments on the process
Type of quantitative reference	With a dropdown menu it can be specified weather the quantitative reference of the process is a reference flow, a functional unit, other parameters or a production period.
Reference flow(s)	When in the field above [Type of quantitative reference] "Reference flow(s)" is selected, all valuable goods and waste flows of the input and output side are listed. In this list the reference flow(s) can be marked. When in the filed above another type of quantitative reference is selected a comment field is available to specify this reference.
Reference year	Start year for which the data set is valid
Data set valid until	End year until the data set is valid
Time representativeness	Further description of valid time representativeness (e.g. summer/winter/day/night...)
Meridian/Latitude	Exact location of data collection/validity. Leave empty, if valid for a region.
Geographical representativeness	Geographical validity specification
Technology description including background system	Description of process technology, operating conditions, included upstream and downstream processes.
Included data sets	With a click on the binoculars separate processes can be linked, when they are included in the system of the data set.
Technical purpose of product or process	Description of the intended application of the process product.
Pictogramme of technology/Flow diagrams or picture(s)	Image files can be linked to be viewed in the documentation directly.
Model description	Mathematically relevant description of the modeling

Documentation of metadata regarding the modeling and validation of the process data set:

DE: Utilization SuperCopy XR-2 <u-so> [Utilization] -- DB Process

Object Edit View Help

Name DE Utilization SuperCopy XR-2 Source u-so - Unit process, single operat

Parameter

LCA LCC: 0 EUR LCWE Documentation

Collapse all Expand all Adopt info ... Highlight EPD fields Highlight ecoSPOLD fields

Modelling and validation

LCI method and allocation

LCI method principle

- ☐ Attributional
- ☐ Consequential
- ☐ Consequential with attributional components
- ☐ Not applicable
- ☐ Other

Deviation from LCI method principle/explanations

LCI method approaches

- ☐ Allocation - market value
- ☐ Allocation - gross calorific value
- ☐ Allocation - net calorific value
- ☐ Allocation - exergetic content
- ☐ Allocation - element content
- ☐ Allocation - mass
- ☐ Allocation - volume

Deviations from LCI method approaches/explanations

Modeling constants

Deviation from Modeling constants / explanations

LCA methodology report

Add

Data sources and handling

Data cut-off and completeness principles

System: No changes. Last change: System, 21.11.2002 12:36:03 GUID: {a108e75f-5229-4366-87d0-cd...

Figure: Modeling and validation fields of the process documentation tab

Modeling and validation	Documentation regarding the the modeling and validation
LCI method principle	The type of LCI method principle can be selected.
Deviation form LCI method principle / explanations	Short description of deviations from principle method
LCI method approaches	The allocation or substitution procedure can be selected.
Deviations from LCI method approaches / explanations	Short description of deviations from principle method
Modeling constants	Short description of systematic constants used as recycling quotas...
Deviation from modeling constants / explanations	Short description of deviations from principle method
LCA methodology report	With a click on the binoculars the documentation can be linked to a reference, citation, which contains a full methodology report
Data cut-off and completeness principles	Cut-off criteria and completeness principles can be described.
Deviation from data cut-off and completeness principles / explanations	Short description of deviations from principle method
Data selection and combination principles	Description of principles of data selection and combination
Deviation from data selection and combination principles / explanations	Short description of deviations from principle method
Data treatment and extrapolation principles	Principles regarding methods, sources and assumptions
Deviations from data treatment and extrapolation principles / explanations	Short description of deviations from principle method
Data handling report	With a click on the binoculars a reference to a data handling report can be linked.
Data source(s) used for this data set	This field can be linked to a reference, citation with information on data sources
Percentage supply or production covered	[0%-100%]
Annual supply or production volume	Total supply/production of process product of the "location" in the "reference year".
Sampling procedure	Procedure for process flow quantification
Data collection period	time period of data collection
Uncertainty adjustments	Methods and assumptions of uncertainty adjustments
Use advice for data set	Advice for the usage of the data set
Supported impact assessment methods	This field can be linked to quantities which represent impact assessment indicators compatible to this data set.
Validation	The validation section contains information about the review process
Add/delete review	Adds/deletes a review section in the validation section.

Type of review	The type of review can be chosen in a drop down menu
Scope of review	For the different parts of the review (Scope of review) a review method can be selected in individual drop down menus.
Quality indicators	The quality of different aspects of representativity and completeness can be rated with a drop down menu.
Review details	Summary or comments regarding the review
Reviewer name and institution	A link to a contact with the contact information of the reviewer can be entered.
Other review details	Summary or comments regarding the review
Complete review report	A link to a reference, citation can be entered, which is connected/refers to the full review report
Compliance declarations	A link to a reference, citation can be entered to specify the compliance with compliance systems (e.g. ISO standards, Product category rules)

Administrative information:

The screenshot displays the GaBi software interface for a process named "Utilization SuperCopy XR-2". The window title is "DE: Utilization SuperCopy XR-2 <u-so> [Utilization] -- DB Process". The interface includes a menu bar (Object, Edit, View, Help) and a toolbar with various icons. Below the toolbar, the "Name" field is set to "DE" and the "Source" is "u-so - Unit process, single operat". The "Parameter" section shows "LCA", "LCG: 0 EUR", and "LCWE". The "Documentation" tab is active, showing a list of sections: "Process information", "Modelling and validation", "Administrative information", "Commissioner and goal", and "Dataset generator/modeller". The "Administrative information" section is expanded, showing fields for "Data entry by", "Converted dataset from", "Official approval of data set by producer/operator", "Publication and ownership", "Workflow and publication status", "Unchanged republication of", "Registration authority", "Registration number", "Entities or persons with exclusive access to this data set", "License type", "Access and use restrictions", and "Owner of the data set". The "Workflow and publication status" is set to "Working draft". The "License type" is set to "Other". The "Owner of the data set" is a user icon. The status bar at the bottom indicates "System: No changes.", "Last change: System, 21.11.2002 12:36:03", and "GUID: {a108e75f-5229-4366-87d0-cd...}".

DE: Utilization SuperCopy XR-2 <u-so> [Utilization] -- DB Process

Object Edit View Help

Name DE Utilization SuperCopy XR-2 Source u-so - Unit process, single operat

Parameter

LCA LCG: 0 EUR LCWE Documentation

Collapse all Expand all Adopt info ... Highlight EPD fields Highlight ecoSPOLD fields

Process information
Modelling and validation
Administrative information
Commissioner and goal
Dataset generator/modeller

Dataset generator/modeller Add

Data entry by

Data entry by

Converted dataset from

Official approval of data set by producer/operator Add

Publication and ownership

Workflow and publication status Working draft

Unchanged republication of

Registration authority

Registration number

Entities or persons with exclusive access to this data set Add Copyright

License type Other

Access and use restrictions

Owner of the data set

System: No changes. Last change: System, 21.11.2002 12:36:03 GUID: {a108e75f-5229-4366-87d0-cd...}

Figure: Administrative information fields of the process documentation tab

Administrative information	Documentation regarding data generation and publication
Data set generator / modeler	This field documents the data set generator(s). With a click on the binoculars GaBi users and contacts can be linked.
Data entry by	This field can be linked to the GaBi user or a contact of the person that entered the documentation data.
Converted original data set	This field can be linked to a reference, citation containing information about the original data set which was imported into GaBi.
Official approval of data set by producer / operator	This field can be linked to contacts and GaBi users which are responsible for the official approval.
Workflow and publication status	The publication and working status of the document can be selected in a drop down menu
Unchanged re-publication of	This field can be linked to a reference,citation to the original data set where' the data have been taken from.
Registration authority	This field can be linked to a contact or GaBi user that registered the data set.
Registration number	Unique identifying number for the data set issued by registration authority
Entities or persons with exclusive access to this data set	This field can be linked to GaBi users and contacts which have exclusive access to confidential data
License type	Type of license for the access and use of the data set
A c c e s s a n d u s e restrictions	Limitations and conditions regarding data set use
Owner of the data set	This field can be linked to a contact or GaBi user which is the owner of the data set.

Additional information:

All information filled in the form can be adopted from another process.

When processes are exported, it depends on the export format which of the documentation fields are exported with the data set.

With a GaBi exchange file (*.gbx) all documentation information will be exported.

With a click on the button "Highlight EPD fields" some of the documentation fields will be marked in blue. Only those will be exported with an EPD file.

With a click on the button "Highlight ecoSPOLD fields" some of the documentation fields will be marked in pink. Only those will be exported with an EcoSpold file.

8.5.3 Process: LCC

The cost information in a GaBi process is divided into flow costs, machine costs and personnel costs. The inputs and outputs of a process with cost information are included in the flow costs table. In addition, machine and personnel costs can be assigned to a process. The detailed information on the costs can be viewed and changed in the window for the individual flows.

Changes to the cost details (e.g. price or overhead cost ratio) are valid both database-wide as well as in other GaBi processes. The cycle time, however, can vary from process to process.

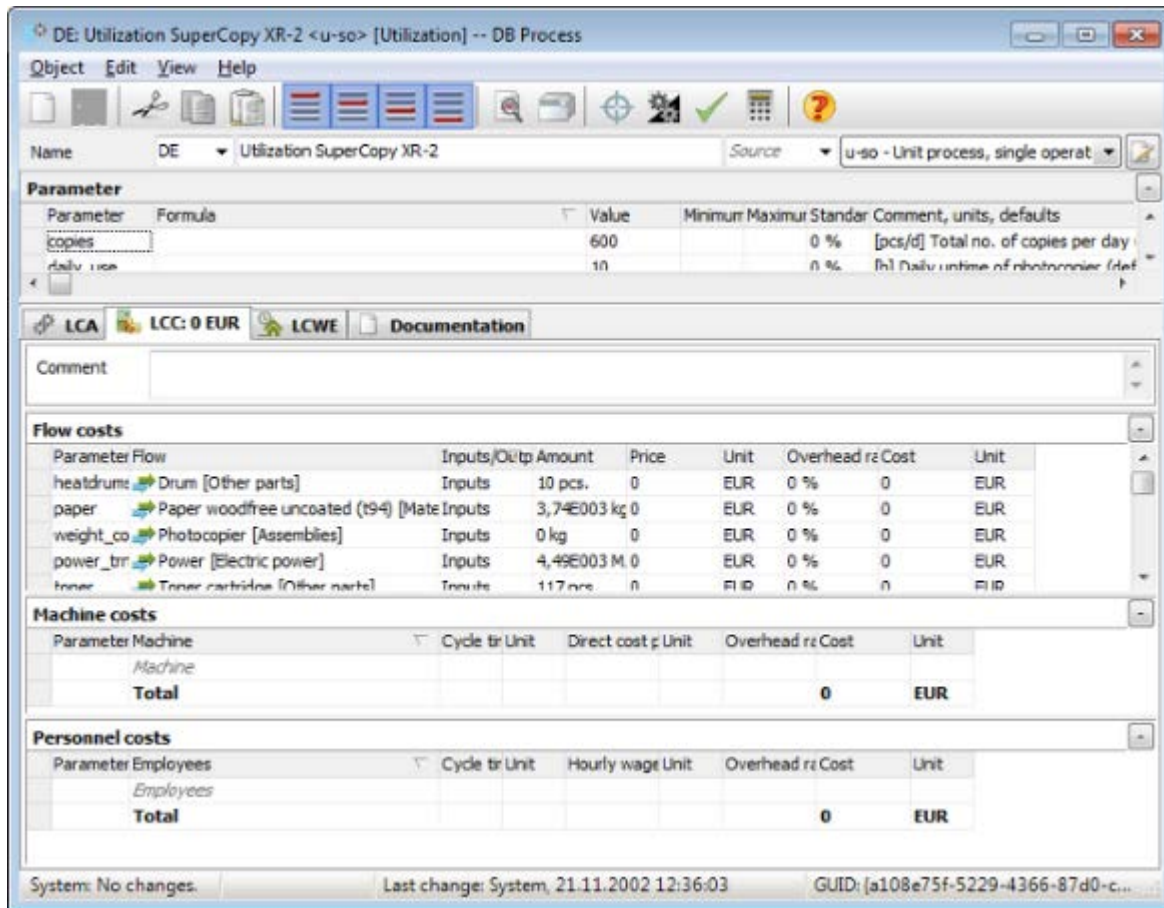


Figure: Object type process window (LCC)

Detailed information to calculate the different costs is located in the description of the flows object type.

The LCC information of a GaBi process consists of:

Comment	Any number of characters		
Flow costs	List		
		Alias	Maximum of 15 characters
		Flow	GaBi flow
		Inputs/Outputs	Inputs/Outputs
		Amount	1 [standard unit] or IO amount
		Price	$5.0 \cdot 10^{-324} \dots 1.7 \cdot 10^{308}$
		Unit	GaBi <i>unit</i> (currency unit)
		Overhead ratio	$5.0 \cdot 10^{-324} \dots 1.7 \cdot 10^{308}$
		Cost	$5.0 \cdot 10^{-324} \dots 1.7 \cdot 10^{308}$
		Unit	GaBi <i>unit</i> (currency unit)

Machine costs	List		
		Alias	Maximum of 15 characters
		Machine	GaBi flow of the “Machine” flow group
		Cycle time	$5.0 * 10^{-324} .. 1.7 * 10^{308}$
		Unit	GaBi <i>unit</i> (time unit)
		Hourly machine set	$5.0 * 10^{-324} .. 1.7 * 10^{308}$
		Unit	GaBi <i>unit</i> (currency unit)
		Overhead ratio	$5.0 * 10^{-324} .. 1.7 * 10^{308}$
		Cost	$5.0 * 10^{-324} .. 1.7 * 10^{308}$
		Unit	GaBi <i>unit</i> (currency unit)
Personnel costs	List		
		Alias	Maximum of 15 characters
		Employees	GaBi flow of the “Machine” flow group
		Cycle time	$5.0 * 10^{-324} .. 1.7 * 10^{308}$
		Unit	GaBi <i>unit</i> (time unit)
		Hourly wage	$5.0 * 10^{-324} .. 1.7 * 10^{308}$
		Unit	GaBi <i>unit</i> (currency unit)
		Overhead ratio	$5.0 * 10^{-324} .. 1.7 * 10^{308}$
		Cost	$5.0 * 10^{-324} .. 1.7 * 10^{308}$
		Unit	GaBi <i>unit</i> (currency unit)

8.5.4 Process: LCWE

The LCWE information of a GaBi process is divided into three different areas. It is divided into qualified work time (QWT), health and safety at the workplace (HSWT) and the humanity of the working conditions (HWT). All three are created as flow groups in each database.

Additional flow groups can be created under the flow group QWT, HSWT or HWT. The main flow group and the flow groups created under it each appear in the pull down menu of the corresponding process table. When you select one of these flow groups, all flows located in this process are entered into the corresponding table. A flow group under QWT, HSWT or HWT therefore also defines an accompanying set of flows which are always used together when inputting LCWE information on a GaBi process and must be saved with amount entries.

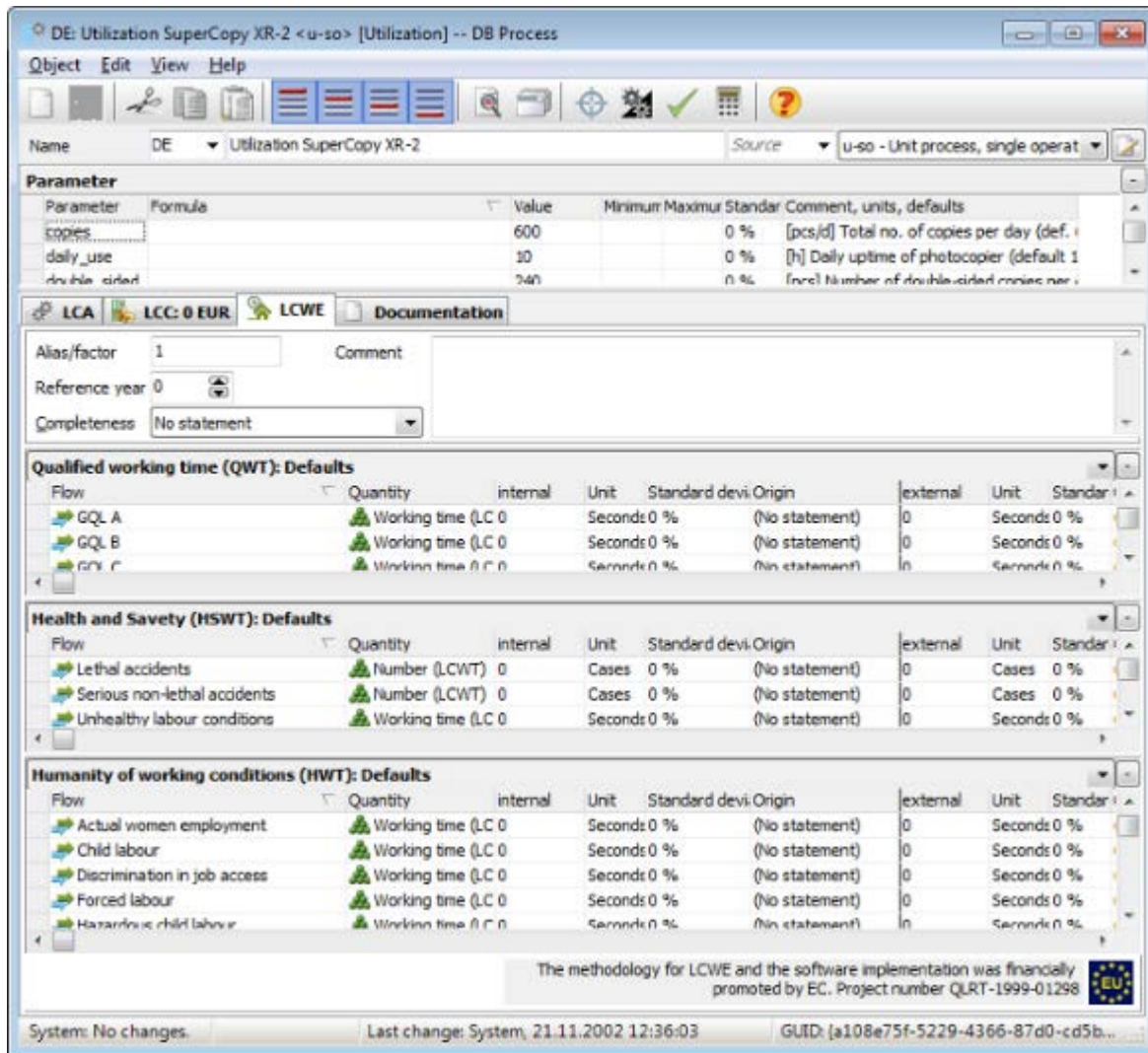


Figure: Object type process window (LCWE)

The LCWE information of a GaBi process consists of:

Alias/Factor	Common multiplier for all LCWE amount entries	
Year	year of data set creation	
Completeness	GaBi <i>DQI</i> (LCWE completeness)	
Comment	Any number of characters	
QWT/HSWT/HWT	Lists	
	Flow	GaBi flow
	Quantity	GaBi quantity
	internal	$5.0 \cdot 10^{-324} \dots 1.7 \cdot 10^{308}$
	Unit	GaBi unit (currency unit)
	Standard deviation	0% .. 65535%

	Origin	GaBi Quality indicators (data origin)
	external	$5.0 * 10^{-324} .. 1.7 * 10^{308}$
	Unit	GaBi <i>unit</i> (currency unit)
	S t a n d a r d deviation	0% .. 65535%
	Origin	GaBi Quality indicators (data origin)

8.6 Object Type: Flow

GaBi manages flows (substances, materials) in a tree structure referred to as the *flow group hierarchy*. In the GaBi system, flows carry basic information for different types of balances (e.g. mass, energy, economic balances, etc.) and are used by GaBi *processes* as inputs or outputs. Flows are used in GaBi *process plans* to connect consecutive unit processes (process steps). In GaBi balances, information can be viewed to a maximum depth of detail at the flow (input/output) level.

A GaBi *flow* consists of the following:

Name	Max. 100 characters		
Flow type	Inputs / Outputs / none		
Addition	Max. 30 characters		
CAS code	Max. 15 characters		
Chemical formula	Max. 20 characters		
Basis	Max. 50 characters		
Reference quantity	GaBi <i>quantity</i> (name)		
Comment/synonyms	As many characters as desired		
Flow quantities	List	Quantity	GaBi <i>quantity</i>
		Conversion factor	$5.0 * 10^{-324} .. 1.7 * 10^{308}$
		Unit	GaBi <i>unit</i>
		Standard deviation	-65536 % .. 65536 %
		Conversion factor ⁻¹	$5.0 * 10^{-324} .. 1.7 * 10^{308}$

8.6.1 Flow: LCA

Information contained in a flow object is divided into two categories, LCA and LCC. LCA data describe the elementary flow and prepare the foundation for a material flow model. LCC data are optional and serve to model the cost side.

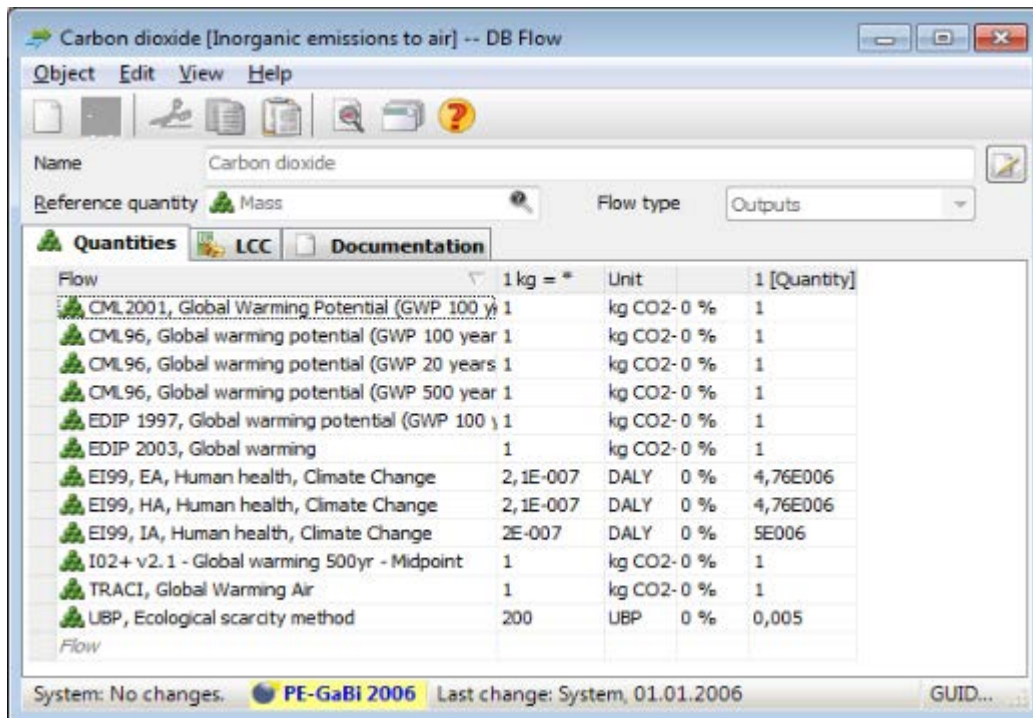


Figure: Object type flow window (LCA)

Command buttons : (From left to right)

New	Opens an empty form to create a new flow.
Save	Saves changes of the current flow in the database.
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard to the active field.
GaBi DB Manager	Switches to the GaBi DB Manager window.
List of windows	Displays a selection of currently opened GaBi windows.
Help	Opens the online Help for the current window.
Documentation	Displays a list of external documentation for the current flow.

Menu commands:

Object	Commands for managing the current flow.
New	Opens an empty form to create a new flow.
Restore	Reverses changes made to the current flow.
Save	Saves changes of the current flow in the database.
Copy all	Copies all of the information of the current flow to the clipboard.
Insert total	Pastes the contents of the clipboard as a complete flow.
Close	Closes the current window after the security prompt (in case of changes).
Edit	Commands for editing the current flow.
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard to the active field.
Delete	Deletes the marked row from the table.
View	Commands for the user screen layout.
DB Manager	Switches to the GaBi DB Manager.
Location of storage	Displays the type of the current flow within the GaBi DB Manager.
Windows	Displays a list of currently open windows.
Load settings	Restores user default window settings.
Save settings	Saves current window settings as user default.
Help	Commands for displaying Help.
GaBi Help	Opens the online Help for the current window.
Index	Opens the Help index.
Info	Displays program information.

Right mouse button menu:

Set as reference quantity	Replaces the currently selected quantity with the reference quantity.
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard to the active field.
Delete	Deletes the marked row from the table.
Details	Opens the current selection quantity window.
Usage	Searches for all objects referring to the selected object.
Select all	Deletes all marked rows and columns from the table.

Special Features:

The field "flow type" allows to classify the flow. The classification is necessary for the **single table balance (Section 7.4.2.4)** display. All elementary flows **must** be classified as either input or output relevant. There are three flow classes:

1. Inputs: Flows such as resources are input relevant. Inputs of these flows appear as a positive value in the single table balance since they are an environmental burden. Outputs are displayed as negative values and can be interpreted as an environmental credit.
2. Outputs: Flows such as emissions are output relevant. Inputs of these flows appear as negative values in the single table balance and can be interpreted as environmental credit. Outputs are environmental burdens and are displayed with a positive value in the balance.
3. None: Non-elementary flows like valuable substances don't need a classification. Positive values in the single table balance represent a flow consumption, negative values a production of the flow.

Entries in the field "Reference quantity" are checked for validity; a matching GaBi *quantity* must be present.

Entries in the column "Quantity" are checked for validity; matching GaBi *quantities* must be present.

Conversion factors are always displayed based on default units but it is possible to enter different units. Conversion factors entered not based on default units are automatically converted.

If a unit from the unit list is used as the reference quantity, the database has to be reorganized. This might take some time and the displayed security prompt has to be confirmed before reorganization can start.

8.6.2 Flow: LCC

Cost information can be assigned to GaBi flows. A basic distinction is made here between three different flow types, each also with a differing cost structure. In addition to the elementary flows generally used, which bear the material costs, there are also machines and people to which machine costs and personnel costs are assigned. Machines and people are location under special flow groups in the flow group "other" and are generally created and edited when inputting process information directly from the process object type window.

8.6.2.1 Material Costs

Elementary flows can be assigned to material cost information. The price, the costs and the overhead costs are important for the later assessment of material costs. You can enter these values directly into the corresponding windows or use the scheme provided to calculate the values.

Figure: Object type flow window (LCC: material costs)

The cost is calculated in the following way:

	Purchase price
+	Freight charges
+	Packaging
+	Insurance
-	Discounts
	Price

The overhead cost ratio is derived from:

Direct cost per period / overhead costs per period = overhead ratio

The overhead costs are determined according to the following formula:

Overhead costs = price * overhead ratio

8.6.2.2 Machine Costs

Flow objects under the Machines flow group (and those sub-classified under it) can be assigned machine information. The hourly machine ratio, the overhead costs and the total costs are important for the later assessment of material costs. You can enter these values directly into the corresponding windows or use the scheme provided to calculate the values.

The screenshot shows the 'New [Machines] -- DB Flow' window. The 'Machine Cost' tab is active, displaying a form for entering machine-related data. The 'Reference quantity' is set to 'Operating time' and 'Flow type' is 'none'. The 'Machine Cost' section includes fields for Replacement value, Interest rate, Utilization period, Annual maintenance, Annual nominal period, Hourly tool cost, and Monthly rental charge. It also has fields for Direct cost per period, Overhead costs per period, Direct cost per hour, Overhead ratio, and Cost. The status bar at the bottom indicates 'System: Changed.' and 'Last change: System, 30.08.2011 15:43:37'.

Figure: Object type flow window (LCC: machine Costs)

The hourly machine ration is calculated in the following way:

$\text{calc. depreciation} = \text{replacement value} / (\text{useful life} * \text{nominal hours})$
 $\text{maintenance costs} = (\text{replacement value} * \text{total maintenance}) / \text{nominal hours}$
 $\text{calc. interest} = ((\text{replacement value} / 2) * \text{calc. interest rate}) / \text{nominal hours}$

	Calc. depreciation
+	maintenance costs
+	calc. interest
+	rent charges
+	Vehicle costs
=	Machine ratio

The overhead cost ratio is derived from:

$$\text{overhead ratio} = \text{Direct costs per period} / \text{overhead costs per period}$$

The total costs are determined according to the following formula:

$$\text{Overhead costs} = \text{machine ratio} * \text{overhead ratio}$$

8.6.2.3 Personnel Costs

Flow objects under the personnel flow group (and those sub-classified under it) can be assigned personnel information. The hourly wage, the overhead cost ratio and the total costs are important for the later assessment of personnel costs. You can enter these values directly into the corresponding windows or use the scheme provided to calculate the values.

New [Personnel] -- DB Flow

Object Edit View Help

Name: New

Reference quantity: Operating time Flow type: none

Quantities LCC Documentation

Personnel Cost Reference quantity: Operating time 1 Hours of operation

Annual gross salary	0 EUR	Direct cost per period	0 EUR
Annual social security	0 EUR		Overhead costs per period
Other social services	0 EUR		
Daily working time	8 h		
Working days per week	5 Days		
Holidays per year	0 Days		
Vacation days per year	0 Days		
Other absent days	0 Days		

Hourly wage: 0 EUR Overhead ratio: 0 % Cost: 0 EUR

System: Changed. Last change: System, 30.08.2011 15:44:45

Figure: Object type flow window (LCC: personnel costs)

The hourly wage is calculated in the following way:

$$\begin{aligned}
 & \text{Gross pay} \\
 & - \text{AG\_Ant.\_Soc. Sec} \\
 & - \text{other social sec. costs} \\
 & = \text{Wage costs} \\
 & / \text{annual nominal hours} \\
 & = \text{Hourly wage}
 \end{aligned}$$

The overhead cost ratio is derived from:

$$\text{Direct costs per period} / \text{overhead costs per period} = \text{overhead ratio}$$

The total costs are determined according to the following formula:

$$\text{Total costs} = \text{hourly wage} * \text{overhead ratio}$$

8.6.3 Flow: Documentation

As every object in GaBi, flows can be linked to external data using the documentation button next to the field of the name.

Additionally GaBi features a documentation form in the documentation tab, which allows a documentation according to the ILCD standard.

New [Emissions to air] -- DB Flow

Object Edit View Help

Name:

Reference quantity: Flow type:

Quantities LCC Documentation

Flow information

Key information

Treatment, standards, routes:

Mix and location types:

Further quantitative specifications:

Synonyms:

Statistical classification:

CAS number:

Sum formula:

General comment:

Geography

Location of supply:

Technological representativeness

Technical purpose:

Technical specification:

Administrative information

Data entry by:

Owner of the data set:

System: Changed. Last change: System, 30.08.2011 15:45:55

Figure: Documentation Tab of the flow window

Flow information	Documentation regarding the flow data
Treatment, standards, routes	Here the treatment received, the standards fulfilled and the name of the the production route can be specified
Mix and location type	Specifications on production mix or consumption mix and the location type of availability (e.g. production mix, at plant), separated by commata
Further quantitative specifications	Additional quantitative information on the flow e.g. energy content, density ... Separated by commata.
Statistical classification	Optional statistical or other classification of the data set.
CAS number	CAS number of the substance
Sum formula	Chemical sum formula of the substance
Comment	Comments
Geography	Information on the geographical representativity of the flow
Technical purpose	Technical purpose of the product or substance
Technical specification	Waste data sheet, safety data sheet etc. With a click on the book icon a new reference, citation can be created, with a click on the binocular existing references, citations can be searched and entered.
Administrative information	Documentation regarding producer of data set
Data entry by	Here a contact data set can be linked regarding the person/organization that entered the data.
Producer of data set	Here a contact data set can be linked regarding the responsible person/organization for the production of data. With a click on the binoculars existing contact data sets can be searched and entered, with a click on the contacts icon a new contact can be created.

8.7 Object Type: Quantity

GaBi can compute various quantities. The GaBi system uses quantities to quantitatively define a flow value (see *Flow*). The purely scalar quantities can be considered characteristics of a flow that are proportional to one another. In addition to physical quantities, GaBi also recognizes economic and environmental quantities, which are also proportional in specific flow terms.

A GaBi *quantity* consists of the following:

Name	Max. 100 characters		
Unit	GaBi unit (name)		
Associated side of balance	Inputs / Outputs / none		
Conversion factors	List	GaBi flow	Flow name [flow group]
		Conversion factor	$5.0 * 10^{-324} .. 1.7 * 10^{308}$
		Unit	Unit of reference quantity of flow
		Conversion factor-1	$5.0 * 10^{-324} .. 1.7 * 10^{308}$
		Standard deviation	0% - 65536%

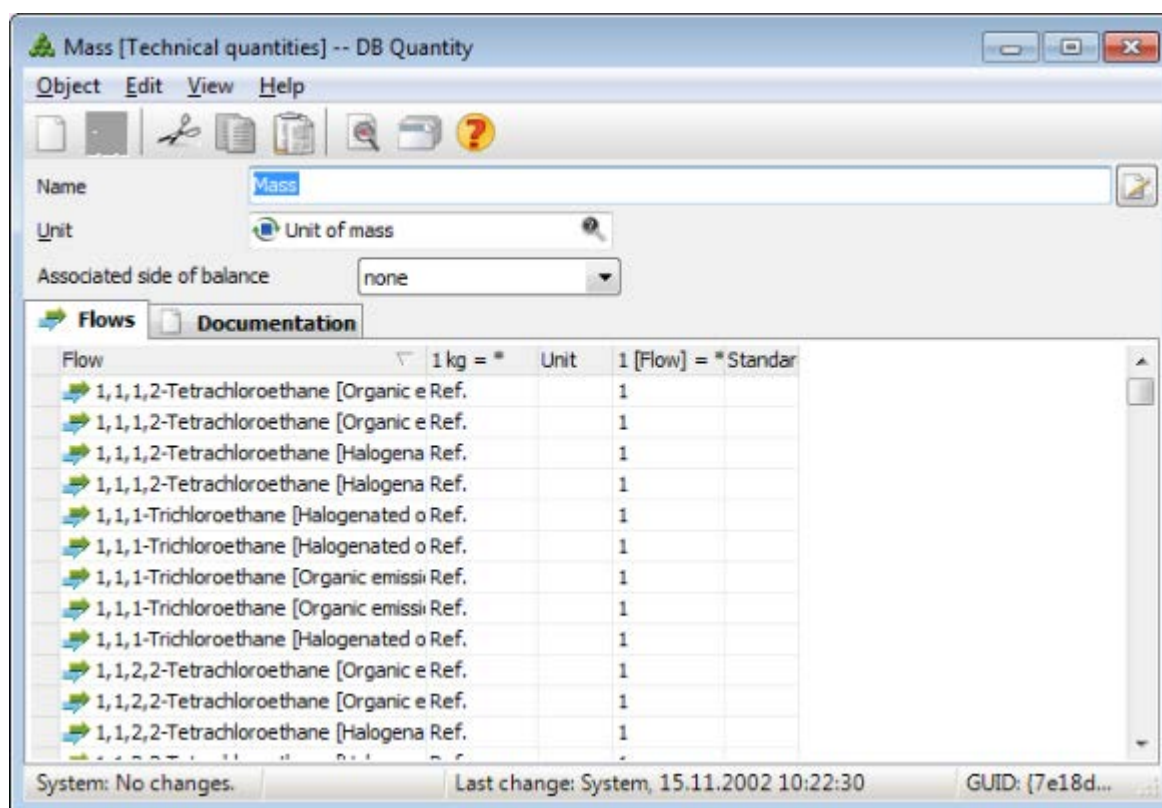


Figure: Object type quantity window

Command buttons : (From left to right)

New	Opens an empty form to create a new quantity
Restore	Reverses changes made to the current quantity.
Save	Saves changes of the current quantity in the database.
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard to the active field.
GaBi DB Manager	Switches to the GaBi DB Manager window.
List of windows.	Displays a selection of currently opened GaBi windows
Help	Opens the online Help for the current window.
Documentation	Displays a list of external documentation for the current quantity.

Menu commands:

Object	Commands for managing the current quantity.
New	Opens an empty form to create a new quantity.
Restore	Reverses changes made to the current quantity.
Save	Saves changes of the current quantity in the database.
Copy all	Copies all information of the current quantity to the clipboard.
Insert total	Pastes the contents of the clipboard as a complete quantity.
Close	Closes the current window after the security prompt (in case of changes).
Edit	Commands for editing the current quantity.
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard to the active field.
Delete	Deletes the marked row from the table.
View	Commands for the user screen layout.
DB Manager	Switches to the GaBi DB Manager.
Location of storage	Displays the type of the current quantity within the GaBi DB manager.
Windows	Displays a list of currently open windows.

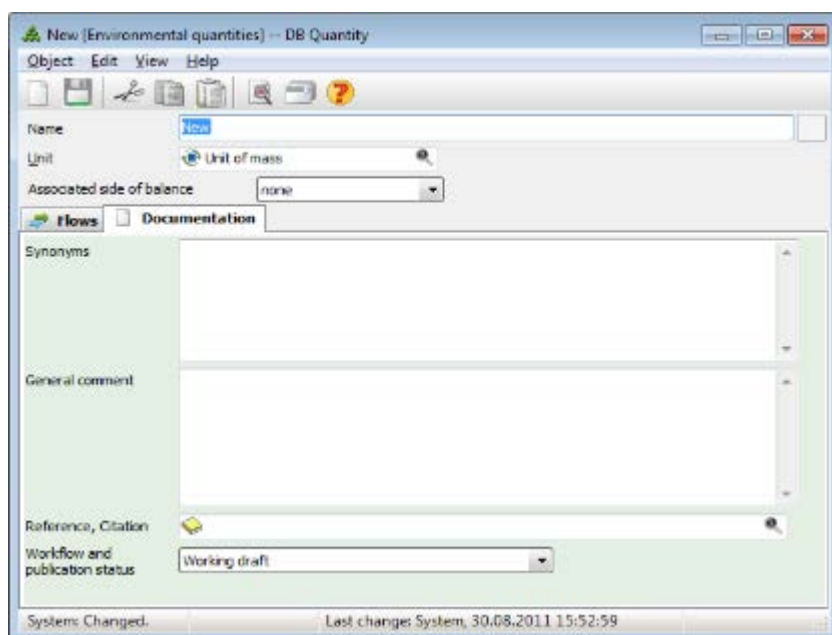
Load settings	Restores user default window settings.
Save settings	Saves current window settings as user default.
Help	Commands for displaying Help.
GaBi Help	Opens the online Help for the current window.
Index	Opens the Help index.
Info	Displays program information.

Right mouse button menu:

Number of entries	Displays the number of entries.
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard to the active field.
Delete	The selected flow is deleted from the flow list in the quantity window, simultaneously, the quantity is deleted from the quantity list of the flow window. Deleting is not possible, if the process or quantity is protected.
Details	Shows the details of the selected flow and opens the flow window.
Usage	Lists all objects which use the selected flow.
Select all	Marks all flows in the flow list

Documentation tab:

GaBi quantities can be documented according to the ILCD standard.



Documentation field	Content
Synonym	A synonym for the quantity can be specified
General Comment	Comments on the quantity can be specified
Reference, Citation	The quantity can be linked to a reference or citation, e.g. a report can be cited. With a click on the binoculars existing references, citations can be search, with a click on the book, a new reference, citation can be created.
Workflow and publication status	A publication status can be defined, e.g. it can be specified, if the data are a working draft or if they are already finalized and published

Special Features:

The quantity can be associated to one side of the balance:

1. Inputs: If the quantity is input relevant (e.g. resource quantities), all inputs appear as positive values in the single table balance. All outputs appear as negative values and can be interpreted as environmental credit.
2. Outputs: If the quantity is output relevant (e.g. Global Warming Potential), all outputs appear as positive values in the single table balance. All inputs appear as negative values.
3. None: The values in the single table balance are positive or negative depending on the classification of the underlying flows.

Entries in the field "Unit" are checked for validity; a matching GaBi *unit* must be present.

Entries in the column "Flow" are checked for validity; matching GaBi *flows* must be present.

Flows using the current quantity as reference quantity cannot be changed in the table of the *flow* conversion factors.

Conversion factors are always displayed based on default units but it is possible to select different units. Conversion factors entered not based on default units are automatically converted.

8.8 Object Type: Units

GaBi is able to convert units. Unit-compliant numerical values are always stored in the database having been converted into the respective default unit. Input and output unit-compliant numerical values are user-specific; the default units are preset.

A GaBi *unit* consists of the following:

Name	Max. 100 characters		
Default unit	Max. 25 characters		
Conversion factors	List	Unit characters	Max. 25 characters
		Conversion factor	$5.0 * 10^{-324} .. 1.7 * 10^{308}$
		Conversion factor ⁻¹	$5.0 * 10^{-324} .. 1.7 * 10^{308}$

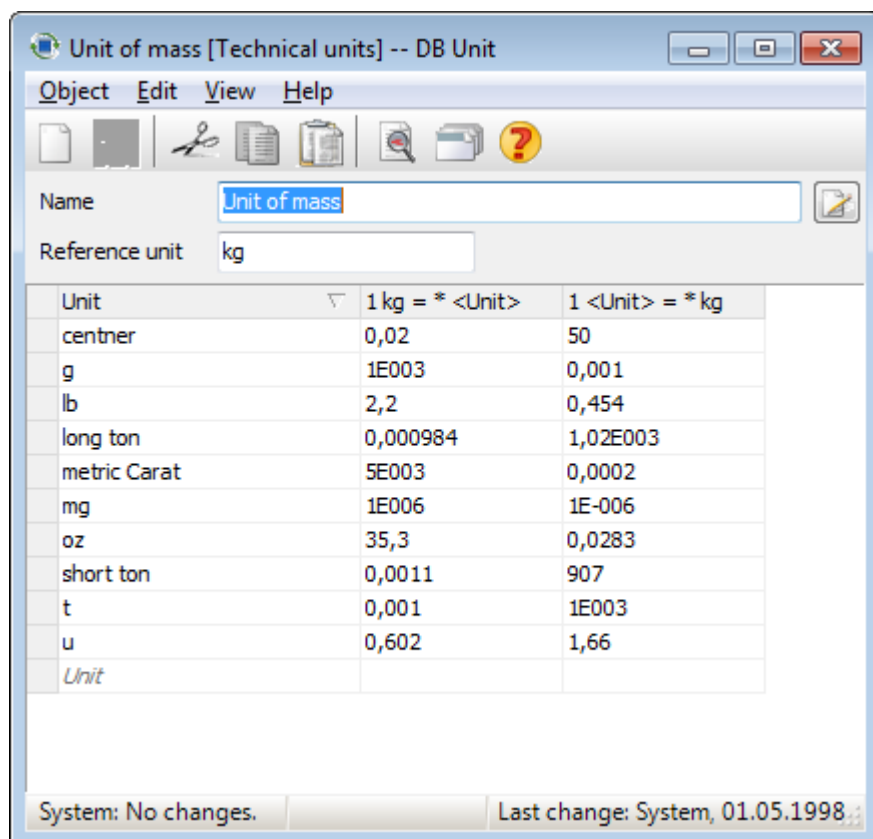


Figure: Object type unit window

Command buttons : (From left to right)

New	Opens an empty form to create a new quantity
Restore	Reverses changes made to the current quantity.
Save	Saves changes of the current quantity in the database.
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard to the active field.
GaBi DB Manager	Switches to the GaBi DB Manager window.
List of windows.	Displays a selection of currently opened GaBi windows
Help	Opens the online Help for the current window.
Documentation	Displays a list of external documentation for the current unit.

Menu commands:

Object	Commands for managing the current unit.
New	Opens an empty form to create a new unit.
Restore	Reverses changes made to the current unit.
Save	Saves changes of the current unit in the database.
Copy all	Copies all of the information of the current unit to the clipboard.
Insert total	Pastes the contents of the clipboard as a complete unit.
Close	Closes the current window after the security prompt (in case of changes).
Edit	Commands for editing the current object.
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard to the active field.
Delete	Deletes the marked row from the table.
View	Commands for the user screen layout.
DB Manager	Switches to the GaBi DB Manager.
Location of storage	Displays the type of the current unit within the GaBi DB Manager.
Windows	Displays a list of currently open windows.
Load settings	Restores user default window settings.
Save settings	Saves current window settings as user default.
Help	Commands for displaying Help.
GaBi Help	Opens the online Help for the current window.
Index	Opens the Help index.
Info	Displays Program information.

Right mouse button menu:

Set as reference unit	Sets the selected unit as reference unit
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard to the active field.
Delete	Deletes the marked row from the table.
Select all	Deletes all marked rows and columns from the table.

Special Features:

If a unit from the unit list is used as the default unit, the database has to be reorganized. This might take some time and the displayed security prompt has to be confirmed before reorganization can start.

8.9 Object type: Contacts

The GaBi system features a contact management function, which means that the documentation of objects can be linked to contacts.

Figure: Object type contact window

A GaBi contact consists of the following:

Short Name	Short name of the contact, max. 100 characters
Name	Full name of the contact, max. 100 characters
Description	Max. 100 characters
Contact address	The address of the contact may be entered
Telephone	Telephone number of contact
Telefax	Telefax number of contact
Email	Contact email address
www address	Homepage of user
Central contact point	Central contact data, e.g. the company's address
Belongs to	Contacts can be linked to other users or contacts, e.g. an organization
Logo	Information on a logo can be specified here.
User rights	Automatically set on Reference (no rights)

Command buttons : (From left to right)

New	Opens an empty form to create a new quantity
Save	Saves changes of the current quantity in the database.
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard to the active field.
GaBi DB Manager	Switches to the GaBi DB Manager window.
List of windows.	Displays a selection of currently opened GaBi windows
Help	Opens the online Help for the current window.
Documentation	Displays a list of external documentation for the current user.

Menu commands:

Object	Commands for managing the current user.
New	Opens an empty window to create a new user.
Restore	Reverses changes made to the current user.
Save	Saves changes of the current user in the database.
Copy all	Copies all of the information of the current user to the clipboard.
Insert total	Pastes the contents of the clipboard as a complete user.
Close	Closes the current window after the security prompt (in case of changes).
Edit	Commands for editing the current object.
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard to the active field.
Delete	Deletes selected content
View	Commands for the user screen layout.
DB Manager	Switches to the GaBi DB Manager.
Location of storage	Displays the type of the current user within the GaBi DB Manager.
Windows	Displays a list of currently open windows.
Load settings	Restores user default window settings.
Save settings	Saves current window settings as user default.

Help	Commands for displaying Help.
GaBi Help	Opens the online Help for the current window.
Index	Opens the Help index.
Info	Displays program information.

8.10 Object Type: User

The GaBi system features a user management function, which means that the GaBi system can identify different users, each with their own password and access rights.

GaBi users have different levels of authorization. The different user types have the following rights:

Guest	Read access to all objects
Clerk	Read access to all objects, write access to own objects
Main user	Read/write access to all objects (not for users)
Administrator	Read/write access to all objects (creating new users, assigning access rights)

If a user modifies an object of another user (only administrators or main users), the affected object is automatically allocated to the modifying user.

Figure: Object type user window

A GaBi *user* consists of the following:

Short Name	Short name of the user, max. 100 characters
Name	Full name of the user, max. 100 characters
Description	Max. 100 characters
Contact address	The address of the contact may be entered
Password	Max. 20 characters, new passwords have to be confirmed
Telephone	Telephone number of user
Telefax	Telefax number of user
Email	Contact email address
www address	homepage of user
Central contact point	Central contact data, e.g. the company's address
Belongs to	Users can be linked to other users or contacts, e.g. an organization
Logo	Information on a logo can be specified here
User rights	Administrator, Main user, Clerk, Guest

Command buttons : (From left to right)

New	Opens an empty form to create a new quantity
Save	Saves changes of the current quantity in the database.
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard to the active field.
GaBi DB Manager	Switches to the GaBi DB Manager window.
List of windows.	Displays a selection of currently opened GaBi windows
Help	Opens the online Help for the current window.
Documentation	Displays a list of external documentation for the current user.

Menu commands:

Object	Commands for managing the current user.
New	Opens an empty window to create a new user.
Restore	Reverses changes made to the current user.
Save	Saves changes of the current user in the database.
Copy all	Copies all of the information of the current user to the clipboard.
Insert total	Pastes the contents of the clipboard as a complete user.
Close	Closes the current window after the security prompt (in case of changes).
Edit	Commands for editing the current object.
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard to the active field.
Delete	Deletes selected content
View	Commands for the user screen layout.
DB Manager	Switches to the GaBi DB Manager.
Location of storage	Displays the type of the current user within the GaBi DB Manager.
Windows	Displays a list of currently open windows.
Load settings	Restores user default window settings.
Save settings	Saves current window settings as user default.
Help	Commands for displaying Help.
GaBi Help	Opens the online Help for the current window.
Index	Opens the Help index.
Info	Displays program information.

Special Features:

GaBi users can only be saved when the associated password has been correctly confirmed.

8.11 Object Type: Project

GaBi supports project management. On one hand the documentation of the project goal and quantity is possible and on the other hand all the data objects assigned to a project in the GaBi Object Type Project can be managed collectively. If a GaBi project is activated, then all created and all altered GaBi object basics are included automatically in the object list of the active project.

A GaBi project consists of:

Design	Maximum of 50 symbols
Activate	yes/No
Project goal	any number of symbols
Funct. and Functionalize unit	any number of symbols
System limits	any number of symbols
Requirements for DQ	any number of symbols
Compare the systems	any number of symbols
Aspects of the test	any number of symbols
Object list	any number GaBi objects

8.11.1 ISO Documentation

The screenshot displays the 'New [Projects] -- DB Projects' window. The 'Project administration' section includes a 'Name' field with the text 'New', an 'Activate project' button, and a status indicator '--- inactive ---'. Below this, the 'ISO documentation' tab is selected, showing a list of fields: 'Goal of project', 'Function and functional unit', 'System boundaries', 'Data quality requirements', 'Comparisons between systems', and 'Critical review considerations'. The 'Object list' tab is also visible. The status bar at the bottom indicates 'System: Changed.' and 'Last change: System, 30.08.2011 15:58:23'.

Figure: Window of the object type project (ISO documentation)

Command buttons : (from left to right)

New	Opens an empty frame for creating a new project.
Restore	Undoes changes on the current project.
Save	Saves changes on the current project in the database.
Cut	Moves the current choice to the clipboard.
Copy	Copies the current choice to the clipboard.
Paste	Pastes the contents of the clipboard to the active field.
GaBi-DB Manager	Changes to the GaBi window database manager.
Window list	Indicates the options of the currently open GaBi window.
Help	Opens the online help for the current window.
Documentation	Displays a list of the documentation for the current user.

Menu commands :

Object	Commands for managing the current project.
New	Opens an empty frame for creating a new project.
Restore	Undoes changes on the current project.
Save	Saves changes on the current project in the database.
Export->GaBi eXchange file	Exports data as a *.gbx file.
Export->GPR data	Exports data for the external process recording tool GaBiPR.
Copy all	Copies the current project completely to the clipboard.
Paste completely	Pastes the contents of the clipboard as a complete project.
Activate project	Activates the current project.
Close	Closes the current window after a certainty query when changes are made.
Edit	Commands for working on the current project.
Cut	Moves the current choice to the clipboard.
Copy	Copies the current choice to the clipboard.
Insert into project	Pastes the contents of the clipboard to the active field
Delete from project	Deletes the selected object from the project.

Parameter explorer	Opens the window of the GaBi Parameter explorer.
Balance calculation	Calculates a balance of the selected objects (only plans and processes).
View	Commands for designing the screen surface.
Large symbols	Displays objects with large symbols.
Small symbols	Displays objects with small symbols.
List	Displays objects in list form.
Details	Displays information about objects on the screen.
DB Manager	Changes to the GaBi DB manager.
Location of storage	Displays the type of the current flow in the GaBi DB manager.
Windows	Displays a list of the windows open at the moment.
Load settings	Restores the user default window settings.
Save settings	Saves present window settings as user default.
Help	Commands for displaying help.
GaBi help	Opens the online help for the current window.
Index	Opens the help index.
Info	Displays program information.

8.11.2 Object List

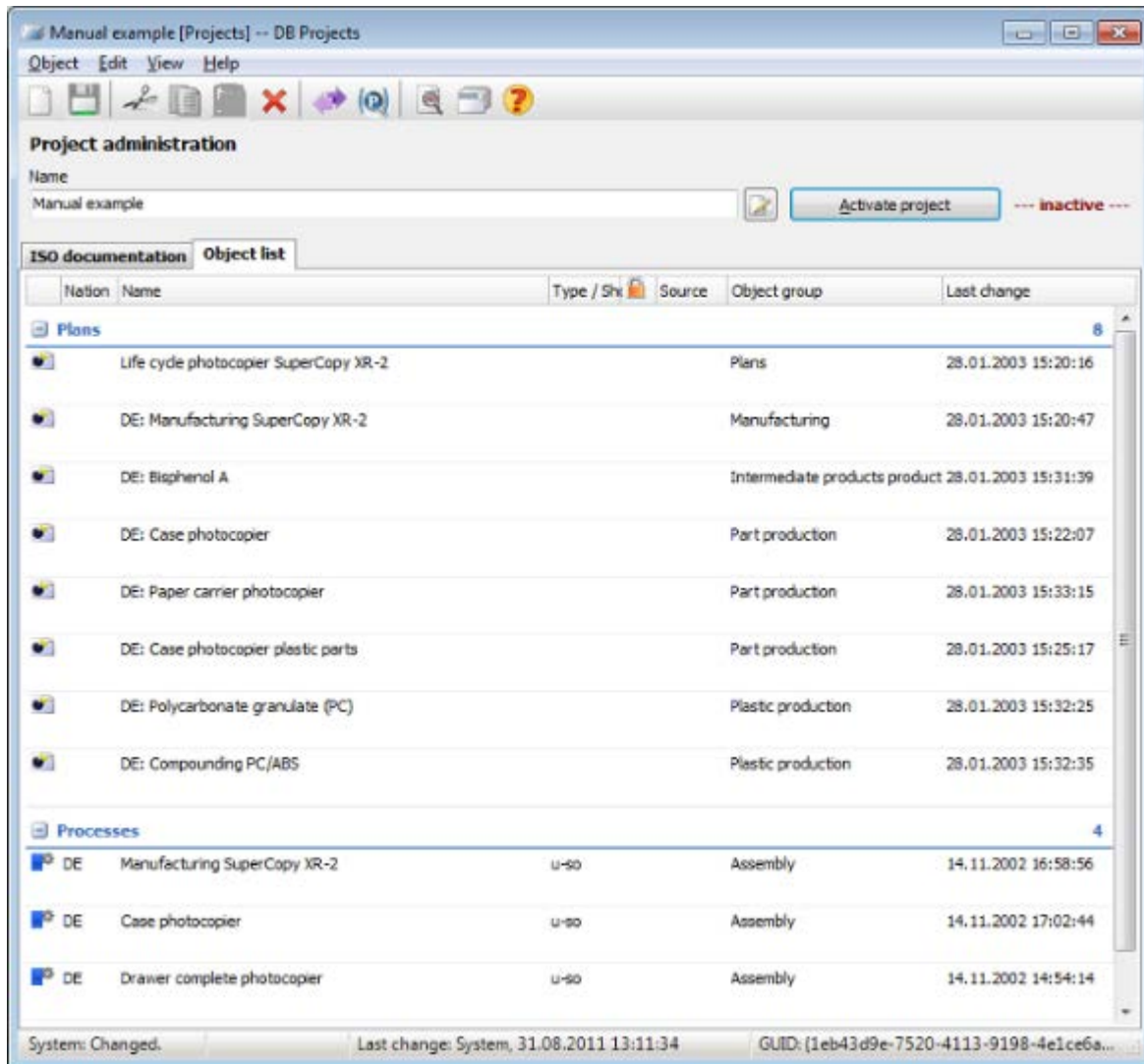


Figure: Object type project window (object list)

Menu right mouse button:

Open	Opens the window of the selected objects.
Rename	Allows the renaming of the selected object.
Calculate balance	Calculate the balance of the selected object (only plans and processes).
Use	Searches database for objects referring to the selected object.
Copy	Copies the current selection to the clipboard.
Paste in project	Pastes the contents of the clipboard to the object list.
Remove from project	Removes the selected objects from the object list.

Special Features:

GaBi projects in the DB manager can be copied to a secondary database. Thus, all the objects used in a project can be copied into another database in one maneuver.

8.12 Object Type: Quality indicators

GaBi has a system for documenting the quality of the data being used, to help ensure that balance results are understandable and to increase their transparency. GaBi objects process, plan and balance, are represented by data quality indicators of completeness, data origin and representativeness.

A DQI can be weighted using a numeric value and thus be subjected to an evaluation. The default values of the GaBi DQIs are equal to zero, to avoid subjective evaluations in a database claiming objectivity.

The data quality can be assessed in a statistical format at balance level.

A GaBi DQI consists of:

Name	Maximum of 100 characters
Value	$5.0 * 10^{-324} .. 1.7 * 10^{308}$
Description	Any number of characters

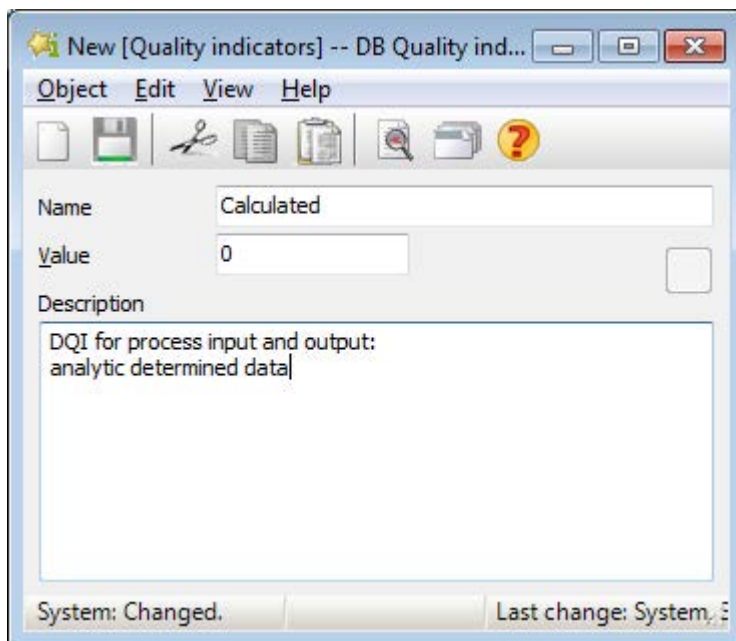


Figure: Object type DQI window

Command buttons: (from left to right)

New	Opens an empty form for creating a new DQI.
Restore	Undoes changes made to the current DQI.
Save	Saves changes made to the current DQI in the database.
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard into the active field.
GaBi DB-Manager	Switches to the GaBi DB-Manager.
List of Windows	Displays a list of the currently open GaBi windows.
Help	Opens the on-line Help for the current window.
Documentation	Displays a list of external documentation for the current DQI.

Menu commands :

Object	Commands for the management of the current DQI.
New	Opens an empty form for creating a new DQI.
Restore	Undoes changes made to the current DQI.
Save	Saves changes made to the current DQI in the database.
Copy all	Copies the current DQI in full to the clipboard.
Insert total	Pastes the contents of the clipboard as a complete DQI.
Close	Closes the current window after a confirmation prompt in case changes have been made.
Edit	Commands for editing the current object.
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard into the active field.
View	Commands for arranging the user screen.
DB-Manager	Switches to the GaBi DB-Manager.
Location of storage	Displays the type of the current DQI in the GaBi DB-Manager
Windows	Displays a list of the currently open windows.

Load settings	Restores user default window settings.
Save settings	Saves current window settings as the user default.
Help	Commands for displaying Help
GaBi Help	Opens the on-line Help for the current window.
Index	Opens the Help index.
Info	Displays program information.

Special features:

GaBi DQIs representativeness and data origin cannot be deleted or recreated.

8.13 Object Type: Interpretation

As well as examining mass, energy, market value, impact categories and other balances, GaBi also allows you to calculate standardized and/or weighted balances. Standardization and evaluation keys are sub-categories of the interpretation object type based on their mathematical relationship.

A GaBi *weighting* consists of the following:

Name	Max. 100 characters		
Quantities	List		
		Quantity	GaBi <i>Quantity</i>
		Equivalences	$5.0 * 10^{-324} .. 1.7 * 10^{308}$
		Unit	GaBi <i>unit</i>
		Standard deviation	-65536 % ... 65536 %
		Weights	$5.0 * 10^{-324} .. 1.7 * 10^{308}$

8.13.1 Weighting

An evaluation key is based on the weightings, the reciprocal values of the equivalencies. The weightings can also represent an uncertain factor, which can be quantified based on the normal distribution with a standard deviation.

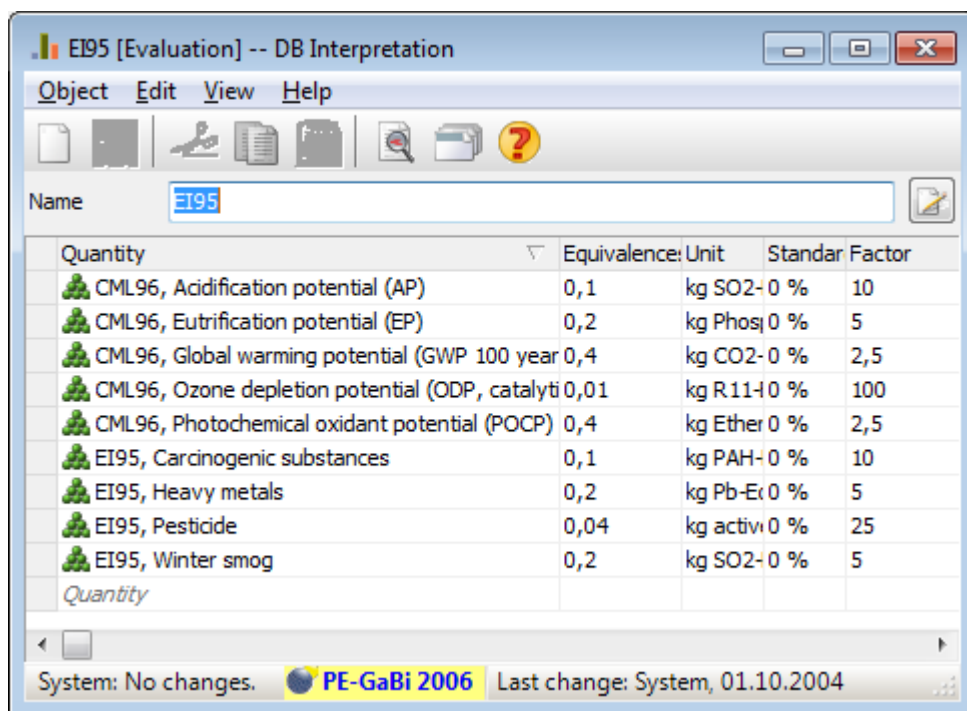


Figure: Object type weighting window (evaluation)

Command buttons : (From left to right)

New	Opens an empty form to create a new weighting key.
Save	Saves changes of the current weighting key in the database.
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard to the active field.
GaBi DB Manager	Switches to the GaBi DB Manager window.
List of windows	Displays a selection of currently opened GaBi windows.
Help	Opens the online Help for the current window.
Documentation	Displays a list of external documentation for the current weighting key.

Menu commands:

Object	Commands for managing the current weighting key.
New	Opens an empty form to create a new weighting key.
Restore	Reverses changes made to the current weighting key.
Save	Saves changes of the current weighting key in the database.
Copy all	Copies all information of the current weighting key to the clipboard.
Insert total	Pastes contents of the clipboard as a complete weighting key.
Close	Closes the current window after the security prompt (in case of changes).
Edit	Commands for editing the current object.
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard to the active field.
Delete	Deletes the marked row from the table.
View	Commands for the user screen layout.
DB Manager	Switches to the GaBi DB Manager.
Location of storage	Displays the type of the current weighting within the GaBi DB Manager.
Windows	Displays a list of currently open windows.
Load settings	Restores user default window settings.
Save settings	Saves current window settings as user default.
Help	Commands for displaying Help.
GaBi Help	Opens the online Help for the current window.
Index	Opens the Help index.
Info	Displays Program information.

Right mouse button menu:

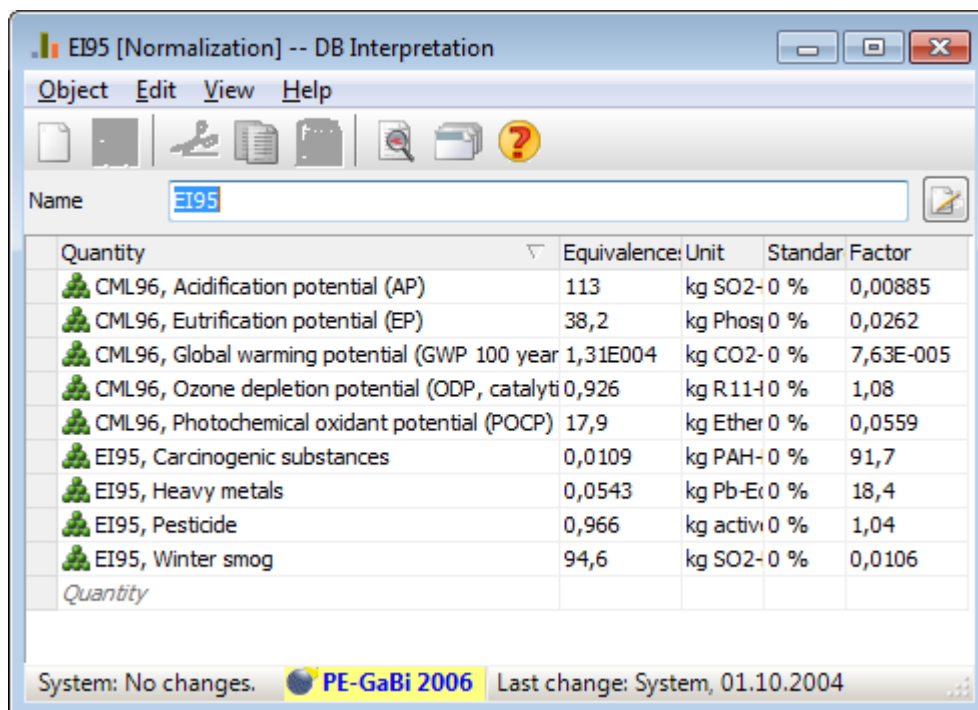
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard to the active field.
Delete	Deletes the marked row from the table.
Details	Opens the current selection quantity window.
Select all	Deletes all marked rows and columns from the table.

Special Features:

GaBi balances can be normalized at different levels. It is possible to normalize both individual balances (mass, energy effects, etc.), and weighted balances.

8.13.2 Normalization

A normalization key is usually defined by specifying equivalencies (e.g. per capita consumption in Europe). The equivalent value can represent an uncertain factor, which can be quantified based on the normal distribution with a standard deviation.



Quantity	Equivalence	Unit	Standar Factor
CML96, Acidification potential (AP)	113	kg SO2-0 %	0,00885
CML96, Eutrication potential (EP)	38,2	kg Phos0 %	0,0262
CML96, Global warming potential (GWP 100 year)	1,31E004	kg CO2-0 %	7,63E-005
CML96, Ozone depletion potential (ODP, catalytic)	0,926	kg R11-0 %	1,08
CML96, Photochemical oxidant potential (POCP)	17,9	kg Ether 0 %	0,0559
EI95, Carcinogenic substances	0,0109	kg PAH-0 %	91,7
EI95, Heavy metals	0,0543	kg Pb-Ex 0 %	18,4
EI95, Pesticide	0,966	kg activ0 %	1,04
EI95, Winter smog	94,6	kg SO2-0 %	0,0106
Quantity			

System: No changes. PE-GaBi 2006 Last change: System, 01.10.2004

Figure: Object type weighting window (normalization)

8.14 Object Type: Global Parameters

In global parameters, parameters can be created which are valid throughout the database. Different parts of your models in GaBi can refer to global parameters and be centrally varied. Group your global parameters in different GaBi objects of the global parameter type (e.g. the GaBi objects “Global Variables” and “Global Constants”).

A GaBi global parameter consists of:

Name	Maximum of 100 characters		
Short	Maximum of 20 characters		
Parameter list	List	Parameter	Maximum of 50 characters
		Value	$5.0 * 10^{-324} .. 1.7 * 10^{308}$
		Standard deviation	0..65535
		Comment	Maximum of 100 characters

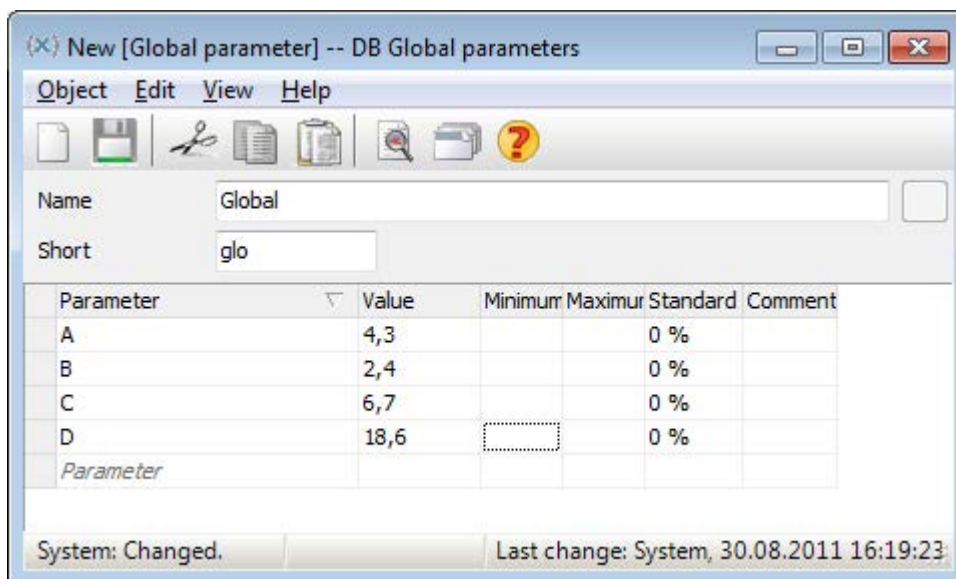


Figure: Object type global parameter Window

Command buttons: (from left to right)

New	Opens a new window to create a new global parameter
Save	Saves changes made to the current global parameter in the database.
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard into the active field.
GaBi DB-Manager	Switches to the GaBi DB-Manager.
List of windows	Displays a list of the currently open GaBi windows.
Help	Opens the on-line Help for the current window.
Documentation	Displays a list of external documentation for the current global parameter.

Menu commands :

Object	Commands for the management of the current global parameter.
New	Opens an empty form to create a new global parameter.
Restore	Undoes changes made to the current global parameter.
Save	Saves changes made to the current global parameter in the database.
Copy all	Copies the current global parameter in full to the clipboard.
Insert total	Pastes the contents of the clipboard as a complete global parameter.
Close	Closes the current window after a confirmation prompt in case changes have been made.
Edit	Commands for editing the current object.
Cut	Moves the current selection to the clipboard.
Create Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard into the active field.
Delete	Deletes marked rows from the table.
View	Commands for arranging the user screen.
DB-Manager	Switches to the GaBi DB-Manager.
Location of storage	Displays the type of the current global parameter in the GaBi DB-Manager
Windows	Displays a list of the currently open windows.
Load settings	Restores user default window settings.

Save settings	Saves current window settings as the user default.
Help	Commands for displaying Help
GaBi Help	Opens the on-line Help for the current window.
Index	Opens the Help index.
Info	Displays program information.

Right mouse button menu:

Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard into the active field.
Delete	Deletes marked rows from the table.
Usage	Searches for all GaBi objects which refer to the selected parameter.
Select all	Marks all rows and columns in the table.

Special features:

A global parameter is referenced using its abbreviation. If, for example, you want to refer to parameter "A1" in the above figure, you must write "g.A1".

8.15 Optional feature (DfX): Object Type: Product model

The product model presents a product's bill of materials in a hierarchical structure. The product tree forms the central structure of the product model. The product tree is built up using the following elements:

- Assembled parts
- Components
- Alternative components
- Materials
- Lubricants and energy
- Processes for modeling supply, processing and transportation

Further information on these elements is available in the next sections. All of these elements can contain references to existing GaBi plans and GaBi processes. This is essentially how the basis information relevant for the Life Cycle Assessment of the product model is supplied.

Alongside the calculation of an LCA, the product model can be used to model the material composition of a product and its use phase and end-of-life phase, including the disassembly, recycling and disposal. There are specific disassembly and end-of-life processes available for the latter. In the product tree, you can enter precedence relationships between parts as well as information about the connection of the parts.

If you already have a GaBi model (i.e., plan hierarchy) for the production phase of your product, you can use this as the basis for a product model. The process-oriented information modeled in an existing GaBi plan hierarchy of a product manufacture is thereby transformed into a material-oriented description. A prerequisite for this is that your model of the production phase is modeled in the appropriate way, that is, using variable flow types (e.g., for

component production, assembling, etc.).

However, you can also build-up a product model from scratch manually based on your bill of materials.

A GaBi product model consists of:

Name	Maximum of 100 characters
Product tree	Hierarchical bill of materials
Process assignment list	Assignment of country or site-specific production processes to material/lubricants/energy flows
Production plan	GaBi <i>Plan</i> , <i>optional</i> (delivers the bill of material information)
Use phase plan	GaBi <i>Plan</i> , <i>optional</i>
Recycling plan	GaBi <i>Plan</i> , <i>optional</i> (for disassembly evaluations)
Alternative Recycling plans	GaBi <i>Plans</i> , <i>optional</i> (for alternative disassembly scenarios)
Construction information	See details below in “Tab: Construction”
Disassembly groupings	See details below in “Tab: Dismantling info”
Connection information	See details below in “Tab: Connection diagram”
Precedence relationships	See details below in “Tab: Connection diagram”

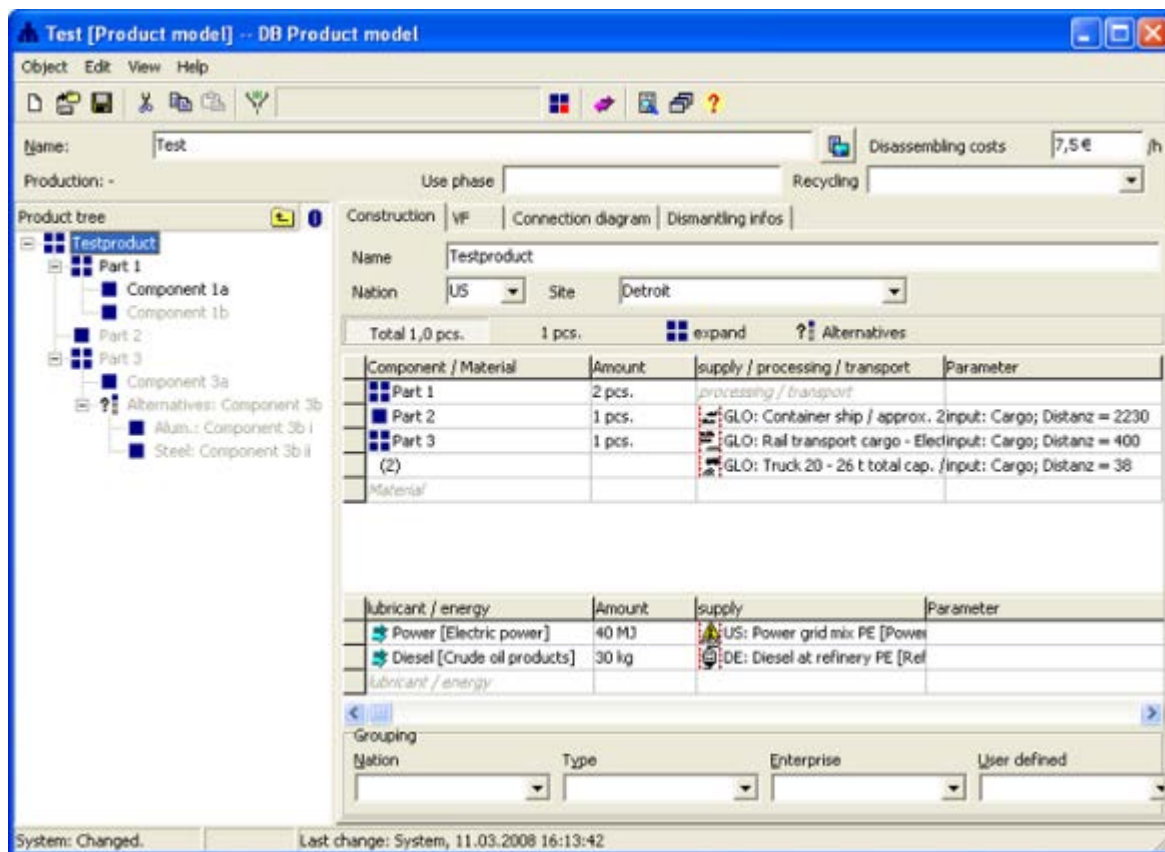


Figure: The product model object window

Command buttons: (from left to right)

New	Opens an empty template for defining a new product model
Save	Changes made to the current product model are saved in the database
Cut	Moves the current selection to the clipboard
Copy	Copies the current selection to the clipboard
Paste	Enters the contents of the clipboard into the active field
IDIS Export	Exports the IDIS information to a file
Grouping filter	Generates a grouping filter facilitating selective analysis of a product model
View selected branch only	Hides components from modules that are not currently selected
Calculate balance	Calculates the balance of the current product model
GaBi DB Manager	Switch to the GaBi DB Manager window
List of windows	Shows a list of the windows that are currently open
Help	Opens the Online Help for the respective window
Documentation for more detail	Lists user-defined documentations for the current product model. See Object Documentation

Menu commands:

Object	Commands relevant to the product model that is currently open
New	Opens an empty template for defining a new product model
Restore	Reverses any changes made to the current product model
Create from production plan	An existing product tree is matched with the production plan.
Update from production plan	Automatic conversion of a production plan (or plan hierarchy) into a product tree
Save	Changes made to the current product model are saved in the database
Copy all	Copies the complete product model onto the clipboard
Insert total	Pastes the content of the complete product model from the clipboard
IDIS Export	Exports the IDIS information to a file
Close	Closes the current window. You will be prompted to save any changes that you made.
Edit	Commands relevant to editing the product model that is currently open

Cut	Moves the current selection to the clipboard
Copy	Copies the current selection to the clipboard
Paste	Enters the contents of the clipboard into the active field
Delete	Deletes the selected cells from the table
View	Commands for configuring the screen
DB-Manager	Switch to the GaBi DB Manager window
Location of storage	Shows the location of the product model in the GaBi DB Manager Windows
Windows	Shows a list of the windows that are currently open
Options	Opens a window where further settings can be modified
Load settings	Activates the user's default settings for the current windows
Save settings	Saves the current windows settings as the user's default settings
Help	Commands for showing the help files
GaBi help	Opens the Online Help file for the current window
Index	Opens the Online Help index.
Info	Shows the program information

8.15.1 The product tree

In the left frame of the product model window you will see the product tree. The right frame always shows information relevant to the element that is currently selected in the product tree.

The symbols next to the tree elements each hold a different meaning:

-  Assembled part
-  Component
-  Alternative part

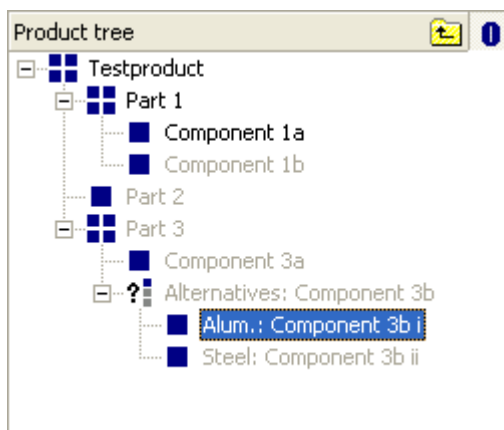


Figure: The product tree in the product model window

Command buttons: (from right to left)

Folder up	Selects the product component one level higher
Zero	When pushed, the elements with a 0 amount will be shown in the right frame (e.g., possible alternatives that have been included in the model). When this button is not pushed, the 0 values will not be shown.

Right mouse button menu:

Show all sub folders	Shows all sub folders for the selected element in the product tree
Details (Plan)	Opens the GaBi plan for the selected element. (Only when production plan exists)
Details (Flow)	Opens the GaBi flow for the selected element. For disassembled components and components from the production plan (or plan hierarchy) a virtual flow exists. For other elements, this menu entry is deactivated
Documentation	Shows a list of the documentations for the selected element's GaBi process (Only when a production plan exists)
Copy	Copies an element onto the clipboard (with all its sub-elements)
Paste	Pastes the copied element beneath the selected component
Delete	Deletes the selected element

8.15.2 The "Construction" tab

The construction tab in the product model is where the product tree can be constructed. This is where the assembled parts and components of an existing product can be renamed and further parts and components can be added. Materials can also be assigned to these here. Multiple lubricants and energy consumptions can also be assigned here. Any element can also be labeled with the nation (two-letter country code), and a site where production takes place and groupings can also be assigned or adjusted.

When an element is selected in the product tree, its sub elements appear in the upper section of the right-hand frame. When the 'expand' button is pressed, new sub elements can be entered; they will then automatically appear in the product tree. Elements added under the main product tree root will automatically appear as components (symbol in the product tree); they will be converted to assembled parts when further components have been defined a level beneath.

When a product structure has been defined with assembled parts and components, then individual components parts should be assigned with their corresponding materials. These are GaBi flows and can be understood as forming the 'leaves' of the product tree. The GaBi flows that are used for the materials should contain GaBi quantities that demonstrate the materials' properties, for example:

- Flow: "Steel cold rolled (St)" – Quantity: "Steel weight" 1 kg per kg mass
- Flow: "Polyamide 6.6 GF" – Quantity: "PA66 weight" 950 g per kg mass
Quantity: "Glass weight" 50 g per kg mass

The material properties for the assembled parts are transferred automatically from the components that comprise it.

A plan or process representing the material supply can be assigned to any material flow. Any number of processes representing the processing and transportation can also be assigned - this creates a process chain. The supply

plan or process is in the cell directly to the right of the material flow; the other modules of the manufacturing chain then follow (with automatic numbering from 2 to n).

Component / Material	Amount	supply / processing / transport	Parameter
■ Component x	1 pcs.	processing / transport	
■ Component y	1 pcs.	processing / transport	
<i>Component</i>			
🔧 Steel cold rolled (St) [Metals]	5 kg	DE: Steel cold rolled (St)	
(2)		supply / processing / transport	
🔧 Polyamide 6 GF30 (PA 6 GF30)	2 kg	DE: Polyamide 6.6 granu	
(2)		GLO: Truck 20 - 26 t total input: Cargo	
(3)		supply / processing / transport	
<i>Material</i>			

In the same way, a process chain or plan chain can be defined for every component or assembled part.

Additionally, any component or assembled part can have multiple GaBi flows assigned to it representing operating materials (e.g., lubricants) or energy consumptions. In turn, each of these GaBi flows can have a supply process assigned. In contrast to the materials, the lubricants and energies are only needed during the production stage and therefore do not contribute to the overall weight of the product or its properties.

Construction | VF | Connection diagram | Dismantling infos

Name: Assembled part 2

Nation: US Site:

Total 1,0 pcs. 1 pcs. expand ? Alternativen

Component / Material	Amount	supply / processing / transport	Parameter
■ Component x	1 pcs.	processing / transport	
■ Component y	1 pcs.	processing / transport	
🔧 Steel cold rolled (St) [Metals]	5 kg	DE: Steel cold rolled (St) [Metal production]	
🔧 Polyamide 6 GF30 (PA 6 GF30)		DE: Polyamide 6.6 granulate mix (PA 6.6) PE [Plastic production]	...
(2)		GLO: Truck 20 - 26 t total cap. / 17,3 t payload / Euro 3 (local) Plinput: Cargo	
<i>Material</i>			

lubricant / energy	Amount	supply	Parameter
⚡ Power [Electric power]	20 MJ		
🔥 Steam (MJ) [Thermal energy]	30,2 MJ		
<i>lubricant / energy</i>			

Grouping

Nation: Type: Processes Enterprise: external User defined:

Figure: Product model window – Construction tab

Any process/plan that has been entered to represent supply/processing/transport can contain parameters. The right column in this table serves for setting these parameters. For processes/plans with several inputs or outputs, one can be selected here enabling a process chain to be built up. Regardless of whether parameters exist or not, the local names of the processes and grouping settings can be entered here, analogous to the process instances on GaBi plans. This is achieved by clicking in the cell to the right of the process and clicking the  button.

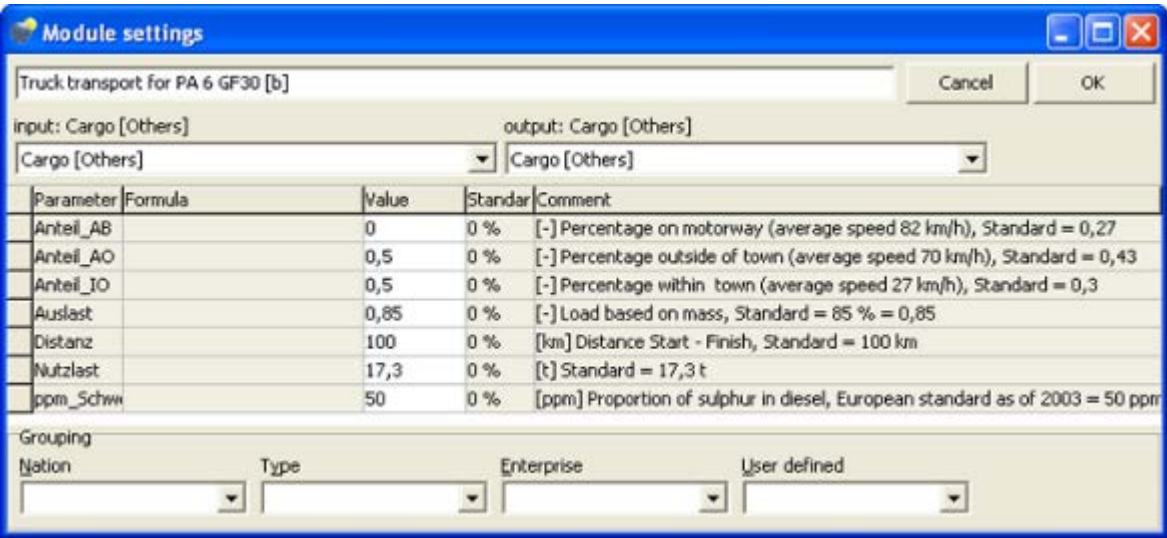


Figure: Window for module settings

The content of the construction tab can be displayed in different modes.

When the Expand button is pressed, empty rows are displayed for entering new components, materials and modules of the process chain. When this button is not pressed, the empty rows disappear to improve the clarity of the table.

When a product contains the same component multiple times, you can choose whether the values shown should reflect the single weight of one of these components or if the total weight of its multiple use should be shown. Say, for example, the product is an automobile and, among others, it has 4 wheels/tyres as components. Each of these has 5 steel screws. When pressing the 1 pcs. button, the weight of one component will be shown. See figure below for the weight of one screw.

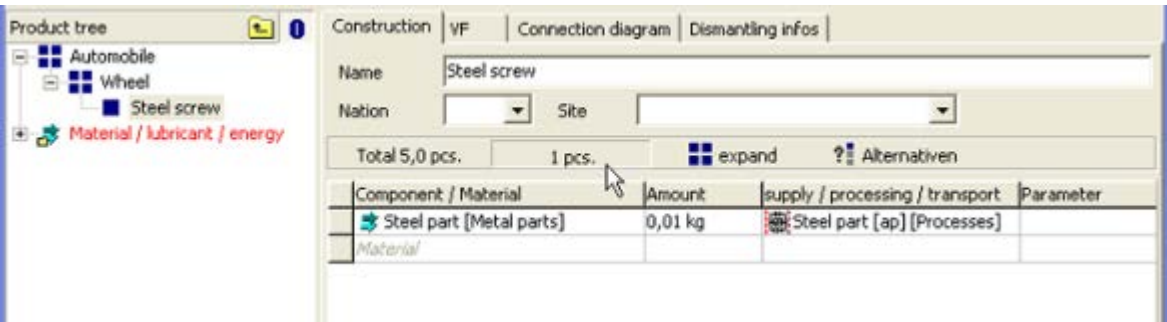


Figure: Example: Showing similar components I

When the button directly to the left is pressed, the total weight of all the similar components will be displayed (e.g., the weight of 20 steel screws).

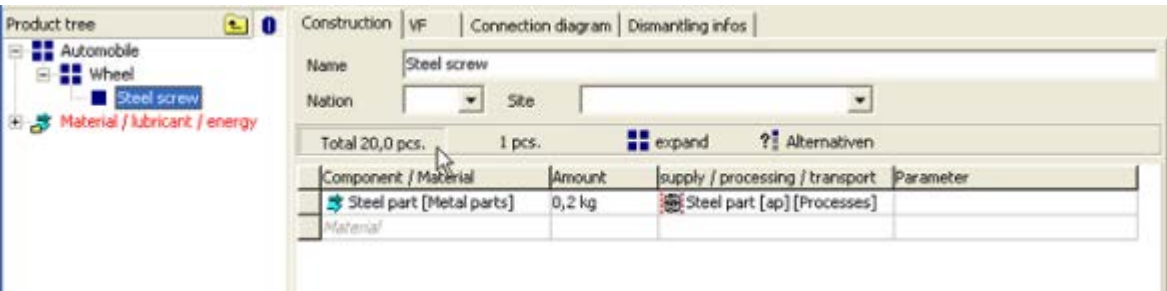


Figure: Example: Showing similar components II

This function can be particularly useful when entering information directly from a bill of materials.

8.15.3 Alternative components

In reality, some components can be made from a choice of several different alternative materials (e.g., steel or aluminum rims). To account for this in the product model and enable simple switching between options, 'Alternative components' can be created.

To make a component into an 'Alternative component' (e.g., a steel rim) select it in the product tree and click the  **Alternatives** button. This will cause a new level to be created in the product tree characterised by the symbol for alternative components . Beneath this alternative component, you can now add further components next to the existing one, which should serve as alternatives (e.g., aluminum rim).

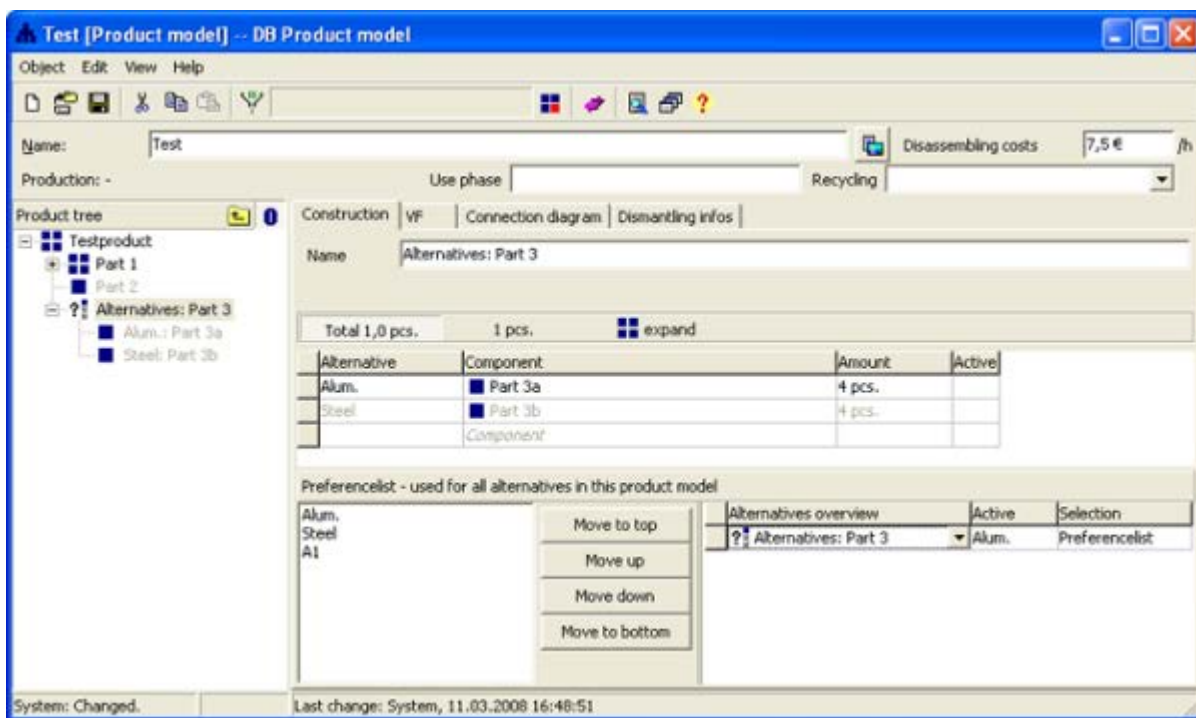


Figure: Product model – Alternative components

Only one of the alternative components is active at any one time; the inactive ones appear in grey font. Only the active alternative's weight and properties contribute to the assembled part. The active component can either be selected directly via the 'Active' column or it can be determined via the alternative groups.

Any alternative component can be assigned to an alternative group (e.g., a group, for example, where all steel alternatives are chosen or all aluminum ones). The active alternative will then be determined automatically according to the entry in the preference list. The alternative that is highest in the preference list will be activated. By simply making one change in the preference list, multiple alternative components in a product model can be activated.

The preference list and the alternatives overview in the lower part of the window always refer to **all** alternative components in the entire product model.

8.15.4 The process assignment list

Whenever the construction tab is shown, the assignment list is displayed in the product tree frame. All flows that are used as materials, operating materials or energy in the product tree, or flows that have open inputs of supply, processing or transport processes automatically appear beneath the tree node "Material / lubricant / energy". Until a supply process or plan has been assigned to a flow (in the cell to the left of it), the flow will be listed in the process assignment list and will be coloured red as a reminder.

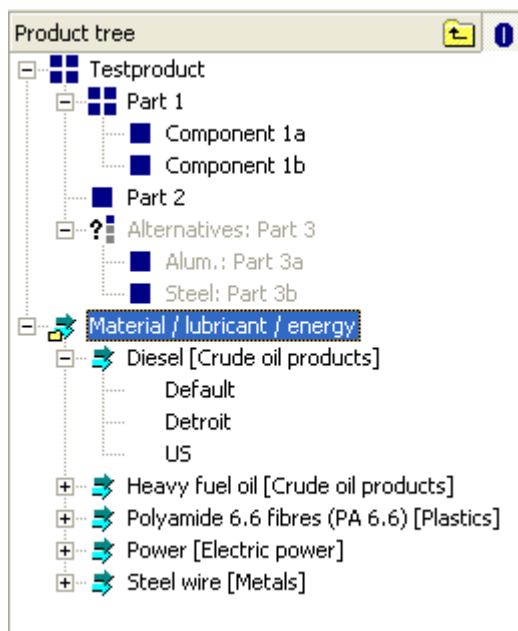


Figure: The assignment list for Materials / lubricants / energy

A component or assembled part's flows can be assigned with supply processes directly via the construction tab. When this is done, the flow will no longer appear in the flow assignment list since you have provided the required upstream information and the flow therefore no longer needs to be highlighted.

However, any flow may have a number of alternative supply processes or plans assigned to them which best represent the geographical location of their upstream production. Country or site-specific processes can be assigned to flows via the process assignment list.

Every flow in the assignment list has sub-entries: the default value and the country code and site that were entered for the respective element in the product model.

When the user has entered processes for the flows via the flow assignment list, they will no longer be displayed in red but instead will be shown in black.

When calculating the balance, 'open' flows will automatically be connected to the respective process/plan, whereby the site is considered first. If none exists, the country will be considered next. If none exists here either, then the default will be assigned. When no supply process exists here either, the flow remains unconnected and appears as an input flow in the balance.

8.15.5 The "VF" (Variable Flow) tab

The VF tab displays the variable flow quantities of the product or of product components and their composition. In the left table, the quantity hierarchy can be expanded like a tree, in the same way as the GaBi Database Manager.

Values are only shown in the quantities folder (in left table, right frame) when the units of all GaBi quantities beneath it are the same.

The right table shows the components in the product which contribute to the quantity that is currently selected in the left table. The name of the quantity is shown in the table heading, e.g., VDA Material Classification in Figure X.

The VF information in the product model consists of:

Quantity hierarchy	List: The values shown refer to the component currently selected in the product tree
Single components	List: The values shown refer to the quantity currently selected in the quantity hierarchy.

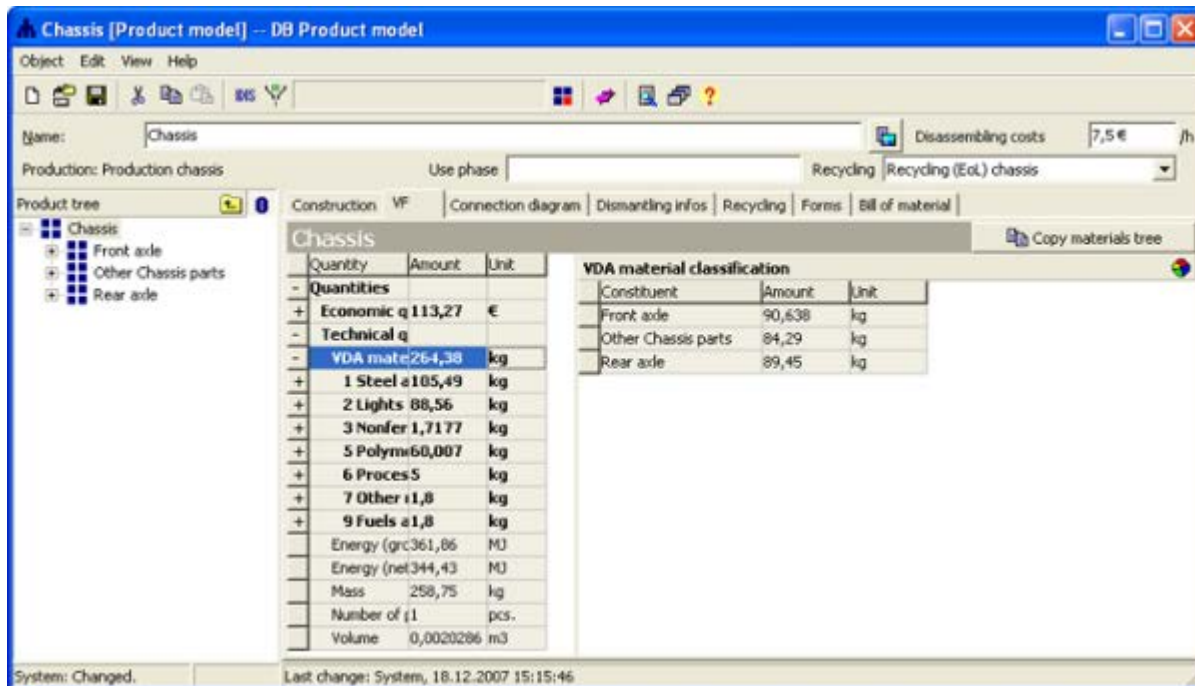


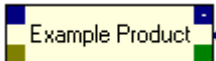
Figure: Product model window – “VF” (Variable Flow) tab

Command buttons: (from left to right)

 Diagram:	Quantities: Shows a chart of the quantity composition Component: Shows a chart of the component composition
Copy materials tree	Copies the entire product tree from the currently selected component (and sub-components) onto the clipboard, accounting for the quantities that are currently shown (or ‘collapsed’).

8.15.6 The "Connection diagram" tab

This tab shows the product model in a graphical format. There are three different connection types by which two or more components can be connected: (1) Is-part-of, (2) Connection, and (3) Precedence.

Each connection type is shown in a different colour and each type is assigned to one corner of a component's box, e.g., . The way the connections are displayed is controlled via the corners of the boxes.

Clicking on a corner with the left mouse button allows all connections for that type of component to be displayed or hidden. Each corner also has a right mouse menu with functions that are relevant for that connection type.

New connections or precedence relationships between components can be established by holding down the left mouse button from the respective corner of the box of a product component and letting go in the box of another component in the connection diagram, or to another component in the product tree. It is also possible to connect a component to more than one other component and with more than one connection type (by drag 'n' dropping from the respective corner of the box multiple times).

A connection diagram consists of:

Boxes	Represents a product component
Connections	
Is-part-of	Lines from a product component to its sub-components. Default colour is blue. Assigned corner: Top left to parent component, top right to sub-components
Connection	Line to the connection name, which is in a coloured box with rounded ends
Precedence	Bow with an arrow from the predeceasing product component to the succeeding one (always in clockwise direction)

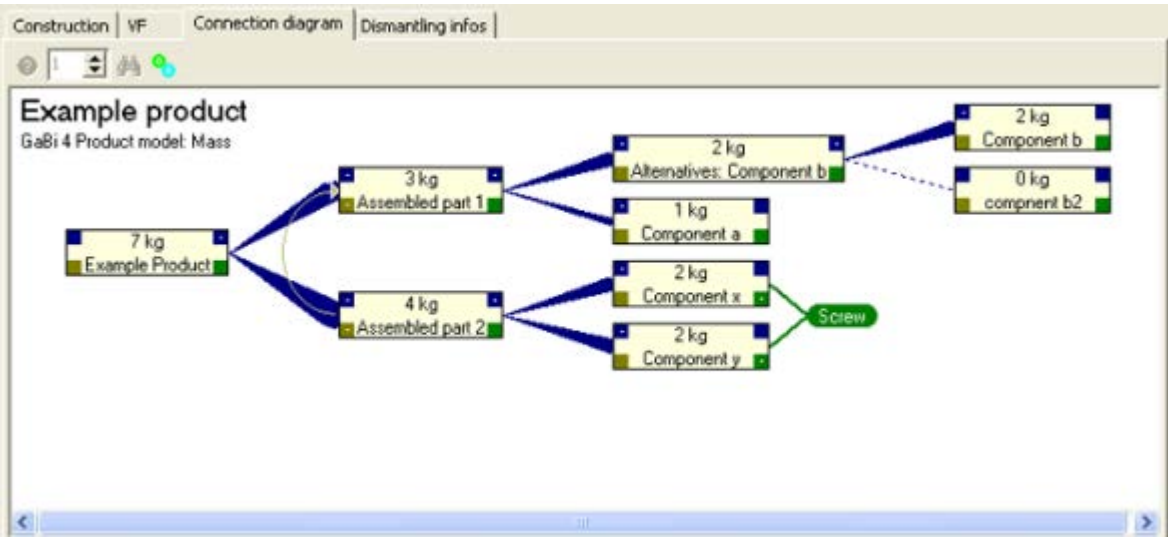


Figure: Product model window – Connection diagram

Command buttons: (from left to right)

Show disassembling steps	Show or hide the disassembling step numbers
Find disassembling step	Locates a certain disassembling step number in the connection diagram
Show ISO disassembling steps	Show or hide the ISO disassembling step numbers: Pre-treatments shown green, ISO disassembly is shown blue.

Right mouse button menu (boxes):

Properties...	Springs to the 'Dismantling Info' tab and selects the respective product component.

Right mouse button menu (corners of boxes):

Show	Define which connections should be displayed or hidden
Delete	Delete single connections (except for 'Is-part-of' connections)

Right mouse button menu (connection names):

Properties...	For editing the connection properties (see below)
Hide	Hide the selected connection
Delete	Delete the selected connection

Right mouse button menu (connection diagram background):

Copy	Copies the currently displayed connection diagram as bitmap or as a windows meta file
Set visualised quantity	To define the quantity that the connection diagram sankey-display should be displayed in
Reset visualised quantity	Deactivate the sankey-display
Show	Define the display of the different connection types

8.15.6.1 Connection properties

A connection can have various information saved behind it: Name, Disassembling time, Disassembling costs and Comments. Disassembly costs and Disassembling time are proportional. The Disassembly cost per unit time is set centrally for all connections in the product model window. Single product components can be deleted from the list of the connection diagram properties.

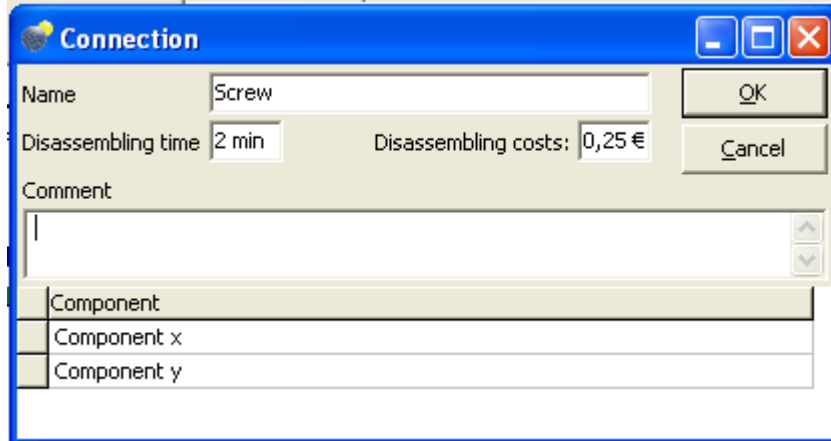


Figure: The connection properties window

8.15.7 The "Dismantling Info" tab

The "Dismantling Info" tab contains information on the individual materials of a product (components and assembled parts). The information related to the product component that is currently selected in the product tree is always shown in the three tables (predecessors, successors, connection) and in the grouping list.

The user can get to this information by double-clicking on the precedence connection.

A product component dismantling info consists of:

Predecessors	List: Product components from which a connection to the selected component exists
Successors	List: Product components to which a connection to the selected component exists
Connection	List: Connections that the selected component is part of
Groupings	List: All of the product models will be shown. The ones which the currently selected product belongs to will be marked with an X.

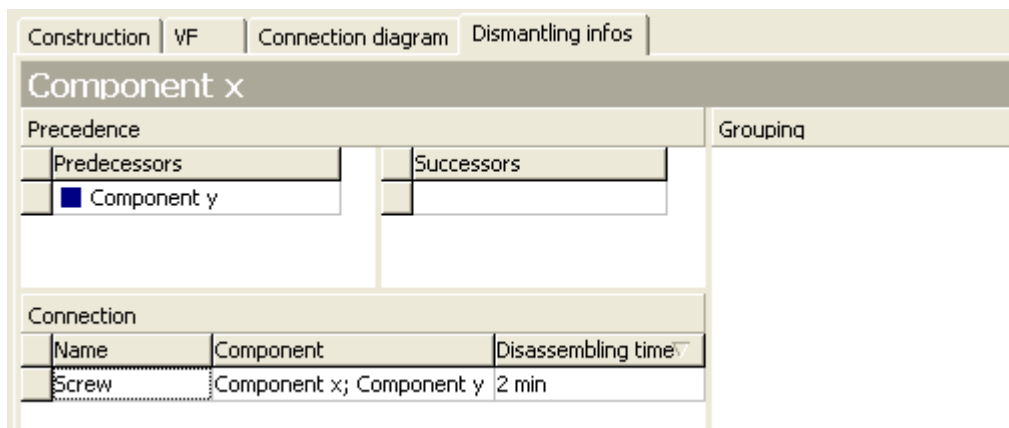


Figure: Product model window – “Dismantling Info” tab

Right mouse button menu (precedence relationships):

Properties...	Navigates via the selected precedence connection to the displayed component
Delete	Deletes the precedence connection to the selected component
Select all	Selects all table entries

Right mouse button menu (connections):

Properties...	Opens the window to edit the connection
Delete	Deletes the selected connection
Select all	Selects all table entries

Right mouse button menu (groupings):

Add	Opens the window to edit the connection
Rename	To rename the selected grouping
Remove	Deletes the selected grouping from the product model and all its product components

8.15.8 The "Recycling" tab

In the recycling tab, the recycling plan selected in the 'Recycling' field of the product model window, or one of its sub-plans, will be shown. When the recycling tab is selected, the product tree display is replaced with the recycling plan's hierarchy, facilitating easy navigation to the sub-plans. The plan can be edited here.

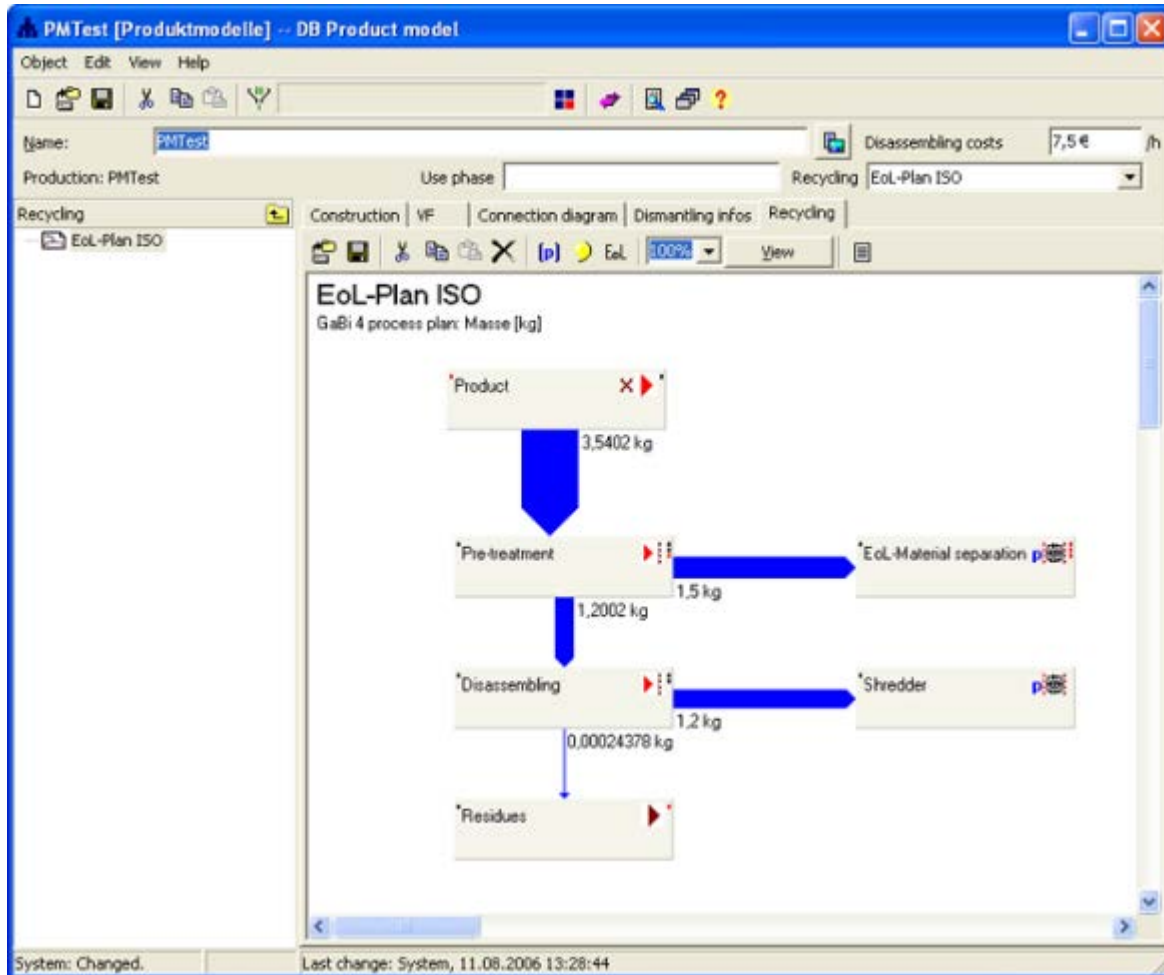


Figure: Product model window – “Recycling” tab

Command buttons:

Restore	Reverses any unsaved changes made to the current plan
Save	Saves changes from the current plan to the database
Cut	Moves the current selection to the clipboard
Copy	Copies the current selection onto the clipboard
Paste	Enters the contents of the clipboard into the active field
Delete	Deletes the selected process or flow
Parameter	Opens the plan parameter window
Comment	Adds a new comment field to the plan
Add EoL instance	
EoL source	Adds an EoL source to the plan (input side interface to the product

	model)
EoL sink	Adds an EoL sink to the plan (output side interface to the product model)
Disassembling process	Adds a disassembling process to the plan
Zoom factor	Changes the display of the plan
View	See Object type: Plan for explanation of the sub-menu entries
Disassembling evaluations	Opens the window for the disassembling evaluations

Right mouse button menu:

See Object type: Plan (Section 8.4)

8.15.8.1 The window for disassembling evaluations

This window shows three various ways of evaluating the disassembly: the disassembly report, the recycling rates and the Life Cycle Costing (LCC) evaluations.

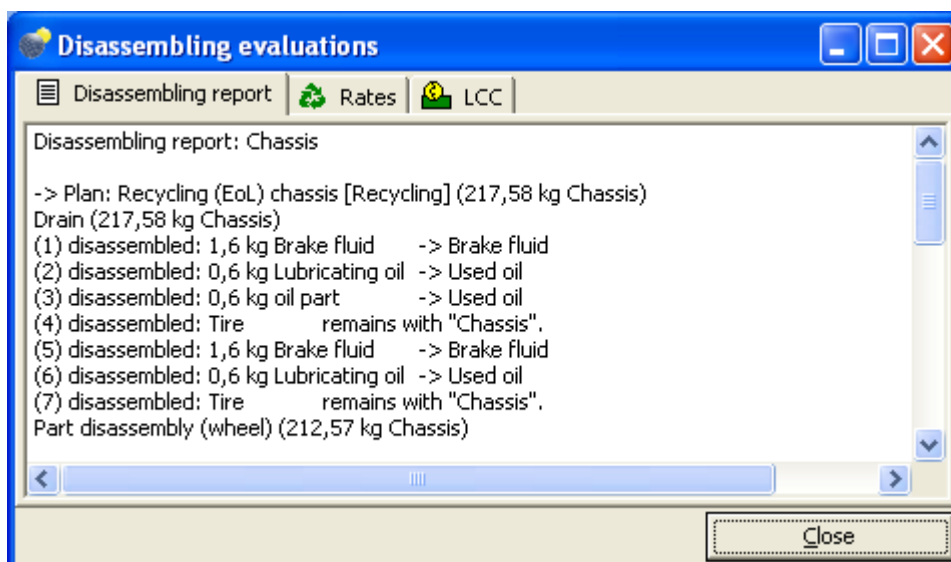
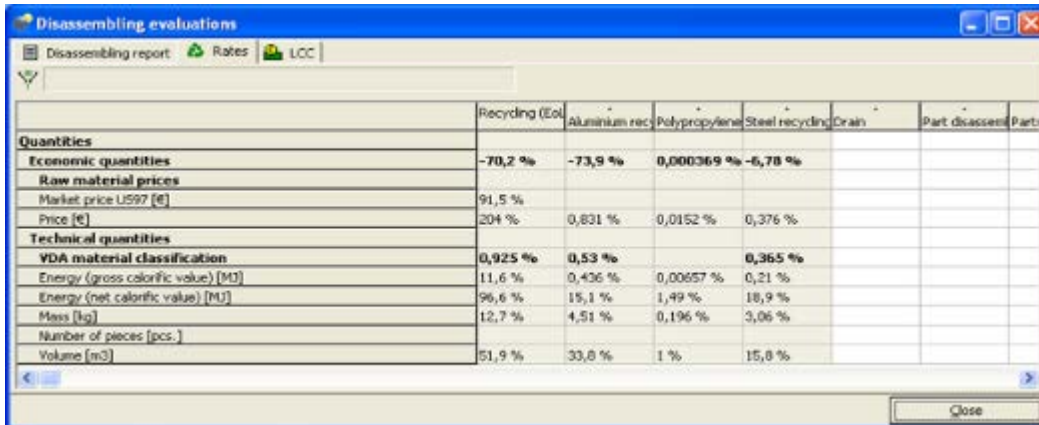


Figure: Disassembly report

The disassembly report describes the disassembly routine shown in recycling plan as text. It documents the disassembling of connections or removal of the product components by means of the disassembling step number and the process instance.



	Recycling (Eol)	Aluminium rec	Polypropylene	Steel recycling	Drain	Part disassembled	Part
Quantities							
Economic quantities							
Raw material prices							
Market price US97 [€]	91,5 %						
Price [€]	204 %	0,831 %	0,0152 %	0,376 %			
Technical quantities							
VDA material classification							
Energy (gross calorific value) [MJ]	0,925 %	0,53 %		0,365 %			
Energy (net calorific value) [MJ]	11,6 %	0,436 %	0,00657 %	0,21 %			
Mass [kg]	96,6 %	15,1 %	1,49 %	18,9 %			
Mass [kg]	12,7 %	4,51 %	0,196 %	3,06 %			
Number of pieces [pcs.]							
Volume [m3]	51,9 %	33,8 %	1 %	15,8 %			

Figure: Recycling rates

The recycling rates are declared separately for each GaBi quantity. The tree structure hierarchy of the quantities and quantity folders can be displayed by double-clicking on the first column.

The calculation of the recycling rates occurs as follows: the outputs of the respective process instances (of the recycling plan) for a certain quantity are totaled, for example, the total mass of aluminum that is available for re-use.

This total is then divided by the value of that quantity for the product (e.g., the aluminum weight in the product), to give the recycling rate.



	total costs	Flow costs	Disassembling costs	Machine costs	Personnel costs
Recycling (Eol) chassis	-70,32 €	-70,82 €	0,50 €		
Product					
Aluminium recycling	-66,42 €	-66,42 €			
Polypropylene regranulation					
Steel recycling	-6,10 €	-6,10 €			
Drain					
Part disassembly (wheel)	0,50 €		0,50 €		
Parts disassembly (steering)					
Brake fluid					
DE: Incineration plastics	1,70 €	1,70 €			
Disassembly process (steering)					
Disassembly process (wheel)					
shredder process					
Used oil					
Used oil					

Figure: Product model - LCC evaluation

The LCC evaluation tab displays the costs from the recycling plan and its plan instances and sub-plans. The total costs are divided into flow costs (disposal costs or, if negative, revenues for valuable materials), disassembly costs (total of the costs for the disassembly of connections) as well as the machine costs and the personnel costs.

8.16 Object Type: Reference, Citation

The object documentation in GaBi can be linked to a Reference, Citation. The reference citation can be linked to external documentation containing the cited document or extensive information on the reference.

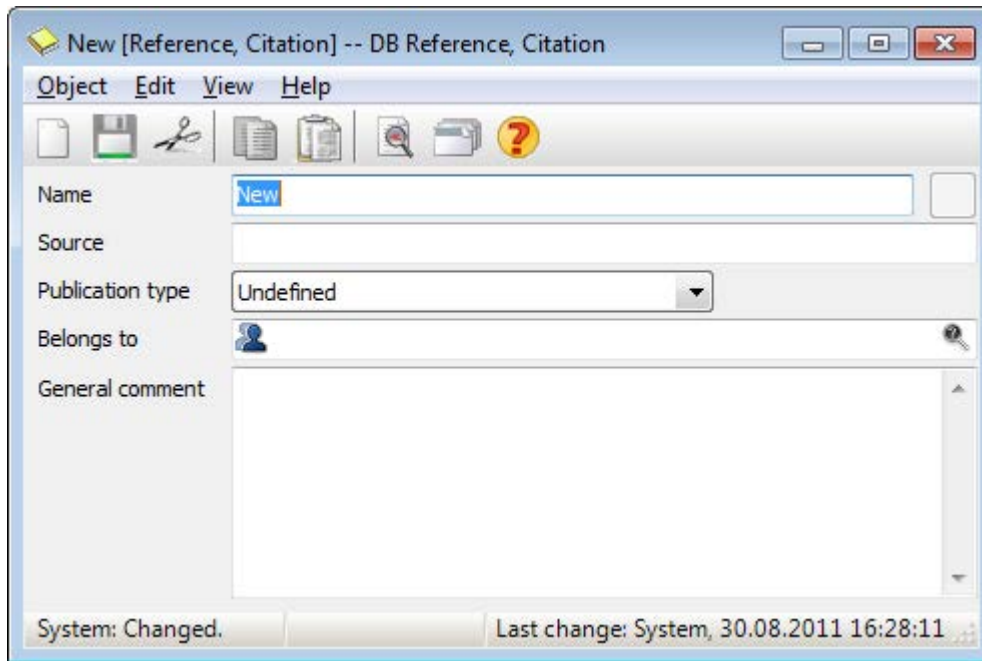


Figure: Reference, Citation window

A GaBi contact consists of the following:

Name	Full name of the Reference, max. 100 characters
Source citation	Short citation of the source
Contact address	The address of the contact may be entered
Publication type	drop down menu specifying if the reference refers to an article, questionnaire, database...
Belongs to	Reference can be linked to a user or contact
General comment	Comment on the documentation

Command buttons : (From left to right)

New	Opens an empty form to create a new quantity
Save	Saves changes of the current quantity in the database.
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard to the active field.
GaBi DB Manager	Switches to the GaBi DB Manager window.
List of windows.	Displays a selection of currently opened GaBi windows
Help	Opens the online Help for the current window.

Documentation	Displays a list of external documentation for the current user.

Menu commands:

Object	Commands for managing the current user.
New	Opens an empty window to create a new user.
Restore	Reverses changes made to the current user.
Save	Saves changes of the current user in the database.
Copy all	Copies all of the information of the current user to the clipboard.
Insert total	Pastes the contents of the clipboard as a complete user.
Close	Closes the current window after the security prompt (in case of changes).
Edit	Commands for editing the current object.
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard to the active field.
Delete	Deletes selected content
View	Commands for the user screen layout.
DB Manager	Switches to the GaBi DB Manager.
Location of storage	Displays the type of the current user within the GaBi DB Manager.
Windows	Displays a list of currently open windows.
Load settings	Restores user default window settings.
Save settings	Saves current window settings as user default.
Help	Commands for displaying Help.
GaBi Help	Opens the online Help for the current window.
Index	Opens the Help index.
Info	Displays program information.

8.17 The Search Window

In order to simplify your dealings with, and navigation of, large databases, the GaBi system contains a search tool for the DB manager. The structure and function of the GaBi search tool are similar to the management tool from MicrosoftTM, Windows Explorer. With the search tool, you can search GaBi object basics of a special type (also with sub-types).

With the GaBi object search, you can search either according to the order of symbols at any position of the GaBi object (complete text search) or according to the beginning of the object name (name/place). You can also make entries for the alteration dates of an object to be searched for. The use of objects can also be checked with the object search.

The GaBi object search consists of:

menu bar, object specification field, various command buttons, object display, status line.

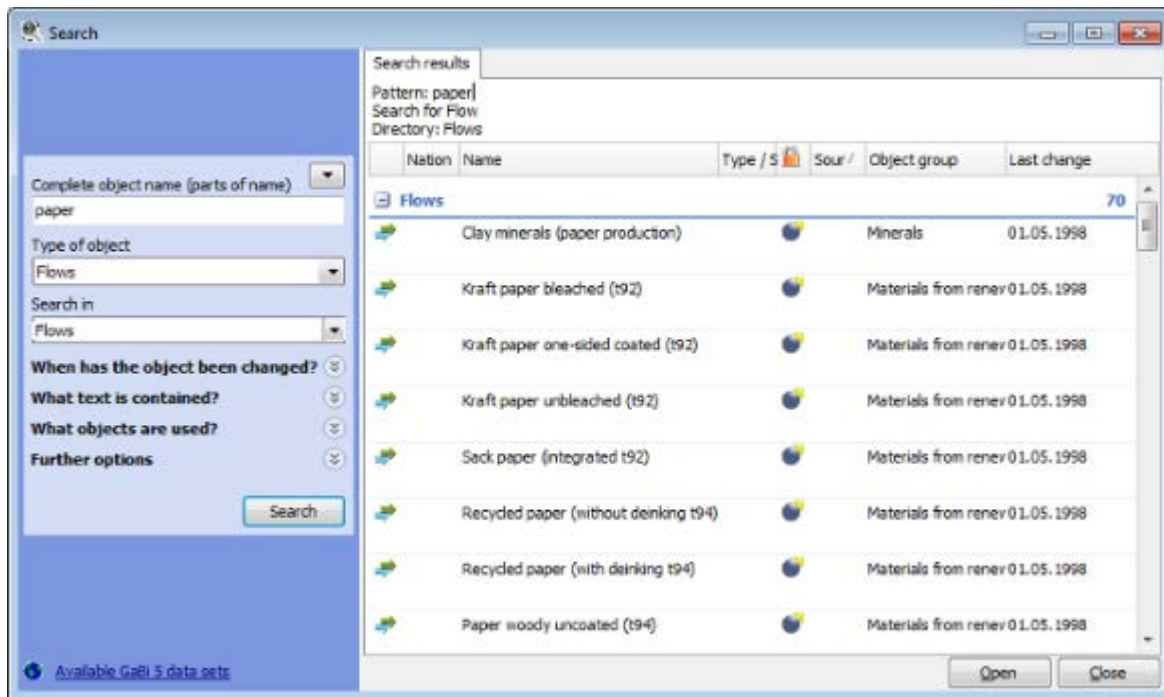


Figure: Search window

Search window tabs:

Complete search	A full text search is done only within the object folder that is selected in the DB Manager (this means plans and processes will not be listed, if the flow folder is marked in the DB Manager)
Name/Place	In this tab you can define special search locations. This is useful if different object types should be searched e.g. to compare a process with a plan.
Modification date	Allows a search according to the modification date
Usage	To use this search function an object has to be searched and marked in the search list. Then a new search in the "Usage" tab can be started. This lists all objects of the database which use or refer to the previously marked object.

Note: All search specification in the tabs are additive. This means that search criteria from the name fields in the "Complete Search" tab and in the "Name/Place" tab and specification in the "Modification date" tab are combined.

Command buttons : (from top to bottom)

Start	Starts a search for the reference objects
Break	Stops a running search.
New search	Starts a search for the search objects, firstly, the list of already found objects is deleted.
Cancel	If the object search is used when pasting an object to the data field, then the paste maneuver with this command field can be interrupted.
Open	Opens the selected objects. If the object search is used when pasting an object to the data field, then the selected objects are accepted.

Menu commands :

Object	Commands for managing the GaBi databases.
Open	Opens an object window for each object selected in the object view.
Delete	Deletes the object selected in the object view after checking to be sure.
Export	Exports data in the specified export format.
Close	Closes the window for the GaBi object search.
Edit	Commands for working on the current database.
Cut	Moves the current object selection to the clipboard.
Copy	Copies the current object selection to the clipboard.
Paste	Pastes as a new object the contents of the clipboard, after checking the type, to the object type selection.
Replace objects	Allows the combining of multiple objects into one object.
Parameter explorer	Opens the window of the GaBi Parameter Explorer with the currently selected process plan (only process plans).
Balance calculation	Calculates a balance of the selected objects.
Extras	Additional commands of the GaBi system.
Duplicate search	Searches for duplicates of any object type (the same name (+optional "(copy)" and saving area).
Broken flows	Searches for plans that possess interrupted flows.
Negative flows	Searches for processes and plans that possess inputs or outputs with a negative quantity.

Incomplete plans	Searches for plans whose basic equation system is under-determined. (Remedy: insert flow connection or specification)
View	Commands for designing the screen surface.
Location of storage	Displays the object in the DB Manger
Windows	Indicates the options of the currently open GaBi window.
Details	Activates the display of object documentation details in the search list.
Help	Commands for displaying help.
GaBi help	Opens the online help for the current window.
Index	Opens the help index.
Info	Displays program information.

Menu right mouse button:

Open	Opens an object window for each object selected in the object view.
Location of storage	Displays the object in the DB Manager
Calculate balance	Calculates the balance of the selected objects.
Copy	Copies the current object selection to the clipboard.
Paste	Pastes as a new object the contents of the clipboard, after checking the type, to the object type selection.
Delete	Deletes the object selected in the object view after checking to be sure.

Drag & Drop:

The search window supports drag & drop. With the drag & drop function you can move objects on a plan or into an object window. You can also change the location of storage of a searched object by dragging it into the appropriate folder in the DB manager.

8.18 Scenarios and Parameter Explorer

GaBi allows you to define scenarios for any object. A scenario accounts for the parameters and allocation settings of the object itself as well as its sub-objects (e.g., sub-plans). The scenarios assigned to an object can be administered in the parameter explorer. The parameter explorer enables the interdependency of parameters to be identified across various plan hierarchies without new scenarios having to be defined. Moreover parameter values can be set and saved in the database.

The scenarios assigned to an object can be viewed and edited in the "Scenario" tab of the Parameter Explorer. The current settings and the various scenario groups and subsets can be seen here.

IMPORTANT: When "DB Object Settings" (situated directly below the tabs) is clicked in the left frame, the right frame shows the parameters values that are currently set in each of the object instances in the plan hierarchy. Parameter values can not be changed here.

Indeed, any changes made to the parameter values via the parameter explorer will not change the settings of the parameters in the object instances unless actively done so by (e.g., by clicking on a scenario with the right-mouse button and choosing "Transfer to DB object settings".) **You can check this at anytime by looking in "DB Object Settings".**

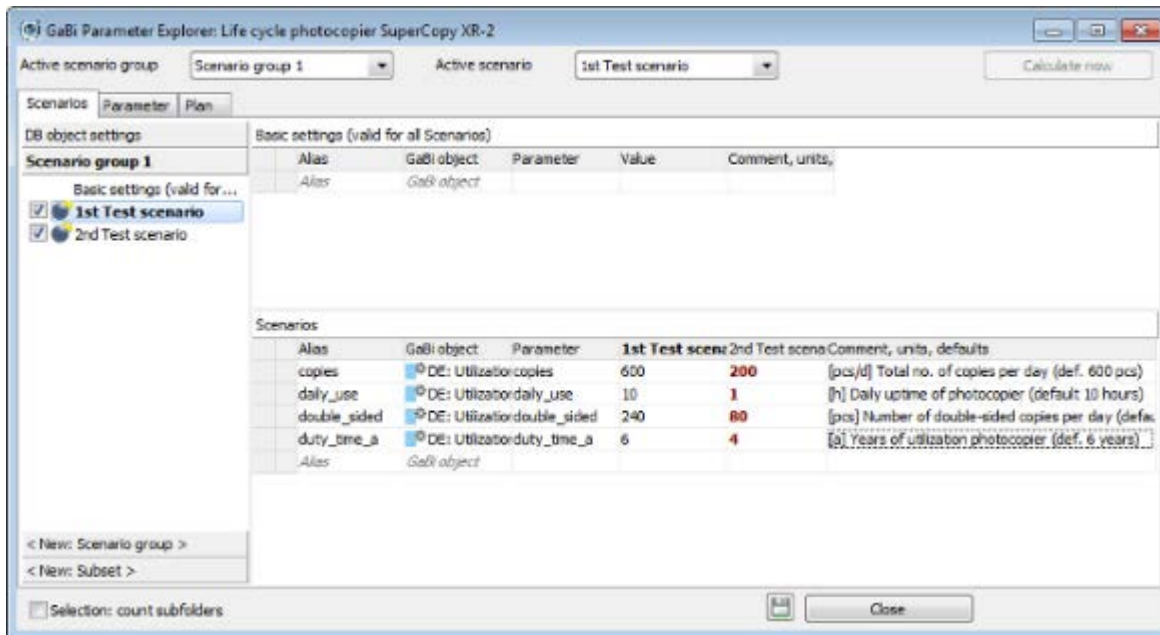


Figure: The GaBi parameter explorer - Scenario tab

A scenario group consists of scenarios and basic settings. Basic settings are parameter values that hold for all scenarios. In both the basic settings frame and the scenario frame you can select parameters from your GaBi model and subsets, rename them and set up groupings.

To create a grouping, e.g., for "Transportation", enter the name of the group in the "Alias/Groupings" column and leave the cell to the left of it (in the "GaBi Object" column) empty. A grouping name is automatically given bold font print. You can nest groupings within other groupings by entering a sub-grouping title and clicking on the arrowhead that points to the right to move it a level lower.

To select an input parameter, click in the cell in the "GaBi Object" column and press the button with '...'. You can now select a GaBi Object from your model which contains the parameters you want to access. When you click in the "Parameter" cell to the right, you can select from all the free parameters in that GaBi Object from a drop-down menu. The name of this parameter will appear automatically in the "Alias/Groupings" column. Where necessary, you can overwrite this to give the parameter a new name. You can also enter comments in the "Comment" column.

Comments can also be entered for groupings.

By selecting the row and holding down the right-mouse button, single or multiple rows can be moved up or down. This can also be achieved via the right-mouse menu. The right-mouse menu also has a function for setting a range of values and for entering a slider to move easily between parameter values (integers only). At the left end of the row, there are arrows with which you can change the grouping level of an entry.

Subsets are very similar to scenario groups. The only difference is that they do not have any basic settings. Subsets provide a way of summarizing settings, which can then be accessed from a scenario group via a drop-down menu. For example, in a subset called "Country settings", various scenarios for "France", "Germany" and "UK" could be defined which each contain multiple parameters (e.g., regarding energy supply or transport distance). Back in the scenario groups, a subset can be selected as the GaBi Object and the "Country settings" from the "Parameter" cell and the different country scenarios can be selected for each value from a drop-down menu ("France", "Germany" or "England") in the parameter value cell.

In the left frame, scenarios can be selected with a right-mouse click and duplicated, deleted, activated or saved. Via the right-mouse menu it is also possible to transfer a scenarios settings to the DB object settings (the object instances) in your model. (Please note that transferring a scenario to the DB object settings will affect all objects within the parameter hierarchy that are using these parameters.)

Clicking a second time on a selected scenario will allow you to rename it.

The parameter values and plans shown in the "Parameter" and "Plan" tabs are valid for the currently activated scenario (Note: It may be necessary for you to press the button "Calculate Now" to update the plan view). A scenario can be activated in the left frame with a right mouse right click or via the drop-down menu at the top of the parameter explorer.

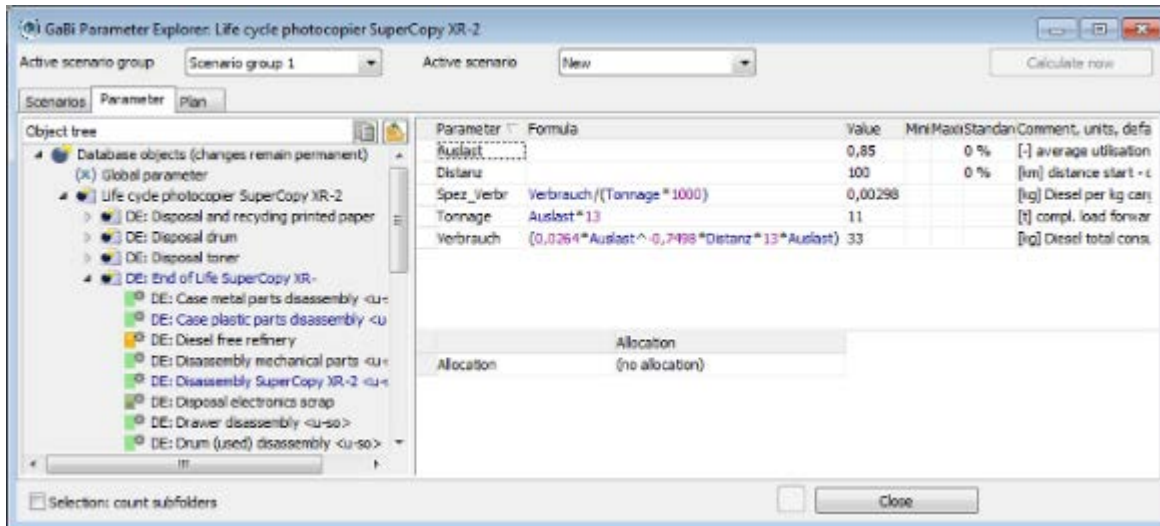


Figure: The GaBi parameter explorer - Parameter tab

Under the parameter tab, the object tree in the left frame shows the hierarchy of the selected plan and the global parameters. In the right frame, the selected objects' parameters are shown.

When you change a parameter value they will appear in bold font, indicating that the value has not yet been entered into the model. This enables the entry of multiple parameter values before the model re-calculation. This can be advantageous if the re-calculation time is extensive. The model re-calculation can be started by pressing the "Calculate now" button.

Under the plan tab, the object tree in the left frame shows the hierarchy of the selected plan and the global parameters. In the right frame, the plan of the selected objects is shown. It is not possible to make changes to the plan from this tab of the parameter explorer.

When the parameter explorer window is closed an automatic query will appear asking if you would like to save the changes (if not already done actively). Only the changes to the scenarios will be saved; the scenario settings will not be transferred to the DB object settings (i.e., the object instances).

The parameter explorer can also be called up from the DB Manager or from the balance window. In the latter case, changes to the parameter values are only effective for the calculation of the current balance, these settings can not be saved. When calling up the parameter explorer from the GaBi Analyst, the changes to the parameter values are only relevant for that scenario.

You can show the results of the scenarios in the balance table by opening the parameter explorer and activating one of the scenarios (e.g., via the drop-down menus at the top of the window).

Command buttons: (from left to right)

Active scenario group	Activate a scenario group
Active scenario	Activate a scenario
Calculate now	Recalculates a scenario based on newly entered parameter values
Copy (object tree)	Copies the object tree as text onto the clipboard
Folder up (object tree)	Moves the currently selected object one level higher in the object tree
View	For submenu features see "Object Type: Plan"
Copy all	Copies the current plan view onto the clipboard as a Windows-Metafile.
Save as process	Saves the selected process instance or plan as a process, retaining the current parameter settings
Selection: count subfolders	When ticked, it displays the number of subfolders that are currently selected
Save	Saves the current parameter settings in the database, in the current balance object and in the current scenario
Close	Closes the Parameter Explorer

Right mouse button menu (Scenario groups):

Activate	Activates the selected the scenario group
Rename	Allows a scenario group to be renamed
Delete	Deletes the selected scenario group

Right mouse button menu (Scenarios):

Activate scenario	Activates a scenario
Add scenario	Adds a new scenario to the scenario group
Duplicate scenario	Makes a copy of the selected scenario group
Rename scenario	Allows a scenario to be renamed
Delete scenario	Deletes the selected scenario
Move to top	Moves the selected scenario to the top of the scenario list
Move up	Moves the selected scenario one position lower in the list
Move down	Moves the selected scenario one position higher in the list
Move to bottom	Moves the selected scenario to the bottom of the scenario list
Transfer to DB object settings	Transfers the parameter value settings for the selected scenario to the respective GaBi object instances in the model (plan hierarchy)

Right mouse button menu (Parameter):

Duplicate	Makes a copy of the selected row
Slider	Enters a slider in the parameter value cell
Range of values	Enables you to set an upper and lower threshold for the parameter values that can be entered. This can be used in combination with the 'Slider' (integers only).
Move to top	Moves the selected row to the top of the table
Move up	Moves the selected row one position lower
Move down	Moves the selected scenario to the bottom
Move to bottom	Moves the selected row to the bottom of the table
Delete	Deletes the selected row

8.19 Mathematical Functions

The GaBi system can handle mathematical functions inside the GaBi processes and the process plans. Besides the basic calculation types „+“, „-“, „*“, „/“ and „^“ the system is already familiar with the following functions:

Sin(X)	The function Sin calculates the sine of the argument. X is an expression of the type real. Sin provides the sine of the angle X in the radian measure.
Cos(X)	The function Cos calculates the cosine of the angle X in the radian measure.
Tan(X)	The function Tan calculates the tangent of X . { $\text{Tan}(X) = \text{Sin}(X) / \text{Cos}(X)$ }
Sinh(X)	The function Sinh calculates the hyperbolic sine of X .
Cosh(X)	The function Cosh calculates the hyperbolic cosine of X .
Tanh(X)	The function Tanh calculates the hyperbolic tangent of X .
Cotan(X)	The function Cotan calculates the cotangents of X . { $1 / \text{Tan}(X)$, $X \neq 0$ }
Arcsin(X)	The function ArcSin calculates the inverse value (arc sine) of the sine of X . For the parameter X , a value between -1 and $+1$ must be used. The return value lies in the range $[-\pi/2 \dots \pi/2]$ and describes an angle size in the radian measure. { ARGUMENT: $ X \leq 1$ RESULT: $[-\pi/2 \dots \pi/2]$ rad }
Arccos(X)	The function ArcCos calculates the inverse value (arc cosine) of the cosine of X . For the parameter X a value between -1 and $+1$ must be used. The return value lies in the range $[0 \dots \pi]$ and describes an angle size in the radian measure. { ARGUMENT: $ X \leq 1$ RESULT: $[0 \dots \pi]$ rad }
Arctan(X)	The function ArcTan calculates the arc tangent arising from the argument. Other trigonometric functions can be calculated with the help of sine, cosine

	and arc tangent as in the following expressions: $\text{Tan}(x) = \text{Sin}(x) / \text{Cos}(x)$ $\text{ArcSin}(x) = \text{ArcTan}(x / \sqrt{1 - \text{sqr}(x)})$ $\text{ArcCos}(x) = \text{ArcTan}(\sqrt{1 - \text{sqr}(x)} / x)$
Arcsinh(X)	The function ArcSinh calculates the area sine (inverse value of the hyperbolic sine) of X.
Arccosh(X)	The function ArcCosh calculates the area cosine (inverse value of the hyperbolic cosine) of X. { ARGUMENT: $X \geq 1$ }
Arctanh(X)	The function ArcTanh calculates the area tangent (inverse value of the hyperbolic tangent) of X. { ARGUMENT: $X \leq 1$ }
Rad(X)	The function Rad converts an angle size present in the angular measure into a radian measure. Thus 360 degrees corresponds to a complete angle, which in turn has a radian measure of 2 Pi (rad) as the angle at the centre of a circle. { rad := degree * Pi / 180 }

Deg(X)	The function Deg converts an angle size present in the radian measure into an angular measure. { Degree := rad * 180 / Pi }
Ceil(X)	The function Ceil rounds up the smallest whole number value, which is greater than or equal to the specified value X. Example: Ceil(-2.8) = -2 Ceil(2.8) = 3 Ceil(-1.0) = -1 { Ceil: Smallest whole number $\geq X$, $X < \text{MaxInt}$ }
Floor(X)	The function Floor rounds down to the largest whole number value, which is smaller than or equal to the specified value X. Example: Floor(-2.8) = -3 Floor(2.8) = 2 Floor(-1.0) = -1 { Floor: Largest whole number $\leq X$, $X < \text{MaxInt}$ }
Round(X;Mag)	The function Round rounds to the nearest whole number value in the order of magnitude. Round(-2.8; 1) = -3 Round(2.8; 1) = 3 Round(2.4; 1) = 2 Round(1153; 100) = 1200
Abs(X)	The function Abs returns the absolute value of the argument.
Exp(X)	The function Exp calculates the power of X. The return value is e to the power of X, with e being the base of the natural logarithm. Tip: $X^Y = \text{Exp}(Y * \text{LN}(X))$

LN(X)	The function Ln calculates the natural logarithm ($\text{Ln}(e) = 1$) of the expression of the type real <i>X</i> .
LogN(N;X)	The function LogN calculates the natural logarithm of <i>X</i> to the base <i>N</i> .
Int(X)	The function Int returns the integer part of the argument <i>X</i> . <i>X</i> is an expression of the type real. The result is the integer part of <i>X</i> ; which means, <i>X</i> rounded to zero.
Sqr(X)	The function Sqr calculates the square of the argument <i>X</i> . <i>X</i> is a floating-point expression. The result, of the same type as <i>X</i> , is the square of <i>X</i> , or X^2 .
Sqrt(X)	The function Sqrt calculates the square root of the argument <i>X</i> . <i>X</i> is a floating-point expression. The result is the square root of <i>X</i> .
Max (X1; X2; X3; ...; XN)	The function Max provides as the result the largest number prefixed with an algebraic sign from the set of all values.
Min (X1; X2; X3; ...; XN)	The function Min provides as the result the smallest number prefixed with an algebraic sign from the set of all values.
DoubleDecliningBalance (Cost; Salvage; Life; Period)	The function DoubleDecliningBalance calculates the current amount of depreciation for a credit item for a specific period. The calculation proceeds according to the method of geometrically declining depreciation. A purchase price <i>Cost</i> , a residual value <i>Salvage</i> , a useful life expectancy <i>Life</i> and a depreciation period <i>Period</i> are assigned as parameters in the calculation.
FutureValue1 (Rate; NPeriods; Payment; PresentValue)	The function FutureValue1 calculates the future value of an investment <i>PresentValue</i> on the basis of a number <i>NPeriods</i> of regular, constant payments <i>Payment</i> and a constant interest rate <i>Rate</i> . In contrast to the function <i>FutureValue2</i> , the payments are made at the end of a period.

FutureValue2 (Rate; NPeriods; Payment; PresentValue)	The function FutureValue2 provides as the result the future value of an investment <i>PresentValue</i> on the basis of a number <i>NPeriods</i> of regular, constant payments <i>Payment</i> and a constant interest rate <i>Rate</i> . In contrast to the function <i>FutureValue1</i> , the payments are made at the beginning of a period.
InterestPayment1 (Rate; Period; NPeriods; PresentValue; FutureValue)	The function InterestPayment1 calculates the portion of interest on a loan repayment or the savings installment payment for a given period <i>Period</i> . A loan (or a target savings amount) with a current value <i>PresentValue</i> is redeemed (or saved up) at a constant interest rate <i>Rate</i> on the basis of regular, constant payments after the elapse of <i>Nperiods</i> . The parameter <i>FutureValue</i> indicates (for savings) the future value (in the case of a loan redemption it must be 0). In contrast to the function <i>InterestPayment2</i> , the payments are made at the end of a period.
InterestPayment2 (Rate; Period; NPeriods; PresentValue; FutureValue)	The function InterestPayment2 calculates the proportion of interest on a loan repayment or the savings installment payment for a given period <i>Period</i> . A loan (or an intended savings amount) with a current value <i>PresentValue</i> is redeemed (or saved up) at a constant interest rate <i>Rate</i> on the basis of regular, constant payments after the elapse of <i>Nperiods</i> . The parameter <i>FutureValue</i> indicates (with savings) the future value (in the case of a loan it must be 0). In contrast to the function <i>InterestPayment1</i> , the payments are made at the beginning of a period.
InterestRate1	The function InterestRate1 calculates the necessary interest rate for an investment whose initial value amounts to its <i>PresentValue</i> and who's

(NPeriods; Payment; PresentValue; FutureValue)	finishing value after an elapse of <i>Nperiods</i> of regular, constant payments <i>Payment</i> should have acquired a level <i>FutureValue</i> . If <i>NPeriods</i> describes a number of years, then an annual interest rate results; if <i>NPeriods</i> describes a number of months, then a monthly interest rate results, and so on. In contrast to the function <i>InterestRate2</i> , the payments are made at the end of a period.
InterestRate2 (NPeriods; Payment; PresentValue; FutureValue)	The function InterestRate2 calculates the necessary interest rate for an investment whose initial value amounts to its <i>PresentValue</i> and whose finishing value after an elapse of <i>Nperiods</i> of regular, constant payments <i>Payment</i> should have acquired a level <i>FutureValue</i> . If <i>NPeriods</i> describes a number of years, then an annual interest rate results; if <i>NPeriods</i> describes a number of months, then a monthly interest rate results, and so on. In contrast to the function <i>InterestRate1</i> , the payments are made at the beginning of a period.
NumberOfPeriods1 (Rate; Payment; PresentValue; FutureValue)	The function NumberOfPeriods1 calculates the necessary period (no. of periods) for an investment whose initial value amounts to its <i>PresentValue</i> and whose finishing value, on the basis of regular, constant payments <i>Payment</i> and a (related to one period) interest rate <i>Rate</i> , should have acquired a level <i>FutureValue</i> . In contrast to the function <i>NumberOfPeriods2</i> , the payments are made at the end of a period.
NumberOfPeriods2 (Rate; Payment; PresentValue; FutureValue)	The function NumberOfPeriods2 calculates the necessary period (no. of periods) for an investment whose initial value amounts to its <i>PresentValue</i> and whose ending value, on the basis of regular, constant payments <i>Payment</i> and a (related to one period) interest rate <i>Rate</i> , should have acquired a level <i>FutureValue</i> . In contrast to the function <i>NumberOfPeriods1</i> , the payments are made at the beginning of a period.

Payment1 (Rate; NPeriods; PresentValue; FutureValue)	The function Payment1 calculates the complete interest-bearing payment for a loan (or an investment) <i>PresentValue</i> on the basis of regular, constant payments and a (related to one period) constant interest rate <i>Rate</i> for a period <i>NPeriods</i> . For the calculation it is assumed that the interest will be paid in arrears at the end of a period. <i>FutureValue</i> describes the value that the investment will represent at a specific time in the future. In contrast to the function <i>Payment2</i> , the payments are made at the end of a period.
Payment2 (Rate; NPeriods; PresentValue; FutureValue)	The function Payment2 calculates the complete interest-bearing payment for a loan (or an investment) <i>PresentValue</i> on the basis of regular, constant payments and a (related to one period) constant interest rate <i>Rate</i> for a period of <i>NPeriods</i> . For the calculation it is assumed that the interest will be paid in arrears at the end of a period. <i>FutureValue</i> describes the value that the investment will represent at a specific time in the future. In contrast to the function <i>Payment1</i> , the payments are made at the beginning of a period.
PeriodPayment1 (Rate; Period; NPeriods; PresentValue; FutureValue)	The function PeriodPayment1 provides as the result for the respectively specified period <i>Period</i> the redemption share (or savings share) for a regular loan repayment (or saving installment). The function <i>InterestPayment</i> returns the proportion of interest for such payment. A loan (or target savings amount) with a current value <i>PresentValue</i> is redeemed (or saved up) at a constant interest rate <i>Rate</i> on the basis of regular, constant payments after a period of <i>Nperiods</i> . The parameter <i>FutureValue</i> (for savings) returns the future value (in the case of a loan it must be 0). In contrast to the function <i>PeriodPayment2</i> , the payments are made at the end of a period.
PeriodPayment2 (Rate; Period; NPeriods; PresentValue; FutureValue)	The function PeriodPayment2 returns as the result for the respectively specified period <i>Period</i> the redemption share (or savings share) for a regular loan repayment (or saving installment). The function <i>InterestPayment</i> returns the proportion of interest for such payment. A loan (or target savings amount) with a current value <i>PresentValue</i> is redeemed (or saved up) at a constant

	interest rate <i>Rate</i> on basis of regular, constant payments after a period of <i>Nperiods</i> . The parameter <i>FutureValue</i> (for savings) returns the future value (in the case of a loan it must be 0). In contrast to the function <i>PeriodPayment1</i> , the payments are made at the beginning of a period.
SLNDepreciation (Cost; Salvage; Life)	The function SLNDepreciation calculates the value of the linear depreciation for a credit item for a specific time period. The function divides the difference between the purchase price <i>Cost</i> and the residual value <i>Salvage</i> by the years of useful life expectancy <i>Life</i> . To obtain a declining depreciation (with higher amounts of depreciation at the beginning of the useful life), you should use the function <i>SYDDepreciation</i> .
SYDDepreciation (Cost; Salvage; Life; Period)	The function SYDDepreciation (sum-of-years-digits depreciation) calculates the depreciation value for a credit item for a specific time period according to a declining balance depreciation method. In this way, higher depreciation values are attained for the first years of the useful life. <i>Cost</i> describes the purchase price of the credit item; <i>Salvage</i> describes its residual value at the end of its useful life as represented by <i>Life</i> . The parameter <i>Period</i> indicates the period for which you want to calculate the depreciation value.
F_G_Umrech (Flow; Starting Size; Target Size)	See function <i>F_Q_Convert</i>
F_Q_Convert (Flow; Starting Size; Target Size)	The function F_Q_Convert (alternatively, <i>F_G_Umrech</i>) returns the factor for the conversion of a flow quantity into another flow quantity from the GaBi database. Thus, the function cue <i>F_Q_Convert</i> (,Carbon monoxide [standard emissions into the air], ,mass', ,GWP (global warming potential)') returns a value of 3. For this, flow names and flow quantities are enclosed in quotation marks and, beginning with the first letters, are marked out as far as the corresponding GaBi object can be identified clearly. Otherwise, the function returns the return value of 0.
Wenn (Condition;P1;P2)	See function <i>If</i>
If (Condition;P1;P2)	The function If possesses the value <i>P1</i> if the <i>Condition</i> applies. It possesses the value <i>P2</i> , if <i>Condition</i> <u>does not</u> apply. <i>Condition</i> is of the type (a<b). Conditions can be linked with AND or OR. The following reference operators are permissible: <, <=, =, >=, >, <>.

8.20 The GaBi Analyst

The GaBi Analyst in GaBi has been completely re-developed. With the GaBi Analyst, you can generate with various analyses of a GaBi balance. The following are supported: a scenario analysis, a parameter variation, a sensitivity analysis and a Monte Carlo analysis.

Caution: An analysis with the GaBi Analyst requires a GaBi balance upon which the analysis is based. When deleting a balance, all the analyses belonging to it are also deleted.

Caution: The columns of a balance visible at the moment of a calculation analysis are important! Only the values of visible columns are available to you for the analysis. Balance columns which are folded together at the time of calculation analysis, are not available for the analysis results. Thus, carefully set the visible columns in a balance before starting an analysis calculation. Do not choose more columns than necessary because that raises the file size and saving requirement, and therefore lengthens the calculation time.

Command buttons : (from left to right)

Open	Loads a GaBi Analysis from the data.
Save	Saves a GaBi Analysis from the data.
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard to the currently selected fields.
Documentation	Displays a documentation list for the current analysis.
GaBi-DB Manager	Changes to the GaBi window database manager.
Window list	Indicates the options of the currently open GaBi window.
Help	Opens the online help for the current window.

Menu commands :

File	Commands for managing the current analysis.
Open	Loads a GaBi Analysis from data.
Save	Saves a GaBi Analysis from data.
Save under	Saves a GaBi Analysis in data with a name provided by the user.
Copy all	Copies the current GaBi analysis completely to the clipboard.
Paste completely	Deactivates.
Close	Closes the current window after a certainty query when changes are made.
Edit	Commands for working on the current project.
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard to the active field
View	Commands for designing the screen surface.
DB Manager	Changes to the GaBi DB manager.
Window	Displays a list of the windows open at the moment.
Help	Commands for displaying help.
GaBi help	Opens the online help for the current window.
Index	Opens the help index.

Info	Displays program information.

Menu right mouse button

Work on scenario	Opens the window of the Parameter Explorer for working on a scenario.
Rename scenario	Allows the renaming of a scenario.
Delete scenario	Deletes the selected scenario.
Move the scenario to the left	Moves the selected scenario one position to the left.
Move the scenario to the right	Moves the selected scenario one position to the right.
Insert scenario	Creates a new scenario.
Delete all scenarios	Deletes all present scenarios.
Insert all parameters	Inserts all the parameters of a model forming the basis of a balance into the present scenario.
Delete lines	Deletes the selected lines of a table.
Select all	Selects all the lines and columns of a table.
Copy	Copies the current selection to the clipboard.

8.20.1 Scenario Analysis (ref.)

In a scenario analysis, two or more scenarios are juxtaposed.

8.20.1.1 Sensitivity Analysis: Settings

Choose the parameter values, allocation keys, size settings and weighting settings of the basic scenario as described above. Enter the minimum and maximum values in the table. Set the visible columns of the affiliated balance and start the calculation of the scenarios with the corresponding command button.

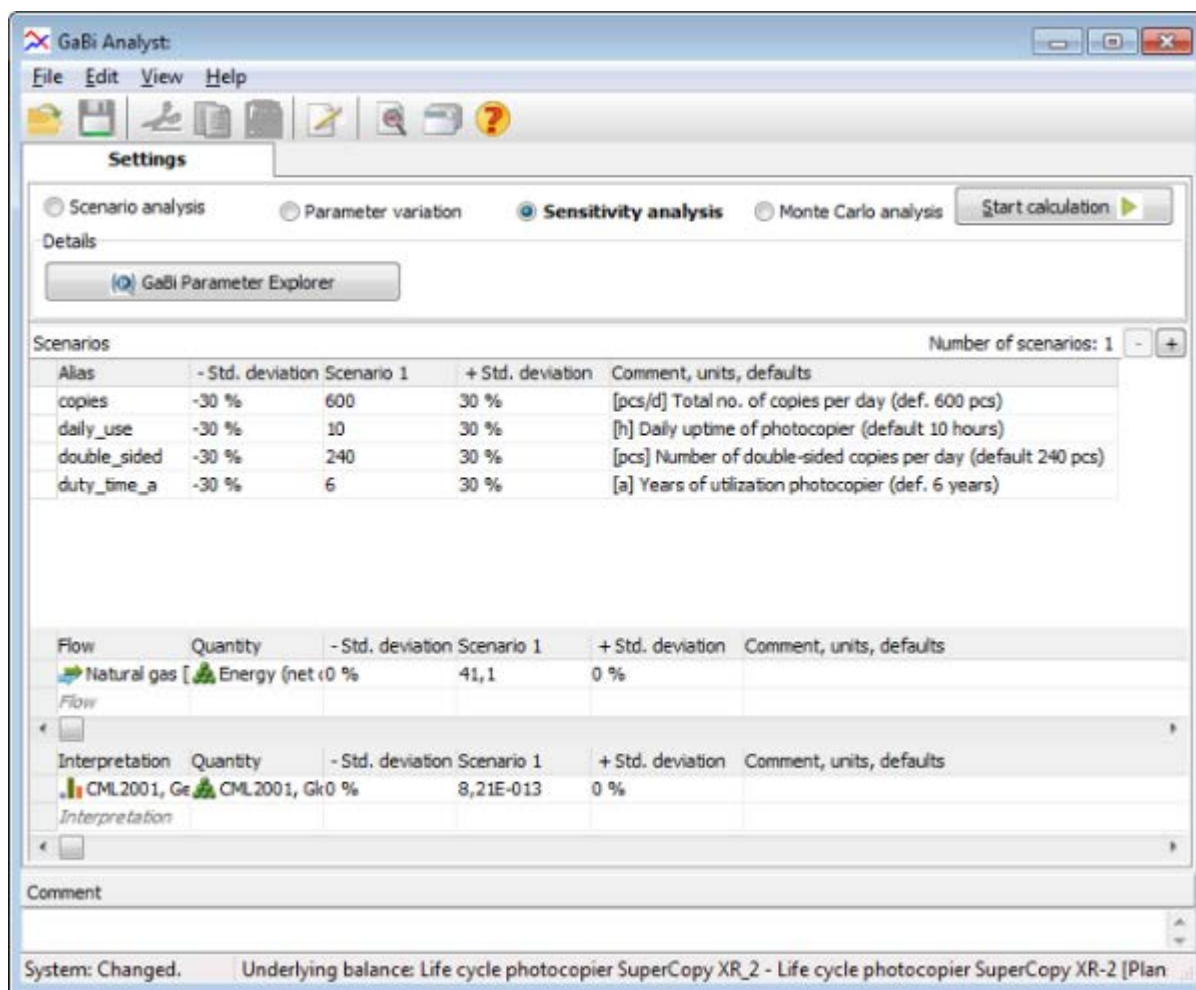


Figure: GaBi Analyst window(sensitivity analysis: settings)

8.20.1.2 Scenario Analysis: Results

The analysis results can consist principally of every table cell of a balance in every conceivable constellation. Balance tables, balance columns, balance lines, size or evaluation, unit or normalization, and also the aggregate level with LCC and LCWE values must be established to specify a result value.

For displaying the results of a scenario analysis, the chart type 'columns' or 'graph' is recommended. If result values are specified completely in the corresponding table, then the affiliated chart elements appear automatically. In the column 'display' of the table 'result values', the display of a special result value in the chart can be switched on or off.

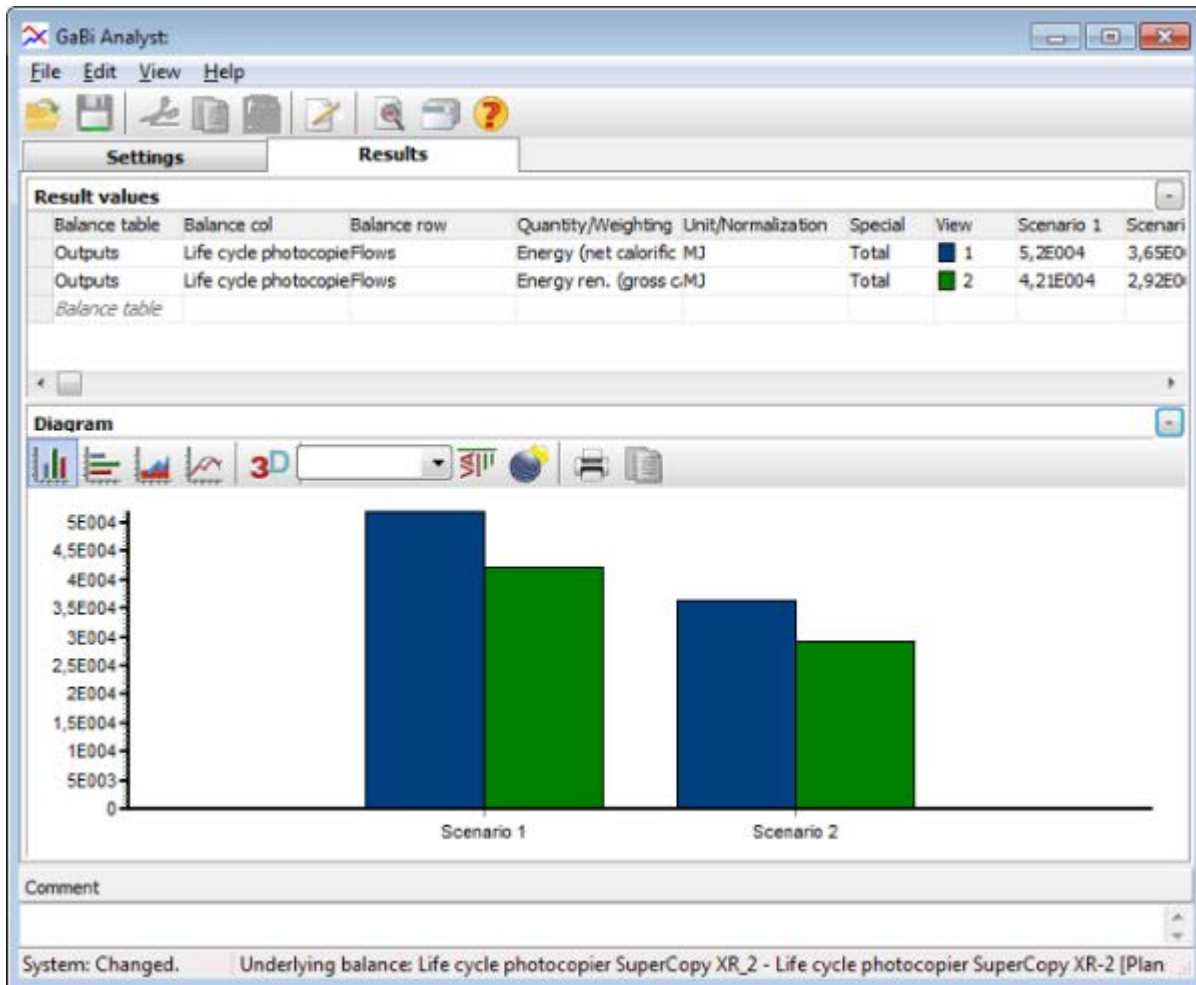


Figure: GaBi Analyst window (scenario analysis: results)

8.20.2 Parameter Variation (ref.)

Any number of parameters in a selectable quantity from equally large steps from a starting value to an intended value can be varied with parameter variations. In the GaBi Analyst, the starting and target values in scenarios are established. More than two scenarios can be entered, the number of intermediary steps refers in this case to the intermediary steps between the two respective scenarios which follow each other.

8.20.2.1 Parameter Variation: Settings

Choose the parameter values, allocation keys, size settings and weighting settings of the scenarios to be understood as corner points, as described above. Insert, when required with the command button 'work on scenario', 'new' and, if needed, additional scenarios, or delete scenarios with the corresponding command button. Choose the number of intermediary steps. Set the visible columns of the affiliated balance and start the calculation of the scenarios with the corresponding command button.

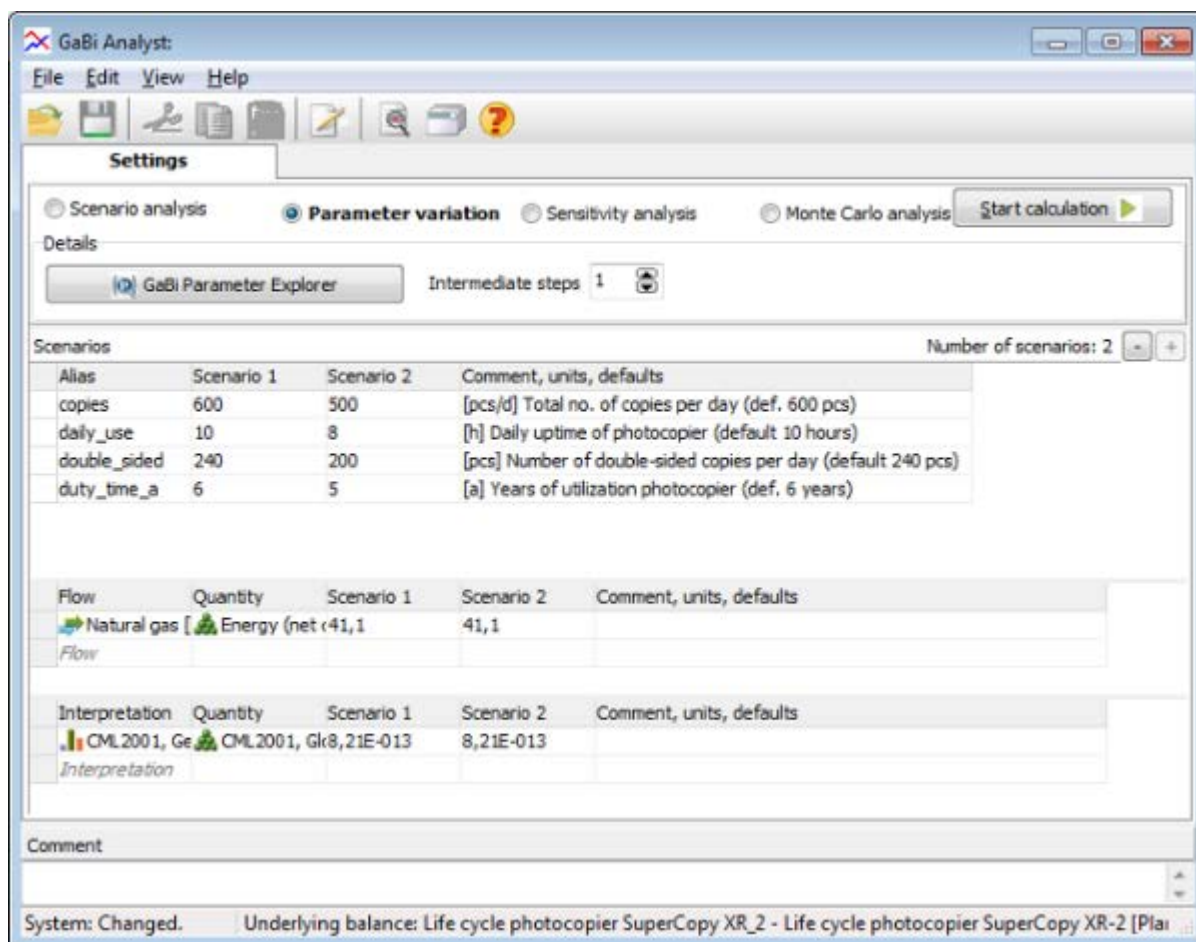


Figure: GaBi Analyst window (parameter variation: settings)

8.20.2.2 Parameter Variation: Results

The analysis results can consist principally of every table cell of a balance in every conceivable constellation. Balance tables, balance columns, balance lines, size or evaluation, unit or normalization, and also the aggregate level with LCC and LCWE values must be established to specify a result value.

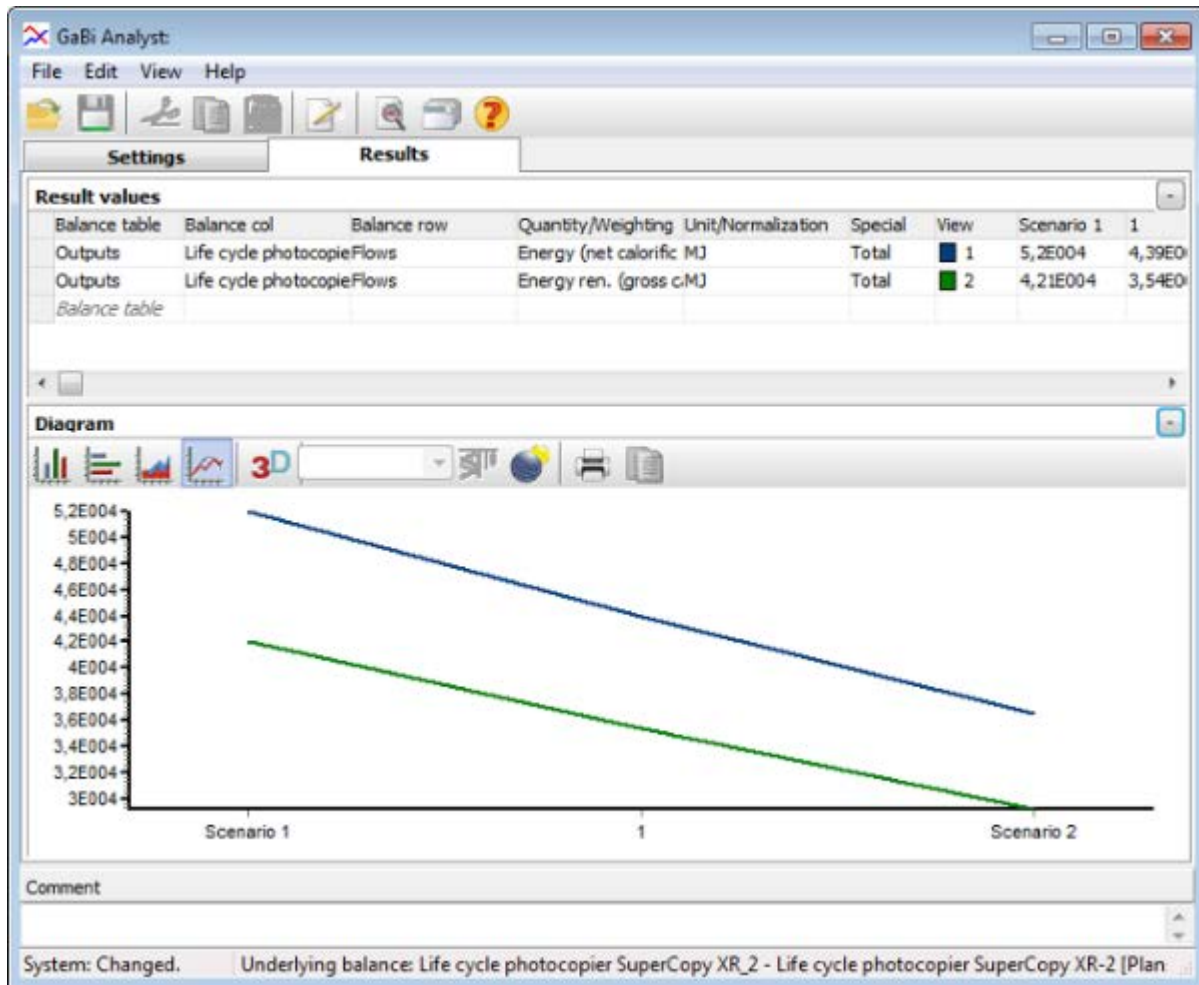


Figure: GaBi Analyst window (parameter variation: results)

For displaying the results of the parameter variation, the chart type 'lines' or 'curves' is recommended. If result values are specified completely in the corresponding table, then the affiliated chart elements appear automatically. In the column 'display' of the table 'result values', the display of a special result value in the chart can be switched on or off.

8.20.3 Sensitivity Analysis (ref.)

In a sensitivity analysis, the sensitivity of result values on the variation of individual model parameters is examined. A basic scenario and minimum as well as maximum value is therefore necessary for each parameter of a model.

8.20.3.1 Sensitivity Analysis: Settings

Choose the parameter values, allocation keys, size settings and weighting settings of the basic scenario as described above. Enter the minimum and maximum values in the table. Set the visible columns of the affiliated balance and start the calculation of the scenarios with the corresponding command button.

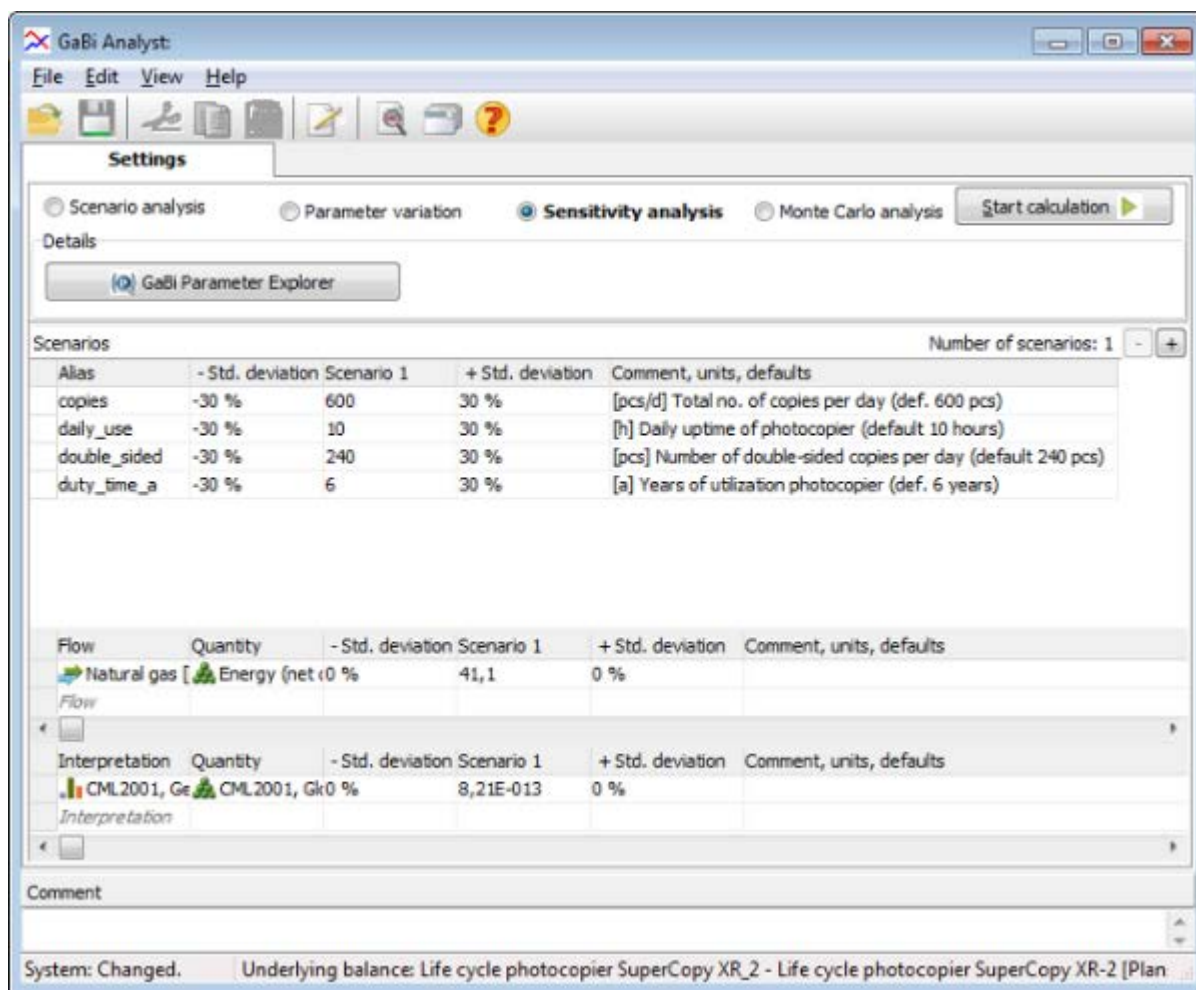


Figure: GaBi Analyst window(sensitivity analysis: settings)

8.20.3.2 Sensitivity Analysis: Results

The analysis results can consist principally of every table cell of a balance in every conceivable constellation. Balance tables, balance columns, balance lines, size or evaluation, unit or normalization, and also the aggregate level with LCC and LCWE values must be established to specify a result value.

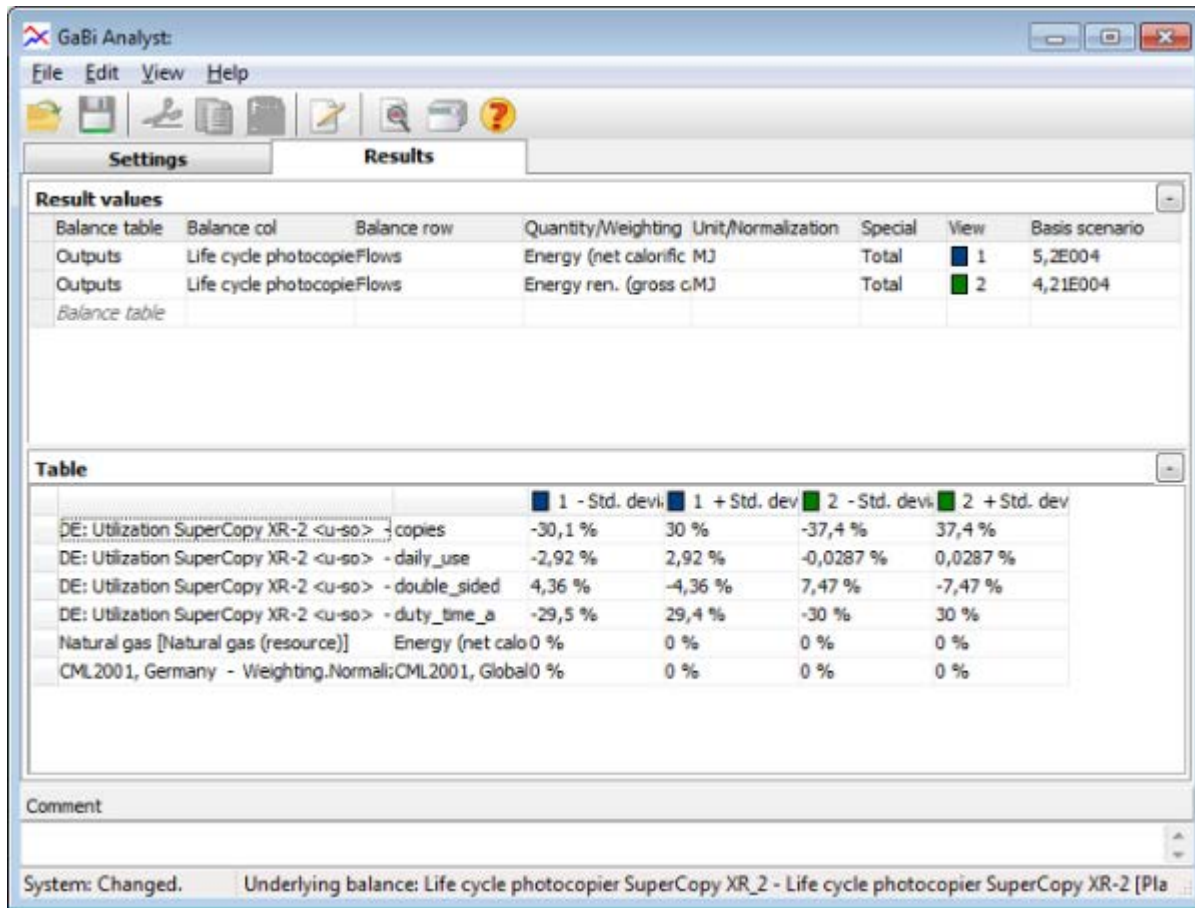


Figure: GaBi Analyst window (sensitivity analysis: results)

Result values of the sensitivity analysis are not displayed in chart form. A minimum and maximum value for the fluctuation width of a result value is displayed respectively per altered parameter and specified result value. The calculation forms the base of the 'Ceteris-Paribus-Clause', which means that upon the variation of a parameter all the other parameters are held constant.

If result values are specified completely in the corresponding table, then the affiliated minimum and maximum values in the lower table appear automatically. In the column 'display' of the table 'result values', the display of a special result value in the lower table can be switched on or off.

8.20.4 Monte Carlo Analysis (ref.)

With the Monte Carlo analysis, the errors of a specific allocation for selected parameters of a model are removed and correspondingly the balance results determined. For each parameter of a model, a scenario and minimum as well as maximum value is therefore necessary for the Monte Carlo analysis. Since, with a normal allocation, any large and any small value can emerge (with very limited probability), for which a model under the circumstances would not provide any meaningful results, you can also enter in this case limiting values, which will not be exceeded or fallen short of by the determined random numbers.

8.20.4.1 Monte Carlo Analysis: Settings

Choose the parameter values, allocation keys, size settings and weighting settings of the basic scenario as described above. Enter the minimum and maximum values as well as the upper and lower limiting values in the table. Set the visible columns of the affiliated balance and start the calculation of the scenarios with the corresponding command button.

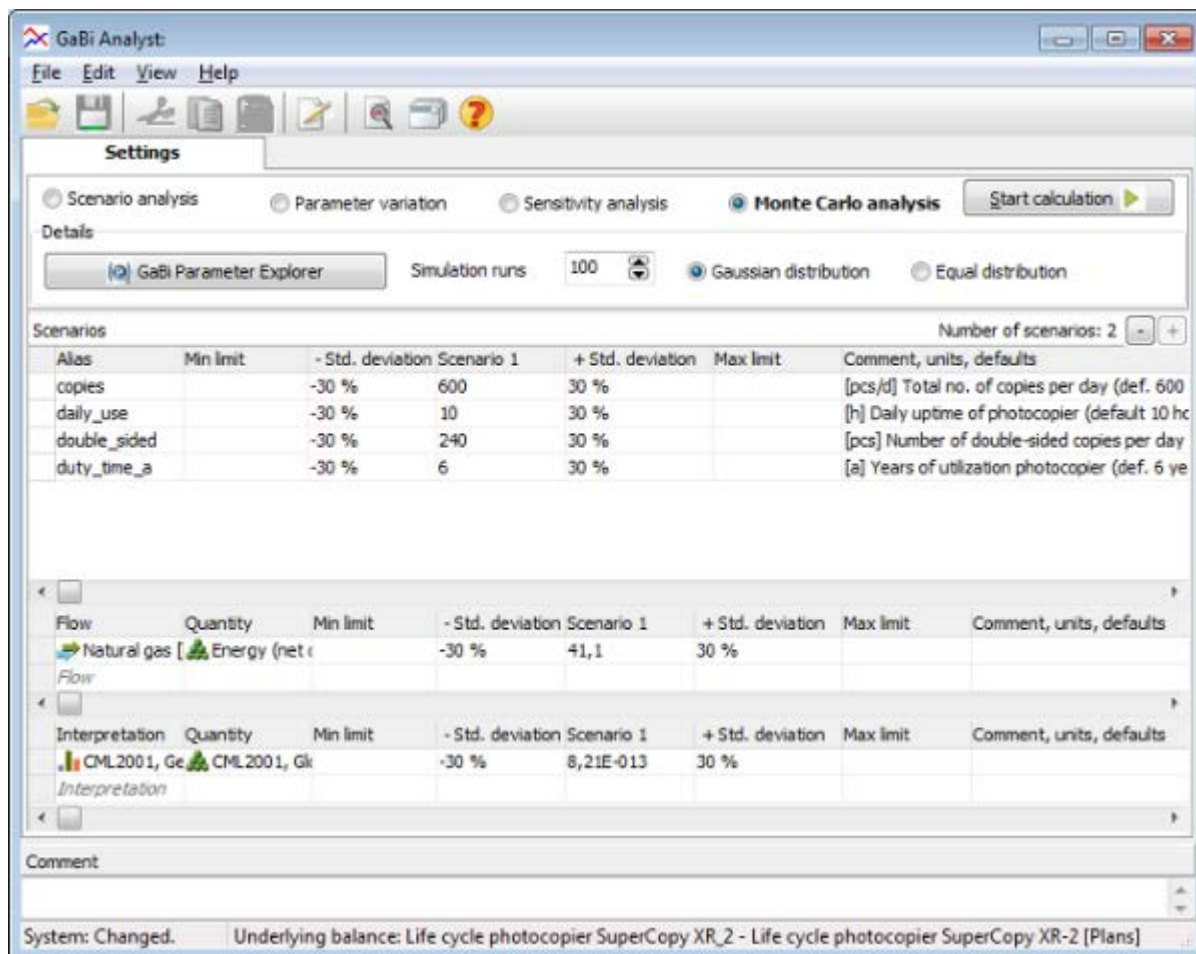


Figure: GaBi Analyst window (Monte Carlo analysis: settings)

8.20.4.2 Monte Carlo Analysis: Results

The analysis results can consist principally of every table cell of a balance in every conceivable constellation. Balance tables, balance columns, balance lines, size or evaluation, unit or normalization, and also the aggregate level with LCC and LCWE values must be established to specify a result value.

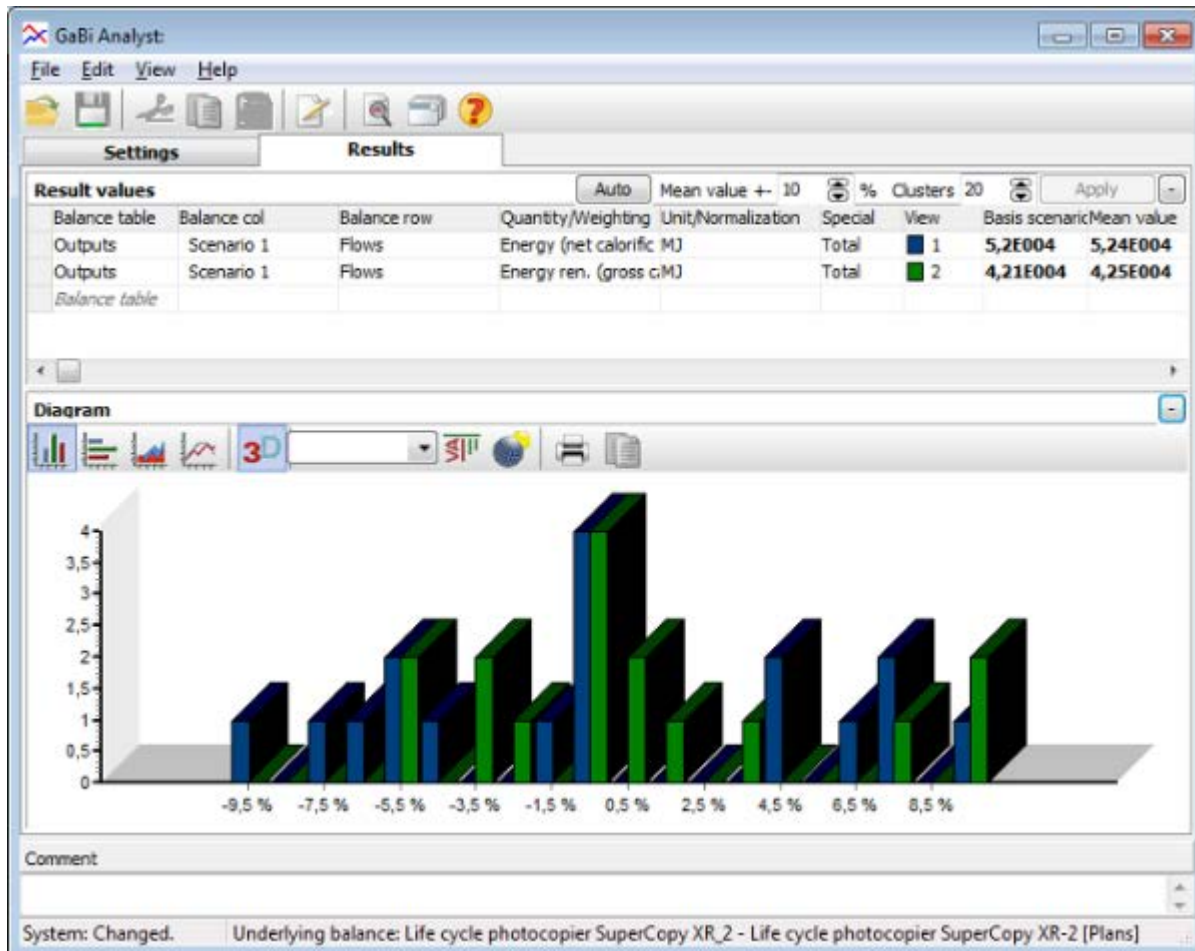


Figure: GaBi Analyst window (Monte Carlo analysis: results)

For displaying the results of the Monte Carlo analysis, the chart type 'lines', 'curves', or 'columns' is recommended. If result values are specified completely in the corresponding table, then the affiliated chart elements appear automatically. In the column 'display' of the table 'result values', the display of a special result value in the chart can be switched on or off.

Since any sector from the allocation of the result values can be displayed in a chart, it is likely that the unexpected allocation curve will be displayed first. Activate the command button 'auto' or set manually the fluctuation width of the expected values and the number of support points (e.g. columns in the chart). The selection of additional result values may require in certain circumstances an adjustment of the fluctuation width.

8.20.5 Analysis Management

The window for analysis management is accessible from the database manager through the corresponding command button or the menu entry 'View.Analysis manager'. All analyses in a GaBi database are displayed in this window. A data name, the affiliated balance, the type of analysis and the calculation status are displayed for each analysis.

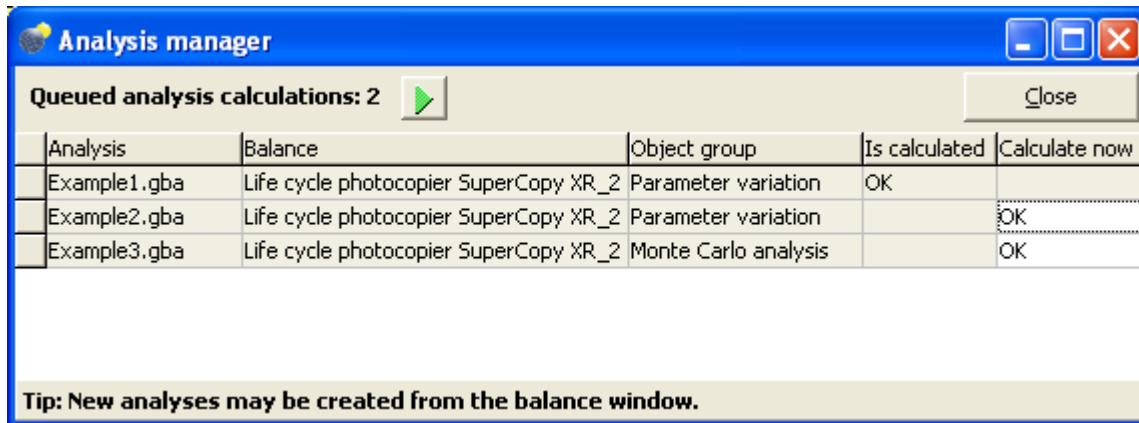


Figure: Analysis management window

Individual analyses from the window for analysis management can be opened with the right mouse button. The balance belonging to an analysis is opened automatically when opening an analysis.

You can activate the automatic calculation of multiple analyses, one after the other, in the window for analysis management. Activate the corresponding option in the table column 'calculate now' and activate afterwards the 'start' command button. The calculation of the analysis can be interrupted with the corresponding command button in the progress window at any time. Calculated data is saved automatically.

9 GaBi Process Recording Tool: Technical Reference

GaBi includes the external process recording tool GaBiPR.exe. Together with information from the "empty" process forms prepared by the GaBi user, this tool sends data to an external location (GaBiPR.exe may be freely distributed to non-GaBi users for the purpose of external data recording). An external data processor or clerk can enter data into the prepared process shell and transmit them back to GaBi users. This data can then also be imported to the GaBi system.

External data acquisition consists of the following steps:

Step 1	Preparing of the processes to be recorded
Step 2	Export of the prepared processes
Step 3	External data recording This help or reference pertains to data recording with the external process recording tool GaBiPR.
Step 4	Importing externally recorded data

9.1 Main Window

The main window of the application opens after "GaBiPR.exe" has been launched. If a file with the extension ".gpr" is found in the same directory as the "GaBiPR.exe" file this file is then automatically loaded.

Flow	Quantity	Amount	Unit	Val	Standard	Origin
Lignite Germany (Lausitz) [Lignite (resource)]	Mass	4.87E-008	kg	0 %	(Keine Angabe)	
Lignite Germany (Rheinisch) [Lignite (resource)]	Mass	0.00078611	kg	0 %	(Keine Angabe)	
Natural gas United Kingdom [Natural gas (re-)]	Mass	0.00040529	kg	0 %	(Keine Angabe)	
Lignite France [Lignite (resource)]	Mass	6.2644E-01	kg	0 %	(Keine Angabe)	
Primary energy from wind power [Renewable Energy ren.]	Energy ren.	2.0732E-00	MJ	0 %	(Keine Angabe)	
Pit gas [Natural gas (resource)]	Mass	0.00019561	kg	0 %	(Keine Angabe)	

Flow	Quantity	Amount	Unit	Val	Standard	Origin
Plutonium (Pu alpha) [Radioactive emissions Activity]	Activity	7.0374E-00	Bq	0 %	(Keine Angabe)	
Radon (Rn222) [Radioactive emissions to air]	Activity	0.62209	Bq	0 %	(Keine Angabe)	
Slag [Hazardous waste]	Mass	0.00048185	kg	0 %	(Keine Angabe)	
Ethane [Group NMVOC to air]	Mass	4.1117E-00	kg	0 %	(Keine Angabe)	
Neutral salts [Inorganic emissions to fresh water]	Mass	9.821E-007	kg	0 %	(Keine Angabe)	
Iodine (I129) [Radioactive emissions to air]	Activity	2.911E-009	Bq	0 %	(Keine Angabe)	

	Inputs	Outputs	Outputs - Inputs
Technical quantities			
Activity [Bq]	0	1393.3	1393.3
Energy [gross calorific value] [MJ]	4.4656	4.1221	-0.34349
Energy [net calorific value] [MJ]	4.0685	7.0556	2.9871
Energy ren. [gross calorific value] [MJ]	3.4677	0.5221	-2.9456
Energy ren. [net calorific value] [MJ]	3.4444	0.5221	-2.9223
Exergy [MJ]	0	3.6	3.6
Mass [t]	110.445	10.453	-9.999617

Figure: Main window of external process recording tool GaBiPR

The following provides an overview over the typical sequence from receiving a GaBi data request to returning a reply:

Step 1	Launch GaBiPR (open a *.gpr file manually if necessary)
Step 2	Fill in all data input fields for all requested GaBi processes Newly create any required flows (materials, forms of energy, etc.) if necessary
Step 3	Save file
Step 4	Send reply mail

9.1.1 Main Window Elements

The main window area is divided into two panes separated by a moveable vertical separator line. The recorded GaBi processes and a GaBi flow hierarchy are on the left. The data input fields of the selected process are on the right.

List of GaBi Processes to be Recorded

Click the GaBi process to be edited. The data input fields display the properties of the selected GaBi process.

Flow Hierarchy with Search Function

Materials, forms of energy, etc. are sorted in the GaBi system with the help of a flow hierarchy. Flow groups sort existing flows hierarchically. Flow groups can be folded and unfolded in the tree-like display. Flows can be dragged and dropped into the input or output list.

To search for a flow enter the first characters of its name into the “Search text” field and click the “Search” button or use the “Search” menu function. The search function then looks for the first instance of the search term in the flow hierarchy starting at the root. Click the button, select the “Search next” menu function, or press the F3 key.

Data Input Fields

The following is a brief description of the process data input fields:

Year	Data survey time
Region (optional)	Location description pertaining to process
Meridian(optional)	Degree of longitude
Latitude (optional)	Degree of latitude
Completeness	Selection field to classify data quality
Synonyms (optional)	Process name synonyms
Comment	Description of boundary conditions, system limits, etc.
Inputs and Outputs	Lists of GaBi flows with amount specifications when selecting a GaBi quantity (e.g. mass, energy, etc.) and a GaBi unit (e.g. kg, g, t, MJ, kJ, etc.). Default deviations with assumed normal distribution, data origin can be recorded as well. Inputs and outputs in the column Material/Waste are classified with the following meaning: X ... Recoverable Materials, * ... Waste, empty ... Other.

Use the flow hierarchy with search function and drag individual flows to the desired list with the mouse when entering flows into the input or output list. Another option is to enter the first characters of the flow name into a cell of the “Flow” column and then press <ENTER>. If only one matching flow name is found, this flow is entered into the input or output list. If several hits are returned, the search function of the flow hierarchy is activated and the first

instance of the search field is highlighted.

9.1.2 Menu Function and Tool Bar

The following is a brief description of the menu functions and the tool bar.

Menu

File	Commands for managing the current file
Open	Opens an existing file.
Save	Saves the current file.
Save As	Saves the current file under a new name.
Email reply	Sends reply mail to person requesting data.
Exit	Closes the GaBi process recording tool.
Edit	Commands for editing the current file
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard to the selected field.
New Process	Creates new process object.
New Flow	Creates new flow object.
Search	Searches for the first instance of a search text in the flow hierarchy.
Find Next	Finds the next instance of a search text in the flow hierarchy.
Options	Program option configuration commands
Language.German	Changes the user interface language to German.
Language.English	Changes the user interface language to English.
Language.Japanese	Changes the user interface language to Japanese. (Only if corresponding font is available.)
Help	Commands to start online help
Table of Contents	Opens the on-line Help table of contents.

Tool Bar

Email Reply	Sends reply mail to person requesting data.
Open	Opens an existing file.
Save	Saves the current file.
Cut	Moves the current selection to the clipboard.
Copy	Copies the current selection to the clipboard.
Paste	Pastes the contents of the clipboard to the selected field.
Contents	Opens the on-line Help table of contents.

Right Mouse Menu (Process List)

New	Creates new object.
Delete	Deletes object (only newly created objects).

Right Mouse Menu (Flow Hierarchy)

New	Creates new object.
Edit	Edits object properties.
Delete	Deletes object (only newly created objects).

9.1.3 Saving Changes and Sending Reply Mail

Click the “Reply” tool or use the corresponding menu function to open a preformatted window of your e-mail program (MAPI interface required, e.g. MS Outlook). Add text to the e-mail as needed and send the message.

If your e-mail program does not feature a MAPI interface or your computer does not have an e-mail program installed you can also send the GPR file (“.gpr” extension) on a diskette or send the file manually using a different computer.

9.2 Window to create new flows

GaBi manages flows (substances, materials) in a tree structure referred to as the *flow group hierarchy*. In the GaBi system, flows carry basic information for different types of balances (e.g. mass, energy, active, economic balances, etc.) and are used by GaBi processes as inputs or outputs.

Figure: Window to create new flows

A GaBi *flow* consists of the following:

Name	Max. 50 characters		
Addition	Max. 30 characters		
CAS code	Max. 15 characters		
Chemical formula	Max. 20 characters		
Basis	Max. 50 characters		
Reference quantity	GaBi quantity usually used to specify amounts for the flow.		
Comment/synonyms	As many characters as desired		
Flow quantities	List		
		Quantity	GaBi <i>quantity</i>
		Conversion factor	$5.0 \cdot 10^{-324} \dots 1.7 \cdot 10^{308}$
		Measuring unit	GaBi <i>unit</i>
		Standard deviation	-65536 % .. 65536 %
		Conversion factor ⁻¹	$5.0 \cdot 10^{-324} \dots 1.7 \cdot 10^{308}$

10 Optional Feature: GaBi DfX

GaBi DfX is the bill of materials (BOM) import tool and product lifecycle management (PLM) integration module for rapid LCA and compliance analysis of complex assemblies to support complete product portfolio reporting. With this tool you can consider different regulations during product design, such as the EU directives for end-of-life vehicles, for electrical and electronic equipment waste, or for the restriction of hazardous substances while simultaneously keeping the environmental performance of your product in focus.

10.1 Parameter import

With the GaBi Parameter import all free parameters of a plan system can be imported at once.

1. Select the top plan of a plan system in the database manager.
2. Select "Database", "Import", "Parameter import ...".

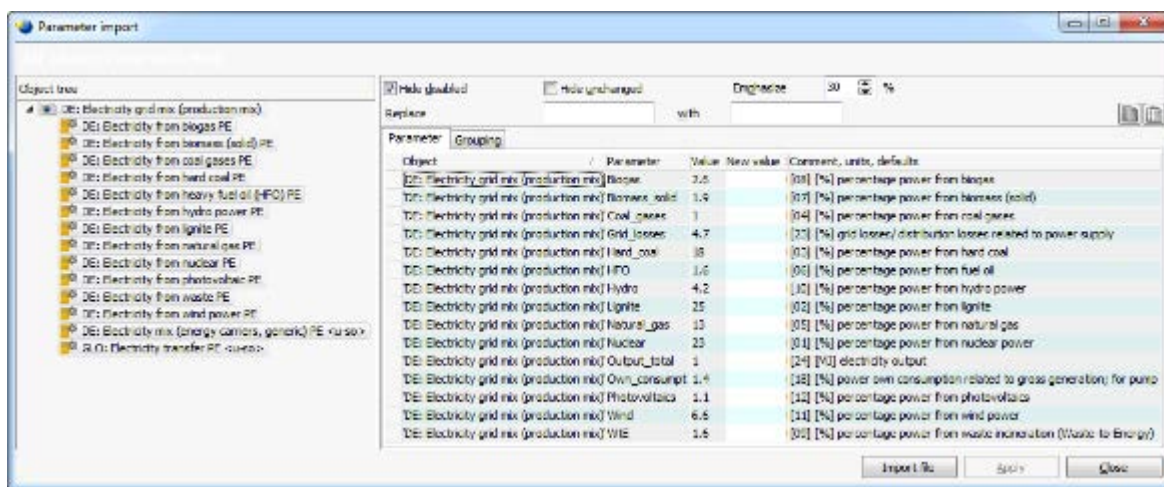


Figure: Parameter import

3. A new window "Parameter import" will open. On the left side the "Object tree" displays a tree structure of the plan system. Select the top object to get objects of the system displayed on the left.

- The objects highlighted in the object tree determine the parameters that will be shown in the window's right-hand frame. By using the right mouse menu in the left part of the window you can select all, branches, or clear the selection. The right part of the window will display parameters accordingly.

4. Change the parameters in one of the following ways:

- Manually enter values in the column "New value".
- Select all parameters in the list and click button. Open an Excel sheet and paste the values. Change the values in the "Value" column. Copy the entire table from Excel. Go back to the import window and click the button.

Note: The same applies for the tab "Groupings" where you can change the groupings of the process/plan instances.

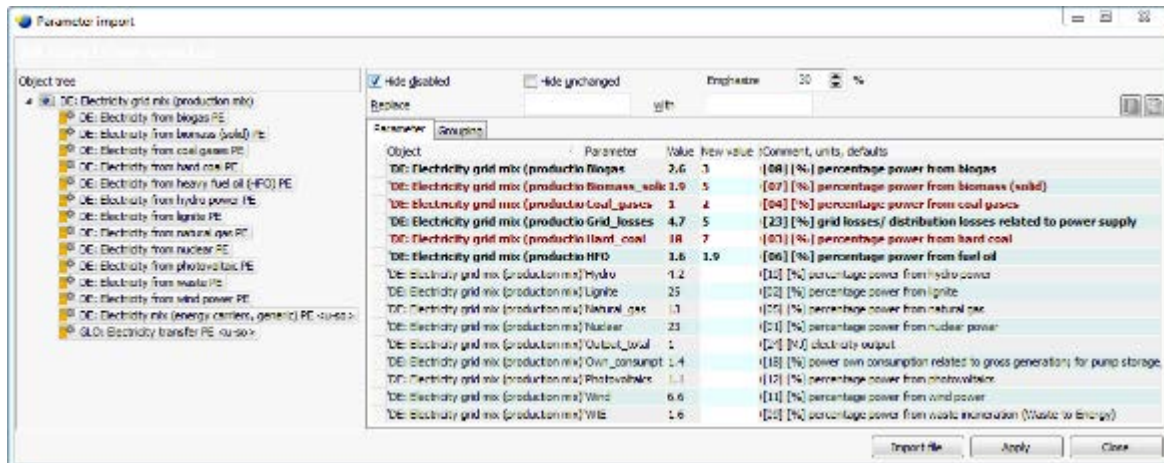


Figure: Parameter import completed

If you believe you have cahnged all relevant parameters , tick the box "Hide unchanged" to get an overview of your parameters. If you are missing an object untick the box again to look out for it.

With the field "Emphasize" you can define the threshold for percental difference when the changes are highlighted in red.

5. Click "Apply" to save the new parameter values.

10.2 Copy assistant

The GaBi Copy assistant allows to copy entire plan systems or product models at once.

Note: If you copy an object in the database manager in GaBi, the objects it uses will not be copied. Both the copy and the original will use instances referencing to the same database object. To learn more about the difference between database objects and instances click **here (Section 7.2.1)**.

1. Select the object you want to copy in the database manager.
2. Select "Extras". "Copy assistant ..." in the GaBi menu.
3. A new window "Copy assistant" will open. On the left side the "Object tree" tab is selected and displays a tree structure of the system. Select the top object to get objects of the system displayed on the left.
 - Alternatively, the tab "Object types" sorts the objects by their location in the GaBi database.
 - If the object is a folder in the GaBi database the column "Object" will be empty and the column "Type" will display the folder name.
 - The objects highlighted in the object tree determine the parameters that will be shown in the window's right-hand frame. By using the right mouse menu in the left part of the window you can select all, branches, levels or clear the selection. The right part of the window will display objects accordingly.

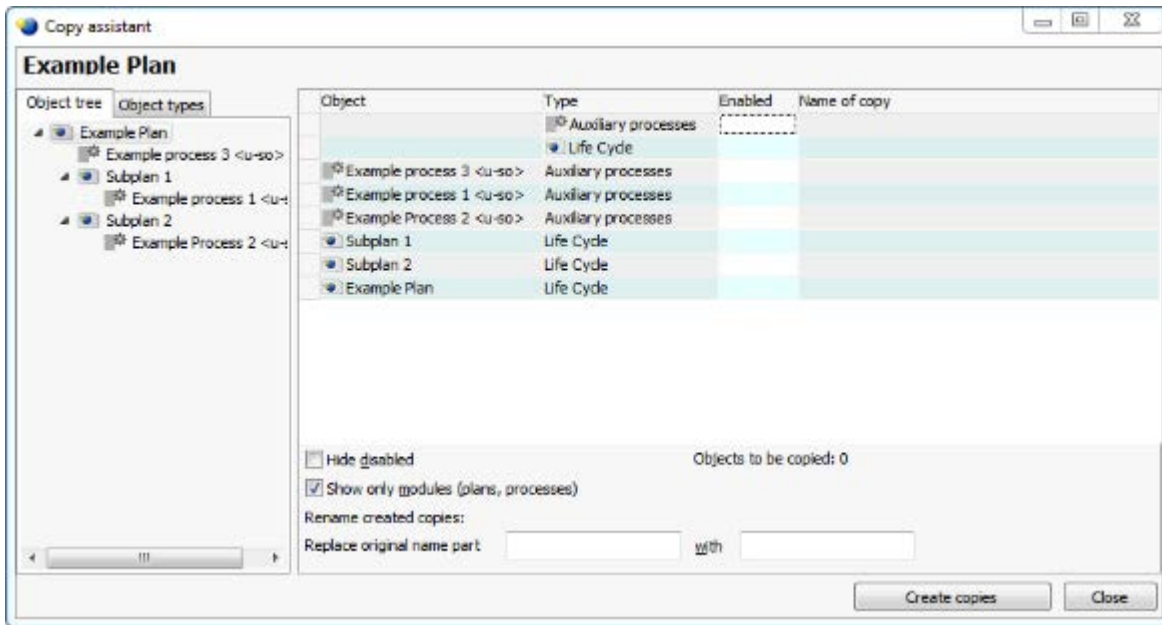


Figure: Copy assistant

Untick the box "Show only modules (plans, processes)" to see flows and all their underlying objects as well. Always bear in mind that copies of standard objects will not benefit from database updates.

4. Click the column "Enabled" for those objects that you want to copy. An "X" will appear for enabled objects. You can also type "X" on your keyboard.

5. Enabling objects will unlock the column "Name of copy" in which you can define how the copy shall be named.

The fields "Rename created copies" allow you to perform bulk renamings of objects:

Enter a term in both fields and the term in the left field will be replaced by the term in the right field if found in the objects.

Enter only a term in the right field and every object will receive this as an addition at the end of its name.

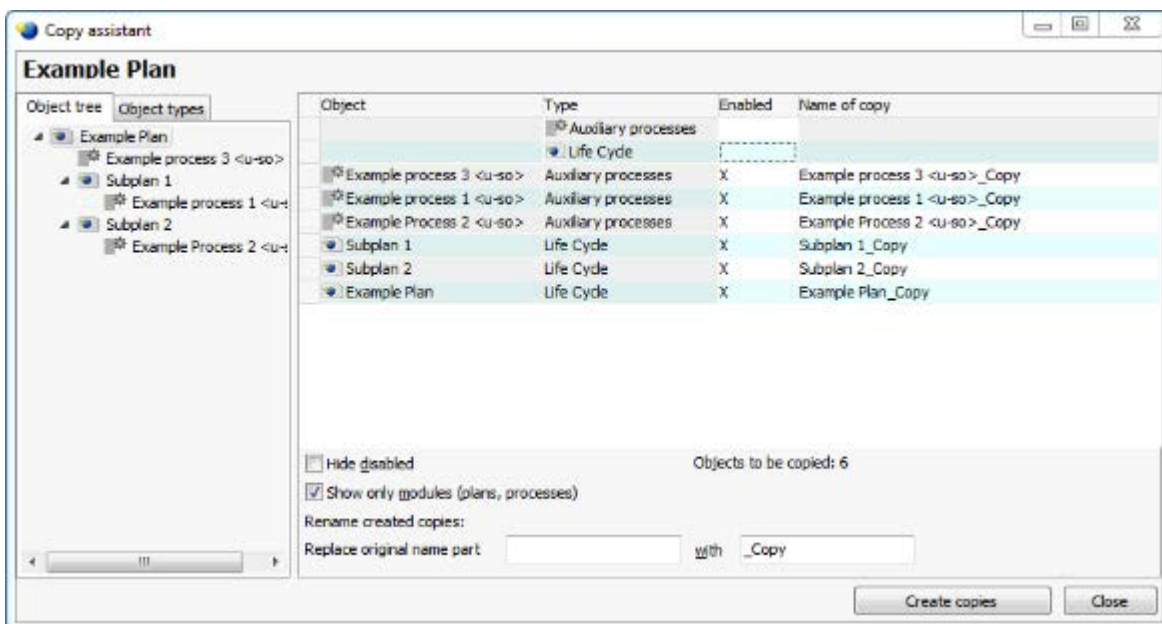


Figure: Bulk renaming of copies

If you believe you have enabled all objects that you want to copy, tick the box "Hide disabled" to get an overview of your objects. If you are missing an object, untick the box again to look out for it.

6. Click "Create copies" to create copies of all your enabled objects.

7. A message will confirm success.

If a project is activated when using the copy assistant is used, the newly created objects will be added to the project. This way you can easily delete entire copied systems.

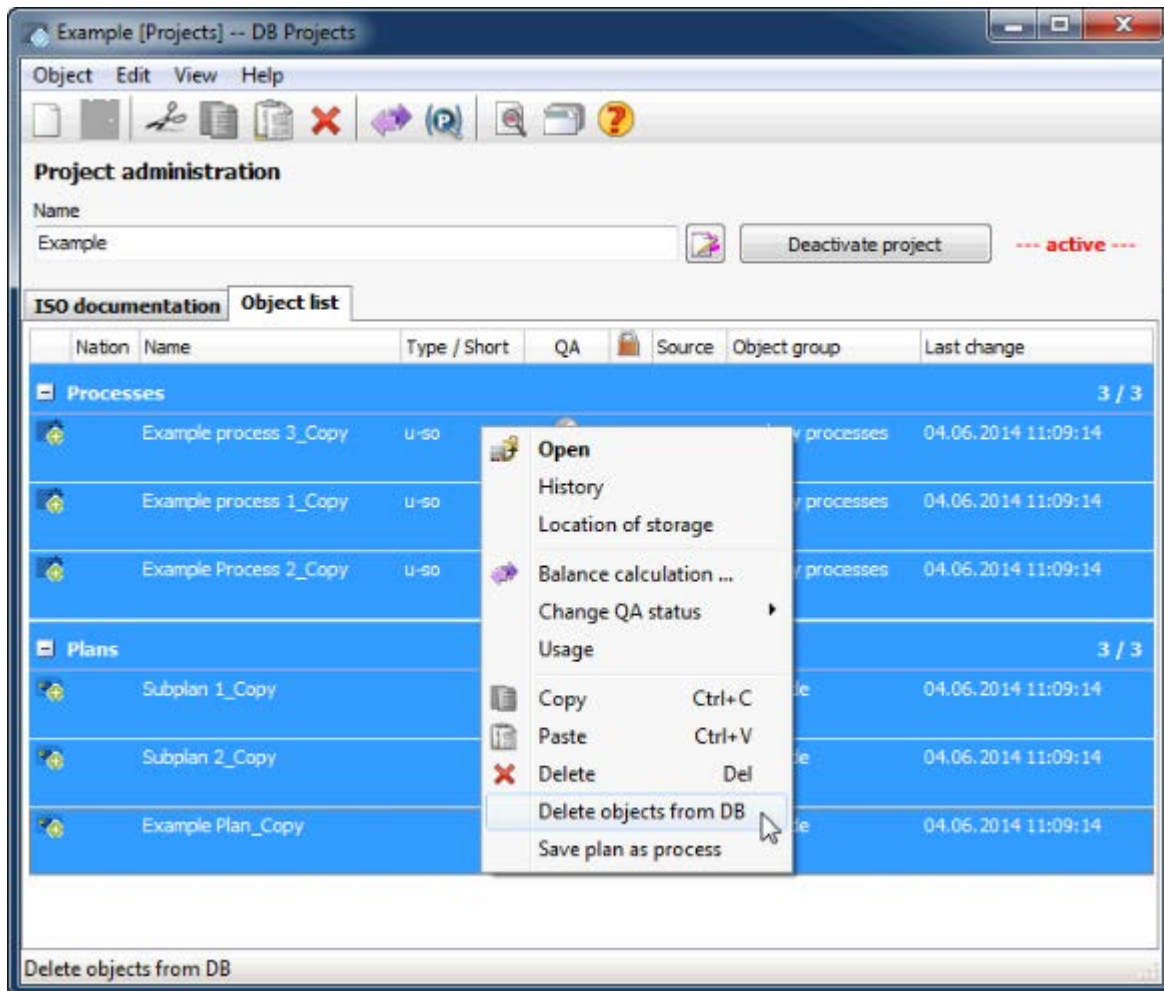


Figure: Deleting copied objects

10.3 SlimLCI: BOM Import

The GaBi BOM Import tool enables the import of a Bill of Materials (BOM) into the GaBi software. Using the BOM Import tool, a BOM of a product, which is a file containing information about materials and production steps of a product, can be opened. The materials and production steps listed are matched to GaBi database objects by using a mapping list and a product model is created automatically.

Upon first start, you have to connect GaBi BOM Import to the GaBi license file:

1. Start the GaBi_BOM.exe file located in your GaBi installation directory (e.g., C:\Program Files(x86)\PE International\GaBi). The following message will appear:

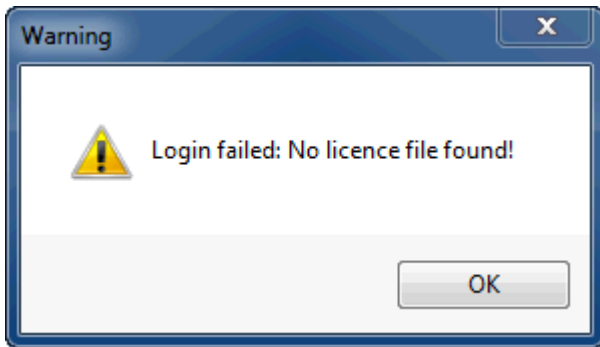


Figure: No license file found

2. Press OK

3. In the GaBi BOM Import Menu select "Help", "License ...", "Select license file ...".

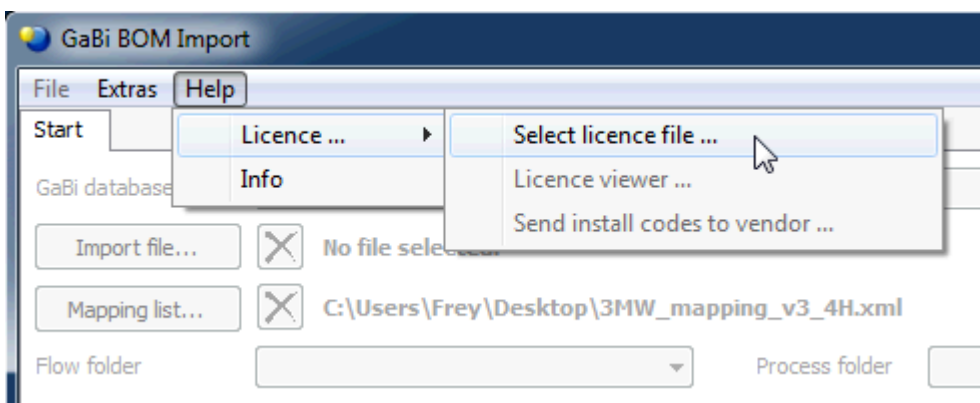


Figure: Select license file in GaBi BOM Import

4. A new window will open. Navigate to the location of your license file (standard location Windows 7: C:\Program Data\PE International\GaBi) and select it.

Note: The name of the file should be the same serial number you entered during the installation and activation process.

5. Press 'Open'.

10.3.1 SlimLCI: Preparations for a BOM Import

To run a BOM Import, do the following:

1. Create an Excel file following the formatting outlined in the Figure: BOM in Excel

	A	B	C	D	E	F	G	H	I
1	Import file	Example BOM.xls							
2	Product name	Example BOM							
3	Created on	01.04.2014							
4	Editor	Username							
5	Base dataset	2014-04 Chassis BOM							
6	Comments	Example Data							
7									
8	Tree level	ID	Part name	Material	Material classification	Weight [kg]	Pieces	Manufacturing process	Comment
9	0		Chassis			250.75	1		This is the h
10	1		Front axle			20.5	1		The weight is
11	2		Brake			20.5	2		This is the h
12	3		Brake caliper	Aluminum	Aluminum and aluminum alloys (unspecified)	6	1	Aluminum die-cast part	This is a pa
13	3		Brake disk	Cast iron part	Cast iron (unspecified)	10	1		This is a pa
14	3		Brake pads	Silica sand	Other materials and material compounds (unspecified)	0.4	1		This part co
15				Epoxy resin mix	Concrete (unspecified)	0.02	1		This part co
16				Steel sheet	Steel (cast steel / hardened steel (unspecified)	0.58	1	Steel sheet deep drawing (multi-level)	This part co
17	3		Brake fluid	Dihylene glycol	Brake fluid (unspecified)	0.6	1		This is a pa
18	2		Transverse control arm/top			1.7	2		This is a pa
19	3		Connector	Polyurethane	Polyurethane (unspecified)	0.067	1	Elastic injection molding	This part co
20				Steel sheet	Steel (cast steel / hardened steel (unspecified)	0.133	1	Steel sheet deep drawing (multi-level)	This part co

Figure: BOM in Excel

Note: The colors of the fields do not have any effect on the import, they can be used for the clarification of the component structure.

Note: If the field "Product name" exists, its content is used as name of the generated Product model otherwise, the import file name is used.

Field	Content
Tree level	With levels the Component structure is determined in hierarchical level. Level 0 is the product itself, Level one are components of the product and so on.
ID	A special identifier can be specified for each component.
Material	Specifies the material of the components.
Material class	Specifies the material classification of the material. In GaBi DfX the material composition of the product can be analysed in accordance with this material classification.
Weight	Weight of one piece of the component.
Pieces	Number of pieces of the component. Note: The number of pieces follows the hierarchy: If you enter 2 pieces of a component, and 2 pieces for its subcomponent, the overall model this will sum up to 4 pieces of the subcomponent.
Manufacturing	Specification of the manufacturing step for the component.
Comment	Comment on the component.

The column 'part name' and the number of units must be filled in. In cases where all components of a part have the same number of pieces, it is possible to define this number at the part level, and set the component to one (e.g., the amount of the brake components is set to one and on the part level, the amount of brake is specified with two pieces). Otherwise, if the components of a part differ in their number of pieces, the number of pieces has to be specified for each single component and the amount of the part will be set to one piece. A detailed description of the format of an import file can be found under the tab 'format description' in each 'GaBi BOMimport format.xls' (MS Excel (TM)-Datei). The above-mentioned Excel file displays an example of the import file.

2. Save this file as a TXT file by using the "Save as" functionality in Excel.

tree level	ID	part name	weight [kg]	material classification	pieces	manufacturing process	comment
0		chassis	258.75	1			this is the top part, its weight is redundant
1		Front axle	84.5	1			The weight is redundant
2		Brake	17.8	2			Two brakes (Front axle)
3		brake caliper		Aluminium and aluminium alloys (unspecified)	6	1	Aluminium die-cast part
3		brake disk		cast iron (unspecified) 10	1		this is a part at the most detailed level
3		Brake pads		other materials and material compounds (unspecified)	0.4	1	This part consists of different materials
		Epoxy resin mix		steels (unspecified)	0.02	1	This part consists of different materials
		steel sheet		steels / cast steel / sintered steel (unspecified)	0.58	1	steel sheet deep drawing
3		brake fluid		ethylene glycol brake fluid (unspecified)	0.8	1	this is a part at the most detailed level
2		Transverse control arm (top)	1.7	2			Two transverse control arm (top) (Front axle)
3		Connector		Polyurethane (unspecified)	0.067	1	Plastic injection moulding
		steel sheet		steels / cast steel / sintered steel (unspecified)	0.133	1	steel sheet deep drawing

Figure: BOM as TXT file

10.3.2 SlimLCI: Start settings

To begin an import, the "Start" settings must be defined. This can be done as follows:

1. Select a database. Use the dropdown menu to select previously used databases or use "Browse" if you want to select a new database. The database used previously is preselected here.

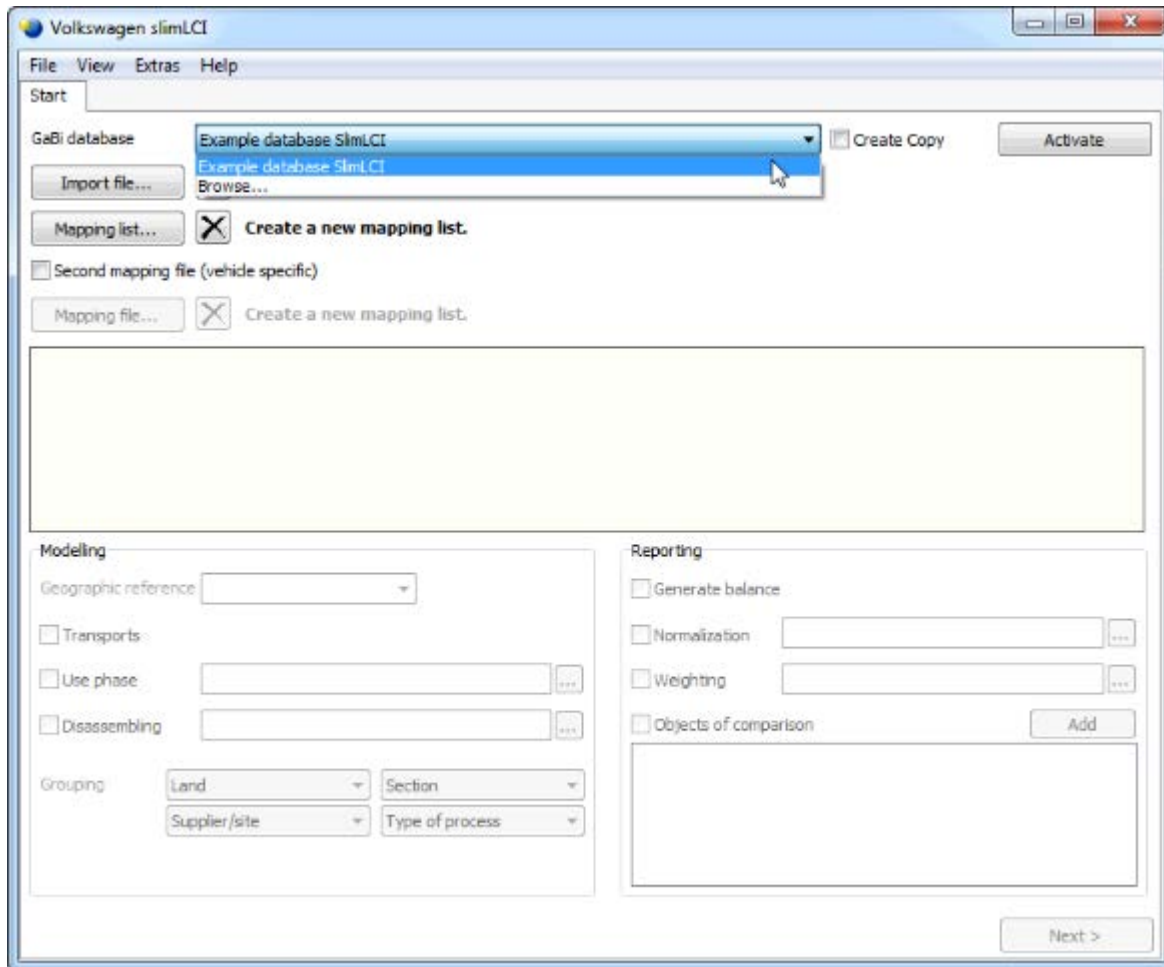


Figure: Select a database for BOM Import

2. You may tick the box "Create Copy".
3. Click "Activate" to load the selected GaBi database. If you have ticked the box "Create Copy" a browse window will open in which you can define storage place and name of the copy.

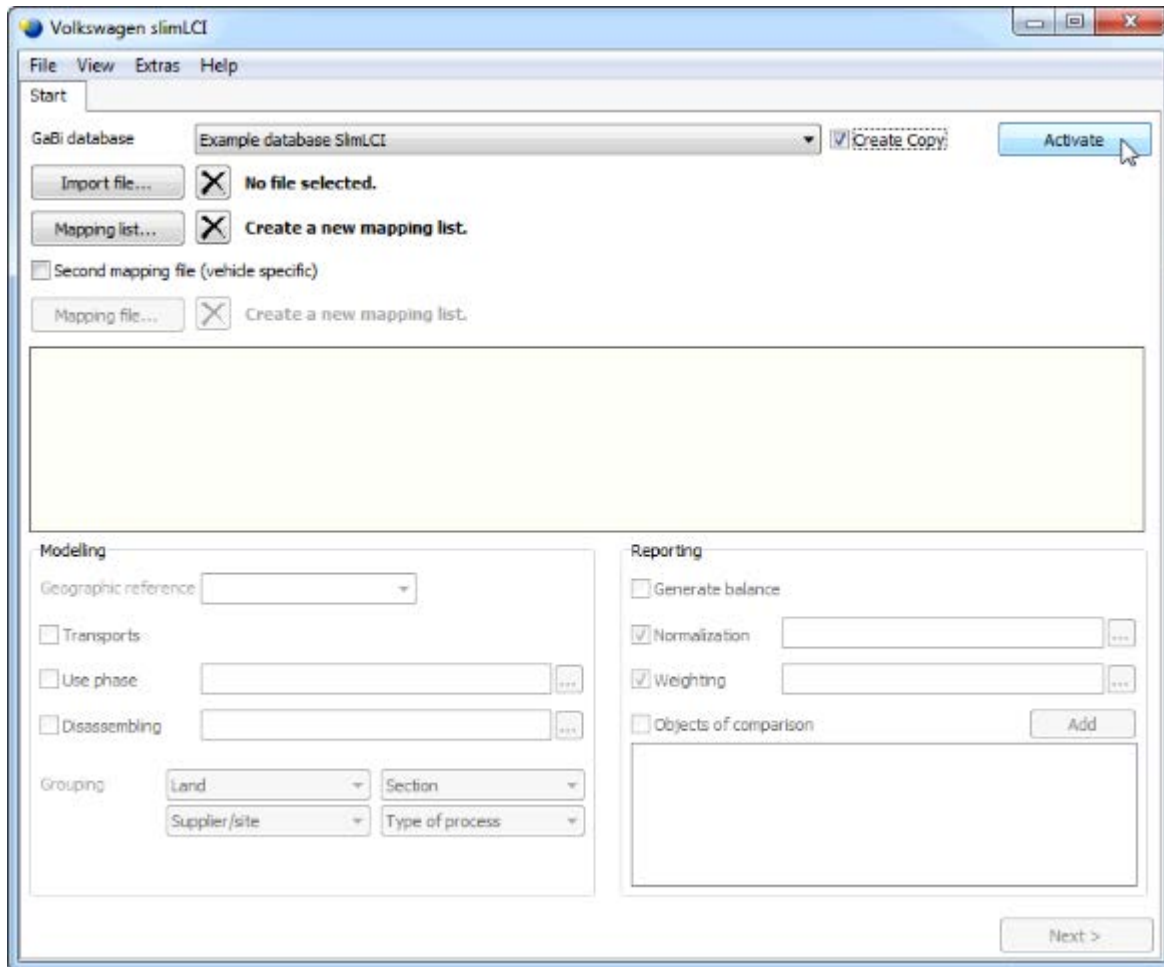


Figure: Activate database and create database copy

4. Select the import file by clicking "Import file...". This has to be a TXT file. When an import file is selected, its location and file name are displayed.

Note: Click  to delete the current selection.

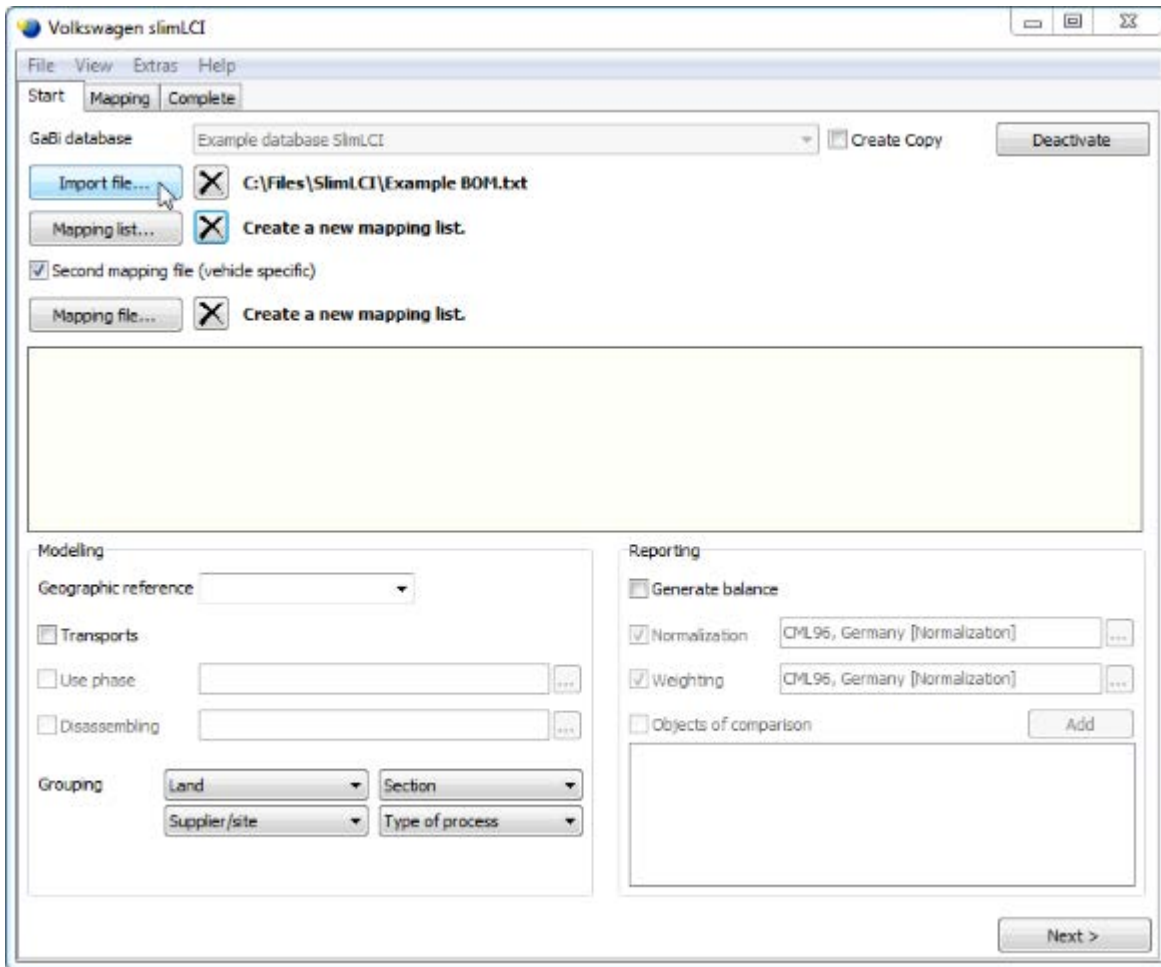


Figure: Select the import file

5. You may select an existing mapping file. In a mapping file, the links between materials/manufacturing steps in BOM-lists and GaBi database objects are saved. The mapping file that was used previously is preselected.

Note: In the case you do not select a mapping file, a new file will be created.

6. You may select a second mapping file. The first mapping list is then write protected and all changes will be saved in the second mapping list.

Note: Select "File", "Save combined mapping list as ..." to merge both mapping lists. This merged mapping list is automatically connected as the first mapping list.

7. Click "Next" to start the mapping.

10.3.3 SlimLCI: Modelling options for the mapping

The area "Modelling" in the "Start" tab provides you with additional options for advanced mapping.

1. The dropdown menu "Geographic reference" allows you to select "site specific" or "country specific" values from the respective columns in the BOM.

If you choose this option, the material will be displayed as a combination of material name and either the country or the site. This makes it easier for you to identify the respective GaBi process to apply the mapping. Open inputs that might appear during the mapping process will also be handled country or site specific. These information will later on be displayed in the "Structure" tab of the component in your product model.

2. The tick-box "Transports" allows you to consider the method and the distance the component is transported.

If your BOM contains information about the transport method and the distance, you will be able to tick this check box. If you select this option you will be able to apply a mapping to transport processes available in the connected database.

3. Use phase

If your BOM contains information about the use phase of the product this option will be available. Select the option and click the button  to browse through the plans available in the connected database. You can now directly select a plan from the database as the use phase plan. Parameter values from the BOM are mapped to the plan parameters if they exist.

4. Disassembling

If your BOM contains information about the disassembly of the product this option will be available. Select the option and click the button  to browse through the plans available in the connected database. You can now directly select a plan from the database as the disassembly plan. Parameter values from the BOM are mapped to the plan parameters if they exist.

5. The "Grouping" dropdown menus allow you to define the content of which of the grouping columns in your BOM will be displayed.

Each component in your product models will have the content of the columns displayed that you select here. You can see them by clicking on any component in a product model. In the very bottom you will find the "Grouping" area. These groupings can later on be used in balances to compare environmental impacts in between groups.

10.3.4 SlimLCI: Reporting options

The area "Reporting" in the start tab provides you with the option to create a balance on the fly.

1. Tick the check box "Generate balance" to directly generate a balance when you are done with the import mapping and click **"Complete" in the tab "Complete" (Section 10.3.7)**.
2. If you want to directly apply a normalization and/or a weighting to the balance tick the check boxes "Normalization" and/or "Weighting" accordingly. Click the button  to browse through the normalizations and/or weightings that are contained in the database you activated.
3. If you want to directly compare the imported data to existing planmodels tick the check box "Objects of comparison". Now click "Add" to browse through the available planmodels in the database you activated. You may select more than one plan. To delete plans from your selection, right-click on the entry in the list and select "Delete".

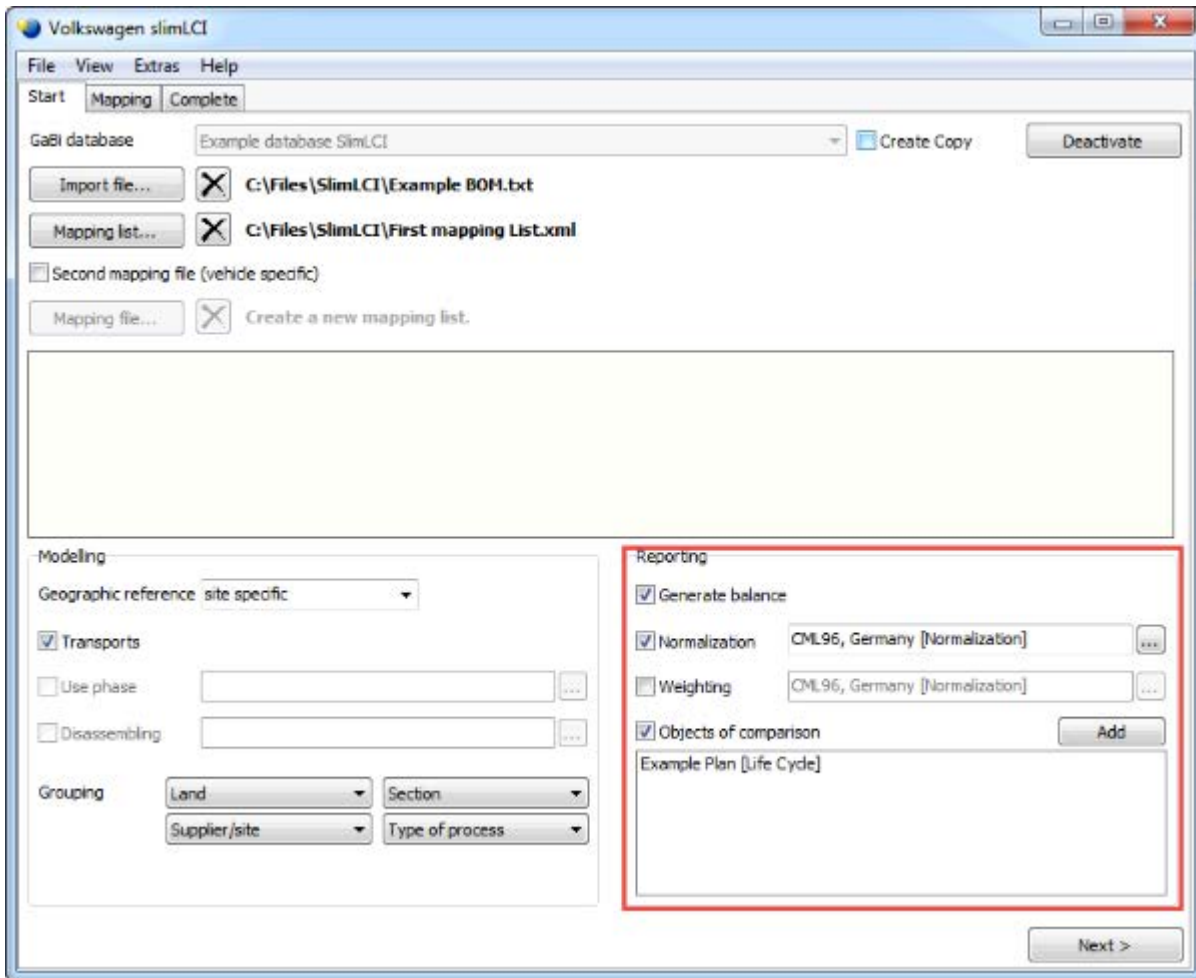


Figure: Reporting options

10.3.5 SlimLCI: Mapping plans and processes

In the "Mapping" tab, the BOM tree and, if applicable, the energy provision and operating materials, appear on the left side of the window.

- Components that have not been mapped completely appear in red.
- Completely mapped components appear in black.
- Completely mapped components that contain an unknown material, a dummy mapping or zero mass appear in olive green.

In some cases it makes sense to map the manufacturing processes first and then the corresponding material processes.

Mapping information is shown on the top right of the window.

Depending on which tab is selected the bottom right shows:

- Another tree structure can be found representing the content of the GaBi database.
- Import information in text format. This import information corresponds to one line of the transfer file and can be viewed here for double-checking.

In order to map components to GaBi database content do the following:

1. Select a component in the BOM tree and click in the column "Process / Plan".

2. You have three options to identify processes/plans to be mapped to components.

Use the text box to enter a term. Hitting return on your keyboard will guide you to the next occurrence of the search term.

Use the  button to search for processes/plans with the GaBi search functionality.

Manually browse through the tree structure.

3. Double-click on the plan/process or drag & drop to select it.

Note: If necessary, you can select "Skip" or "Dummy" via the drop down menu in column "Status".

4. Click "Next" to jump to the next unmapped material or manufacturing process.

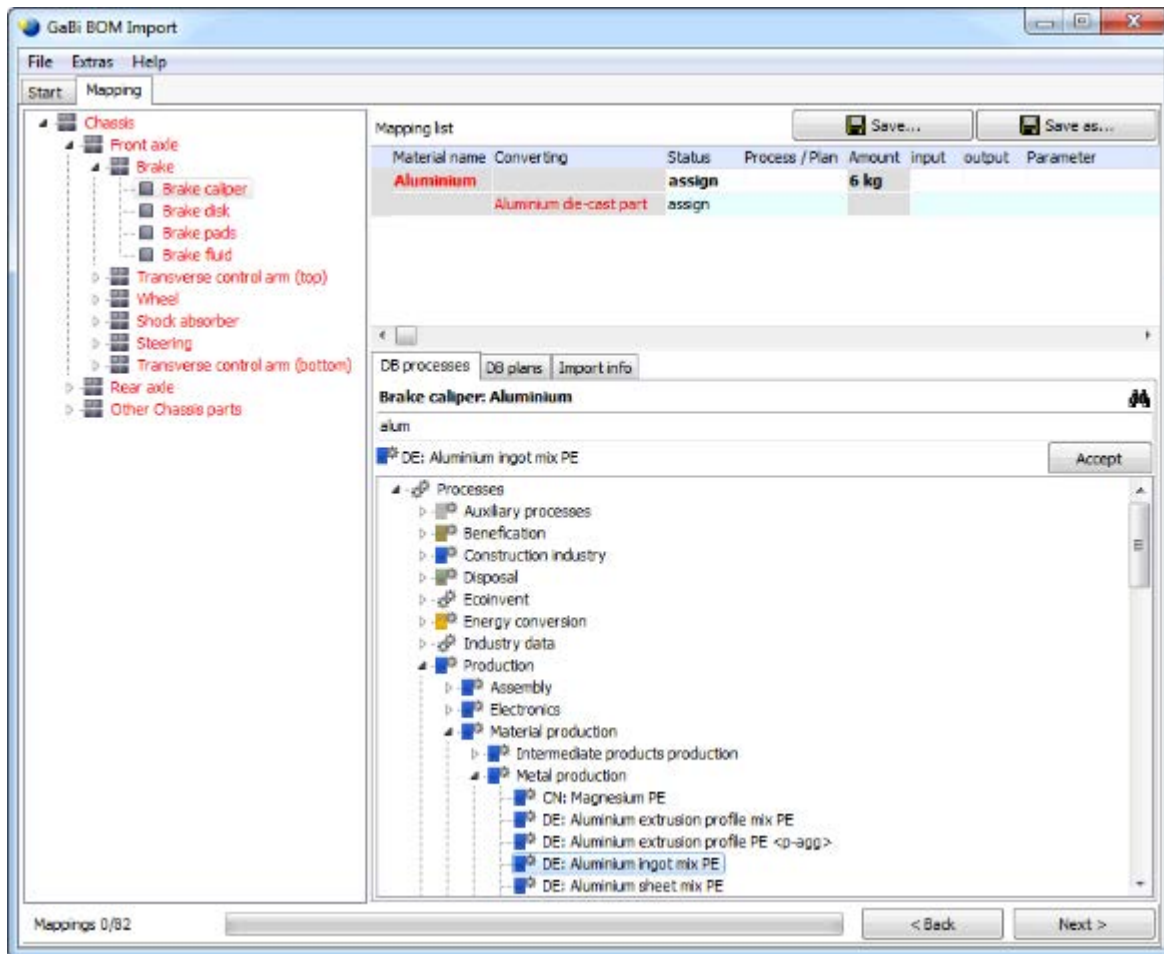


Figure: Select processes or plans for mapping

Note: A progress bar at the bottom of the window displays how many mappings are complete and how many are still to be completed.

5. If the mapped process/plan contains parameters, you can specify them by clicking the  button in the column "Parameter". A new window will open in which you can:

Modify parameter values

Define groupings

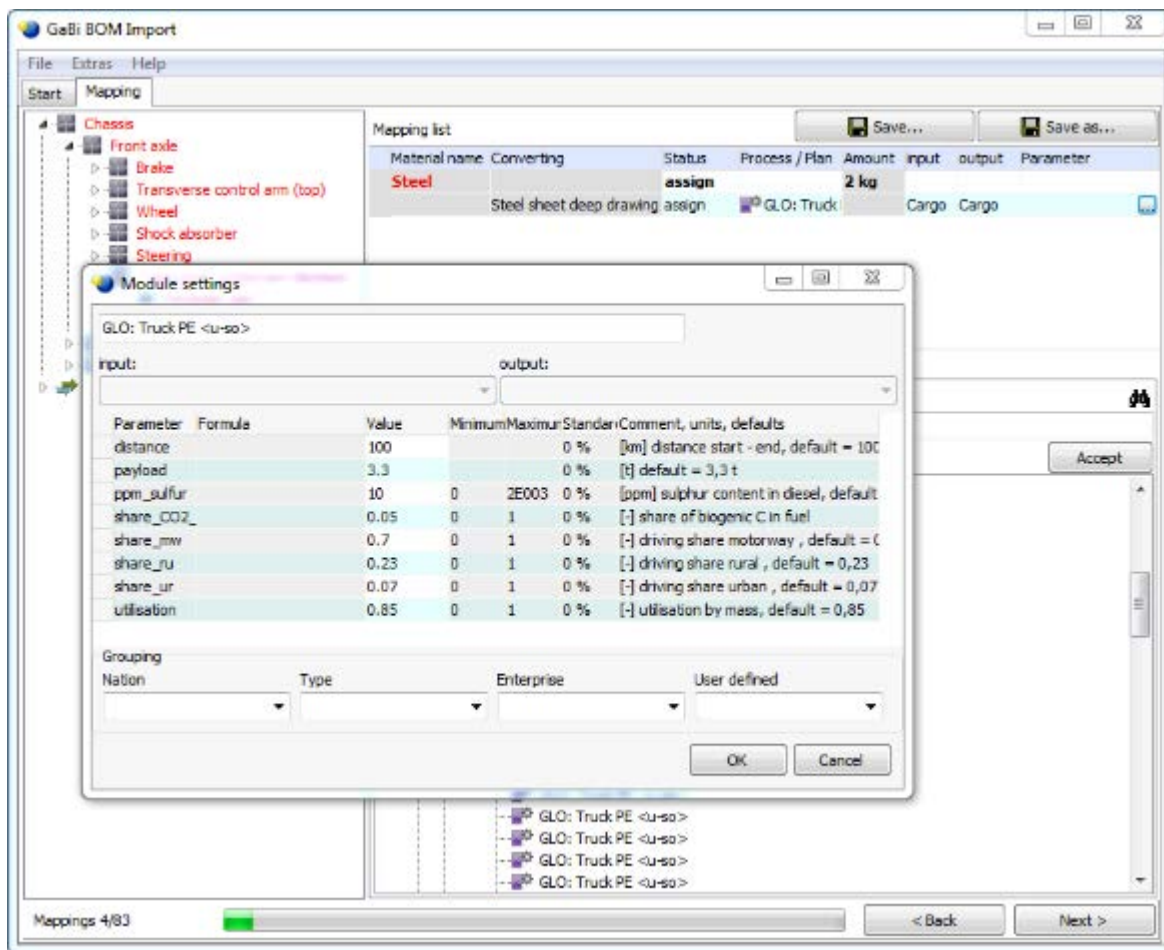


Figure: Setting parameters and grouping

A temporary state of mapping can be saved, in a mapping file by clicking "Save" or "Save as". This way the mapping can be continued later on.

10.3.6 SlimLCI: Mapping lubricants and energy supply

If processes for the material or processing steps have been mapped that still have open inputs ("Lubricants, energy supply"), an extra section appears under the BOM tree.

Map the "Lubricants, energy supply" **the same way as mapping plans and processes to the components ('Mapping plans and processes' in the on-line documentation).**

This way you can define a default process from the GaBi database to be linked to all processes in the model with a certain open input.

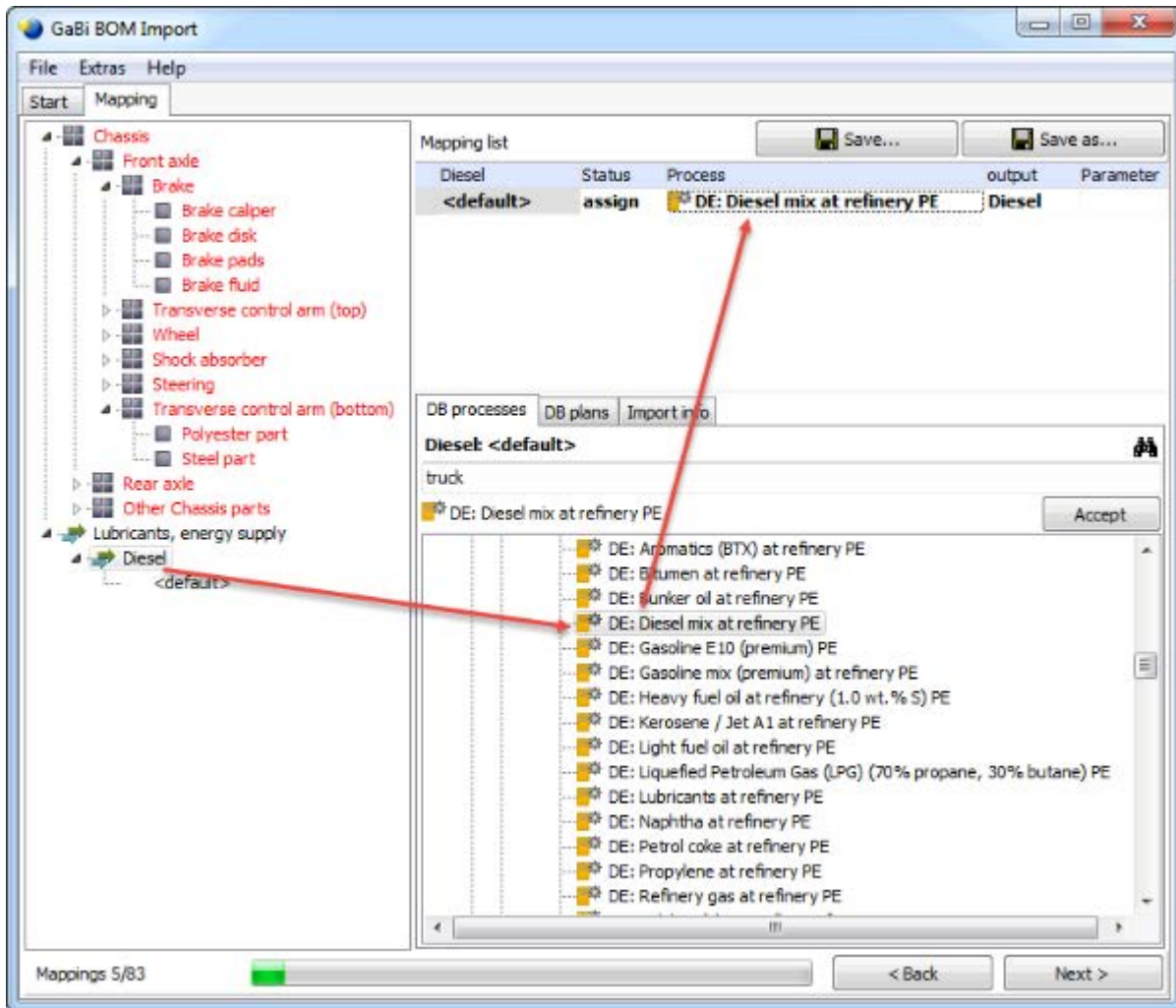


Figure: Mapping of "Lubricants, energy supply"

10.3.7 SlimLCI: Completing the import

When all the mappings have been set, start the generation of the product model.

Perform these steps in the "Complete" tab:

1. Enter names for "Material classes" in the table on the left. Use the dropdown menu or type free text.

Note: The material classes are required for defining the material quantities in the GaBi system. The material classifications from the import file will be searched for in GaBi quantities and can be defined if they do not exist.

2. Decide whether you want to import the BOM as a product model or a plan model. Tick the check box in the bottom left corner of the window if you want to import the BOM as a product model. By default the check box is ticked.

3. Click "Complete"

4. A new window will open. You can now save the mapping file (recommended). If you select "Yes" you can select the place where your mapping file will be saved.

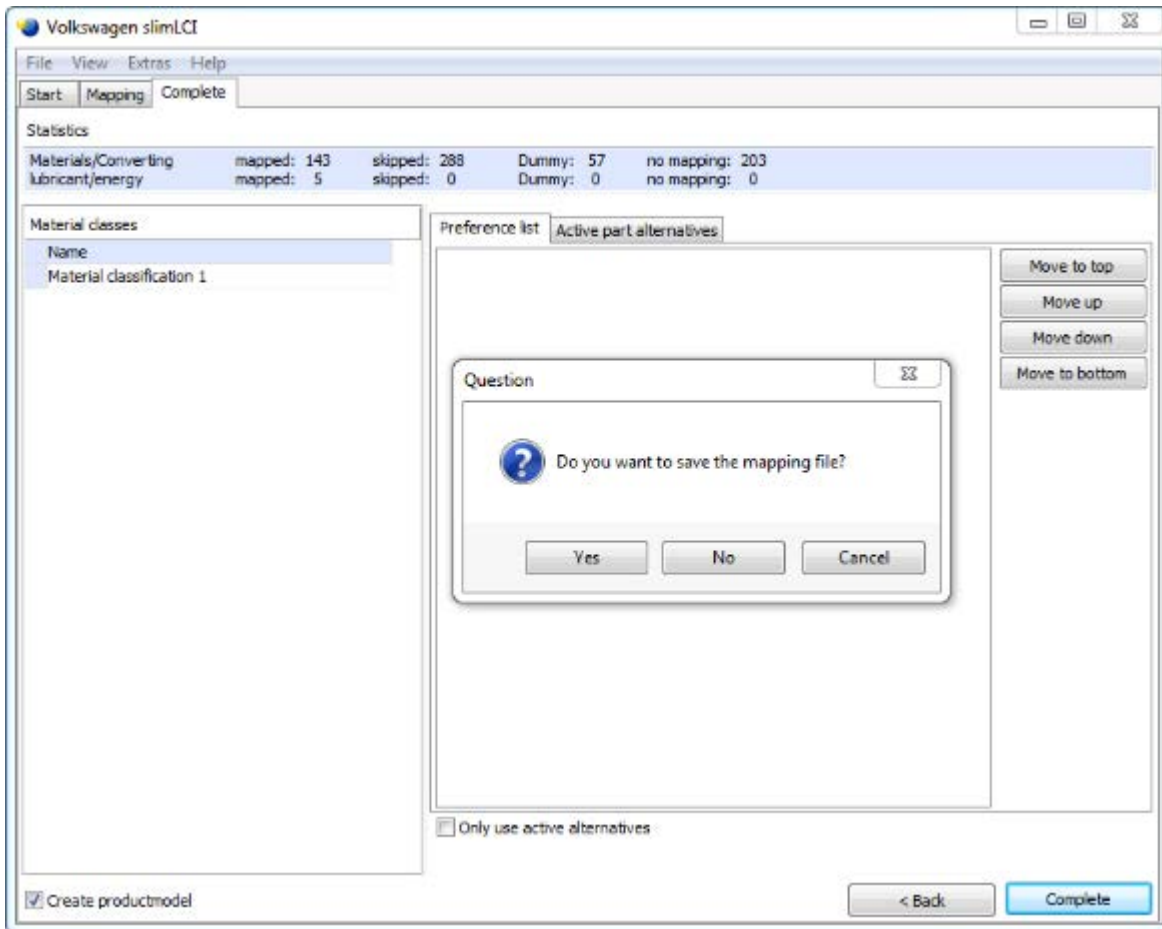


Figure: Complete the import

The generation of the product model may take some time. A progress bar will provide you with additional information.

After successful generation, a confirmation message appears.

10.3.8 SlimLCI: Quality Report

If you calculate a balance from a product model or a plan model that was generated through a BOM import an

additional button  will appear at the top of the balance window.

If you click the button a new window will open.

1. The left part of the window, displays your BOM in the tree structure view that you know from the product model. Use this area to navigate through your model.
2. Use the radio buttons below to decide whether new mappings (from the second mapping list), skipped mappings/dummies or unmapped components shall be highlighted in the tree structure.
3. In the tab "Statistics" the top right area of the window contains information about how many of the BOM entries have no mapping, a quality assured mapping (first mapping list), a new mapping (second mapping list), or are skipped/dummies.

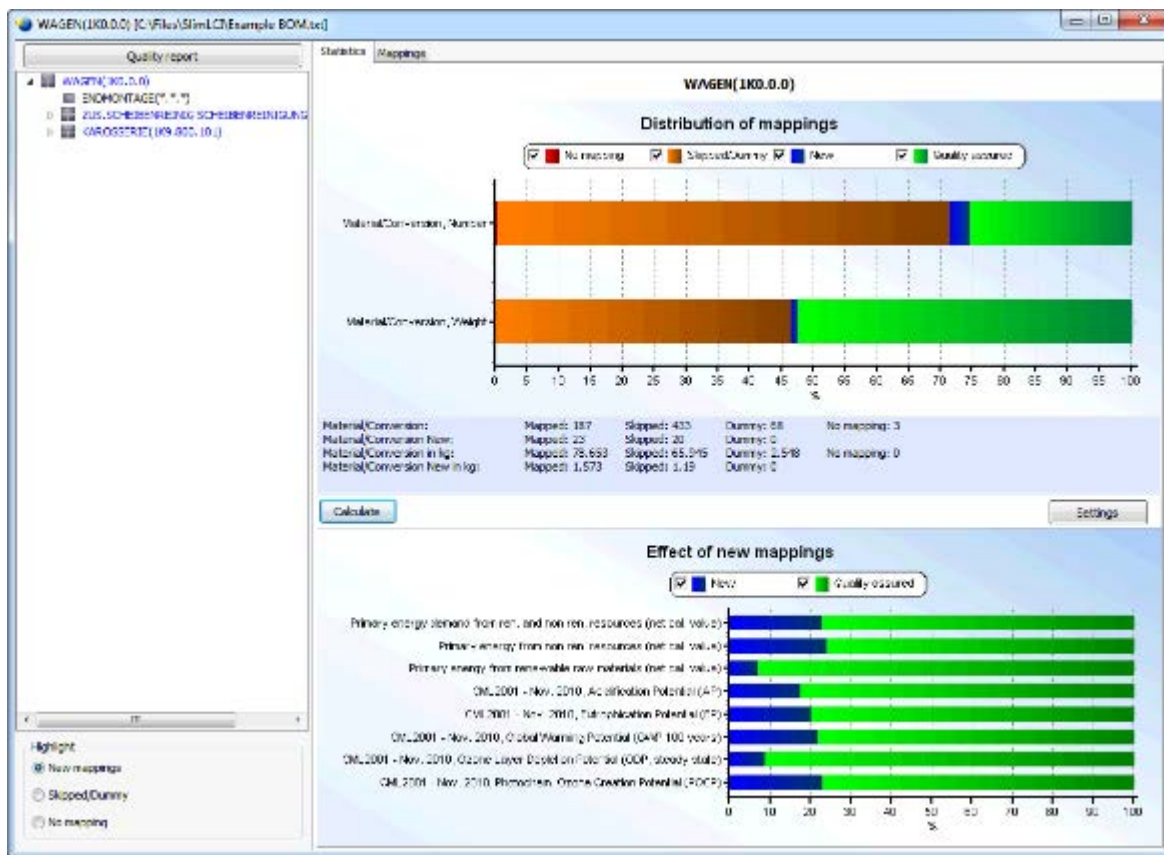


Figure: Quality report

4. Use the button "Calculate" to generate a chart displaying the effect of new mappings as compared to quality assured mappings that existed beforehand.

Note: Click the "Settings" button to define which quantities from your database are displayed in the "Effect of new mappings" chart. A new window will open in which you can add, remove or view quantities. You can also change the order in which they are displayed in the "Effect of mappings" chart.

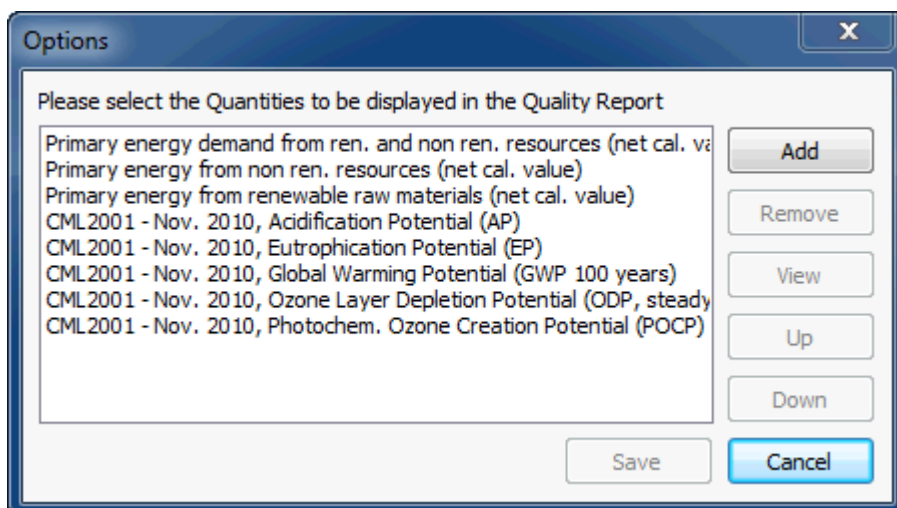


Figure: Effect of new mappings quantity selection

5. In the tab "Mappings" you can see the mapping information for each component. Navigate through the tree structure to find out which user mapped which component to which process/plan.

6. The button "Quality report" the top left corner generates a PDF document which contains detailed information about the entire mapping.

10.4 Variable flow quantities

Variable flow (VF) quantities serve to automatically calculate defined flow quantities in a final product over the entire life cycle. These defined flow quantities can be material classifications or cost quantities, but any other quantity classification is also possible.

The product components and its composition can be displayed by opening a product flow or a quantity.

Click in the "variable" column of a quantity to mark it with an "X".

Doing this allows flow quantities to have different settings in the context of different GaBi plans. When this option is not activated, the quantities will be constant across the database are not variable and correspond to the standard GaBi functionality.

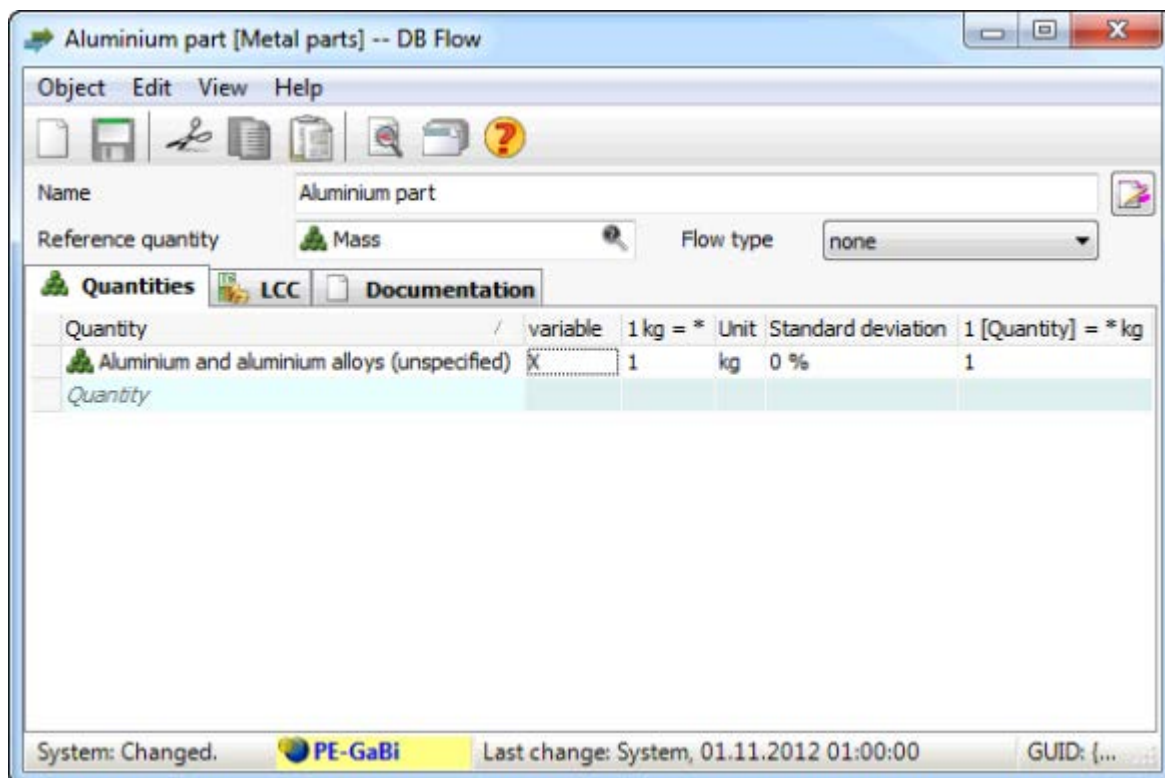


Figure: Variable flow quantity

Variable flow quantities can be calculated in processes and process instances as the sum of all inputs. For this purpose, for each process a special VF type, that defines the nature of its calculation, can be defined. The modeling of the variable flow quantities takes place on the database process level. Only those quantities and units that are shown can be modified.

Variable flow quantities from output flows can be calculated locally in processes (and process instances).

As a general rule, no user-specified formula is required here. Instead, the standard calculation method is employed. Depending on the VF type, this means either reading out the respective default value for the flow (DB object) or totaling the respective quantity value of the material input (while also taking the recycling quota into consideration).

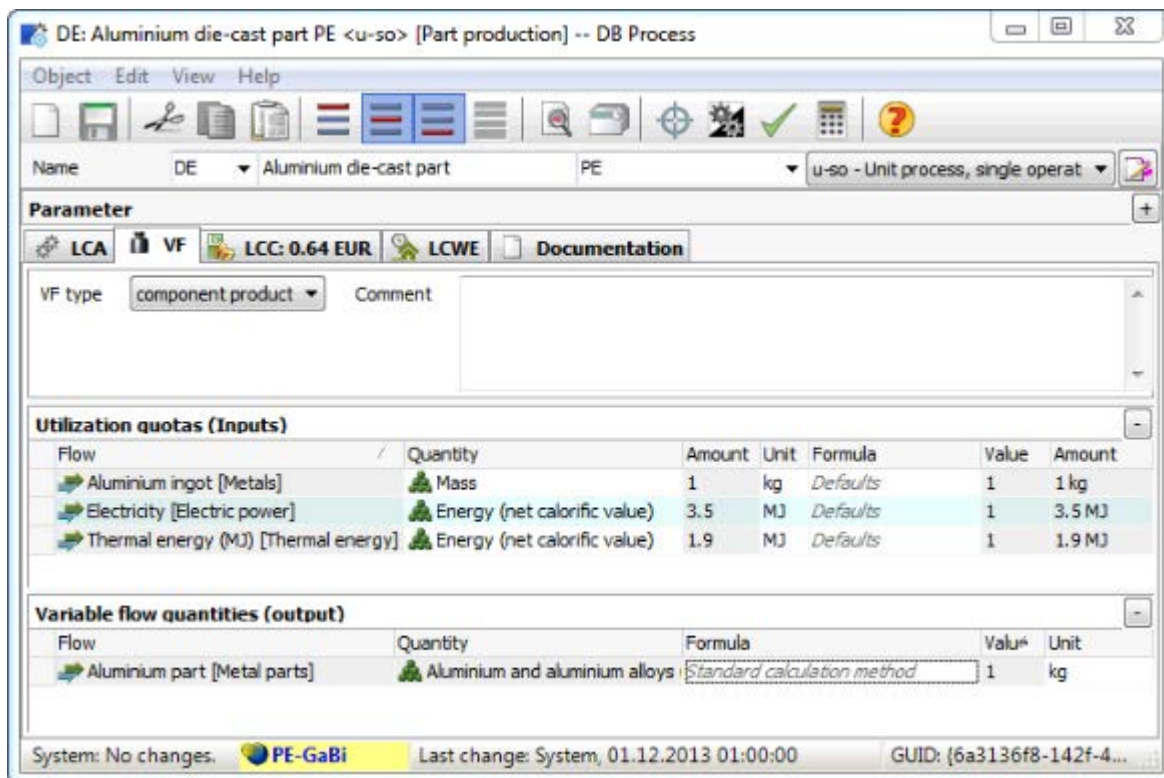


Figure: Window of the object type process (VF)

The different VF types have the following functionalities: unspecific, component production, assembling, converting, EoL process and material separation.

unspecific

n material inputs, n material outputs

This VF type is the standard setting of processes. It is not possible to enter recycling quotas here. Values of variable flow quantities in the output flows can be explicitly entered via formulae or constant.

component production

n material inputs, 1 material output

This VF type is used in processes for manufacturing components from raw materials. Utilization quotas are possible here. The variable flow quantities for material outputs are calculated as the total of all corresponding material inputs quantity values (also considering the recycling quota). A user-specific may be also be used, this is however optional.

The recycling quota determine what proportion of the variable flow quantities of the inputs will be transferred into output flows. The default is 100%.

As stated above, values of variable flow quantities in the output flows can be explicitly entered via formulae or constant.

assembling

n material inputs, 1 material output

This VF type is used in processes for manufacturing "ready-to-assemble"-components. The inputs of such processes are usually components. It is not necessary to enter utilization quotas here; the input components go 100% into the output components. The variable flow quantities for material outputs are calculated as the total of all corresponding material inputs quantity values (also considering the recycling quota). The values of variable flow quantities in an output flow may also be entered explicitly with formulae or with constant.

converting

n material inputs, 1 material output

A typical process of this VF type is, for example, a cleaning process. The flow quantities of the input materials are transferred to the output material unchanged. Utilization quotas are possible here. The variable flow quantities for material outputs are calculated as the total of all corresponding material inputs quantity values (also considering the utilization quota). The values of variable flow quantities in a output flow may also be entered explicitly with formulae or with constant.

EoL process

n material inputs, n material outputs

Neither the recycling quota nor the calculation of variable flow quantities is possible in the EoL process. However, in the parameter formula of an EoL process, locally calculated variable flow quantities can be read out with the `vf_separation` or `fq_convert` functions, which is not possible in conventional processes. When building the plan, the EoL process must not be connected before the process instances of the type "Component manufacturing", "Assembling" and "Converting".

material separation

1 product input, n material outputs

Analogous to the EoL process, neither the utilization quota nor the calculation of variable flow quantities are possible in the EoL process. Similarly, in the parameter formula of an EoL process, locally calculated variable flow quantities can be read out. This is generally achieved by using `vf_separation`, which enables the entry of multiple quantities and their associated percentages. The variable flow quantities of the outputs are calculated via their parameters by accessing possible `vf_separation` functions used in their formulae. The formula of a material separation process can be entered manually. It can also be entered via the material separation assistant to simplify the parameterisation of the process.

10.4.1 Material separation assistant

The material separation assistant supports the parameterisation of the material separation process. You can divide aggregated quantities of the material input into the individual material outputs. Quantities can be divided among the corresponding output flows with factors (between 0 and 1). Furthermore, an output flow can be specified as residual matter rest.

Inputs	
Quantity	Amount
- Quantities	1 kg
+ Technical quantities	1 kg

Outputs				
Quantity		Fraction 1	Fraction 2	Fraction 3
--- Rest --->				X
- Quantities				
- Technical quantities				
- VDA material classification				
+ 1 Steel and iron materials	1			
+ 2 Lights alloys, cast and wrc		1		
+ 3 Nonferrous heavy metals,				1
+ 5 Polymer materials				1

Figure: Window of the material separation assistant

The upper table in the material separation assistant shows the aggregated quantities of the input flows. You can expand quantity hierarchy like a tree.

The lower table shows two columns for each material output.

1. If the output flow includes the respective flow quantity, you can set a specific factor in the first of the two columns. The second column shows the calculated value of the flow quantity.
2. Enter an X in the line "---Rest--->" to define which output is residual matter rest.

10.5 Product model

The GaBi product model object type is in line with the hierarchical structure of a product. The information of a product manufacture, which is modeled in a GaBi plan hierarchy in a process-oriented way, is presented as a bill of materials. The conversion takes place based on the variable flow types.

Besides the name, a manufacturing plan, a use-phase plan and an EoL plan with alternatives can be entered in a product model. The manufacturing plan (and sub-plans) serves to prepare information via the hierarchical bill of materials. The use-phase plan can account for product-specific quantities from the manufacture in the form of a balance of a product model. The EoL plan and its alternatives can carry out disassembly calculations on the basis of information from the manufacture and the connection information and precedence connections set in the product model. Furthermore, in the right field of the product model window, a value for the disassembly costs can be entered with the unit Euro per hour. This value is drawn upon for calculation of the disassembly costs for defined disassembly times of connections. The value is constant for the respective product model.

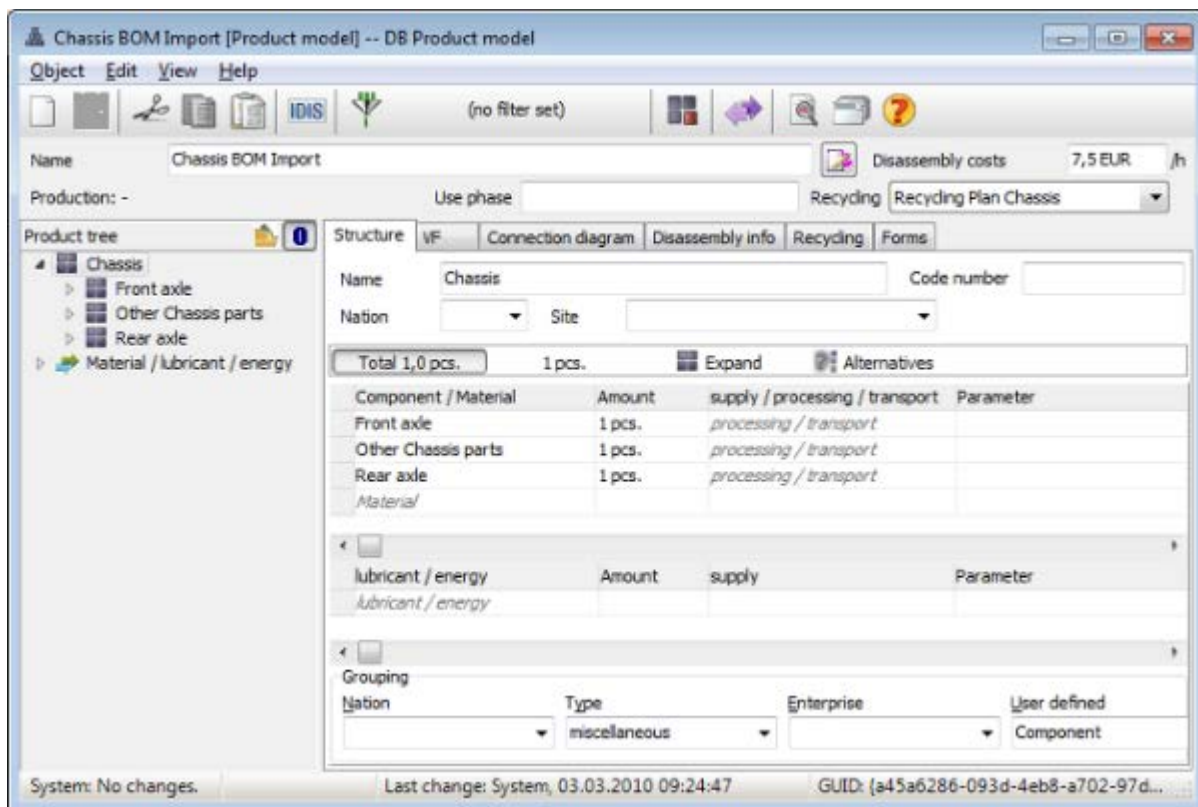


Figure: Window of the product model object type

In the left frame of the product model window, the product tree is shown. The highlighted component of the product determines the information shown in the right frame (under the chosen tab).

10.5.1 Product model, Tab: Construction

In the "Structure" tab you can define the product tree. Here you can:

1. Rename assembled parts and components of an existing product and add further parts and components.

2. Assign materials to these.
3. Assign multiple lubricants and energy consumptions.
4. Label any element with the nation (two-letter country code) and a site.
5. Assign and adjust groupings.

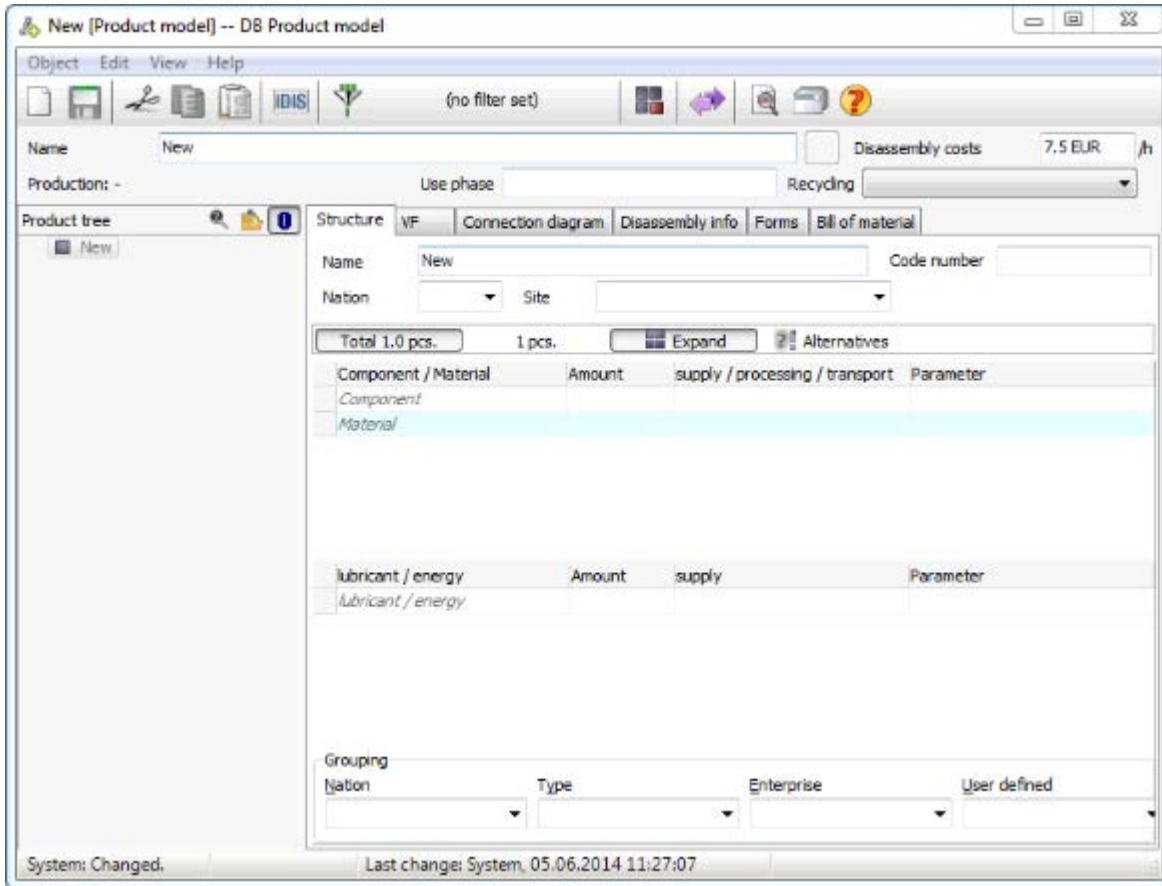


Figure: New GaBi product model

1. Select an assembled part component in the product tree to see the respective information in the right-hand frame. You may enter name, nation, site and code number.
2. Its sub elements appear in the upper part of the right-hand frame.
3. Click the "Expand" button to add components and materials.
4. When you enter information in the "Component" line of the column "Components/Material" a component will appear in the product tree. Components will be converted to assembled parts if you define further components a level beneath.

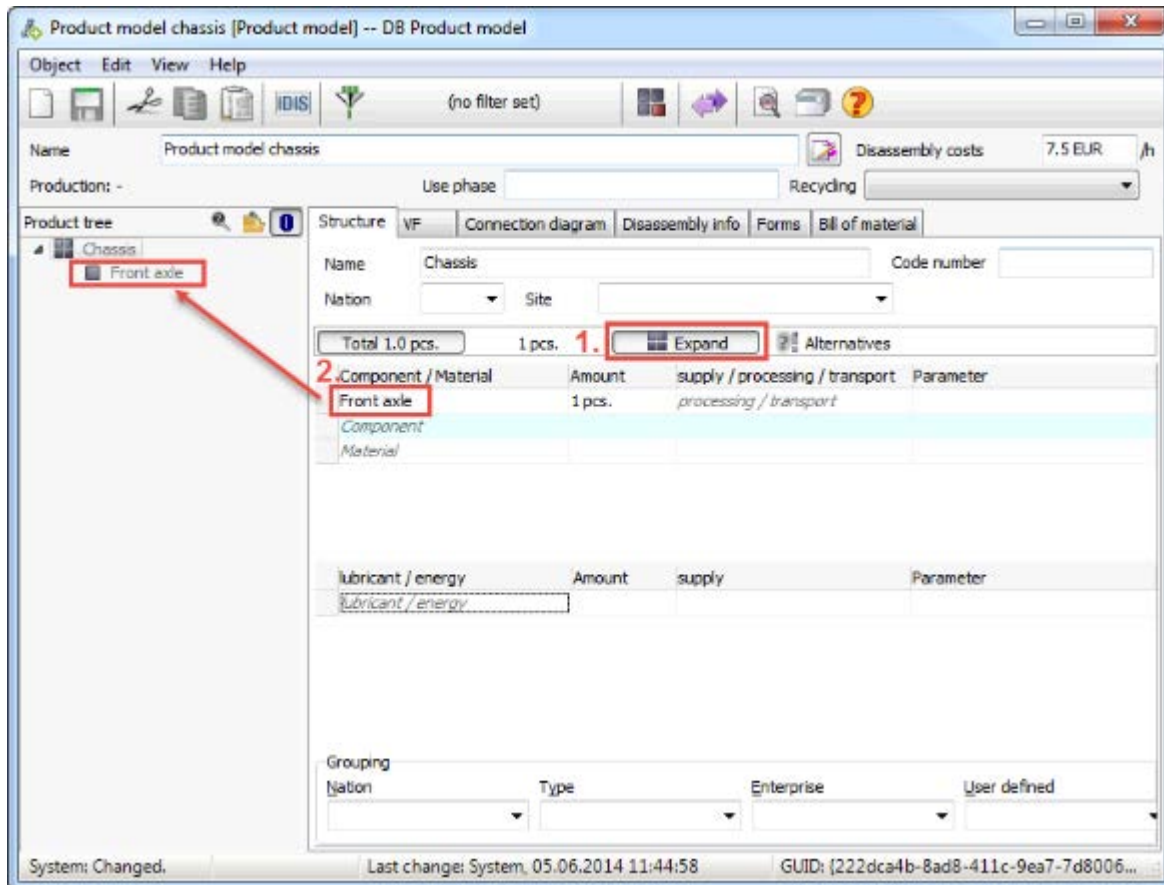


Figure: Adding components to product model

5. If you enter information in the "Material" line of the column "Components/Material" a search window will open to select a GaBi dataset. Once you selected a dataset the material will be added to the product tree. Components that have a material assigned will be displayed in red in the product tree.

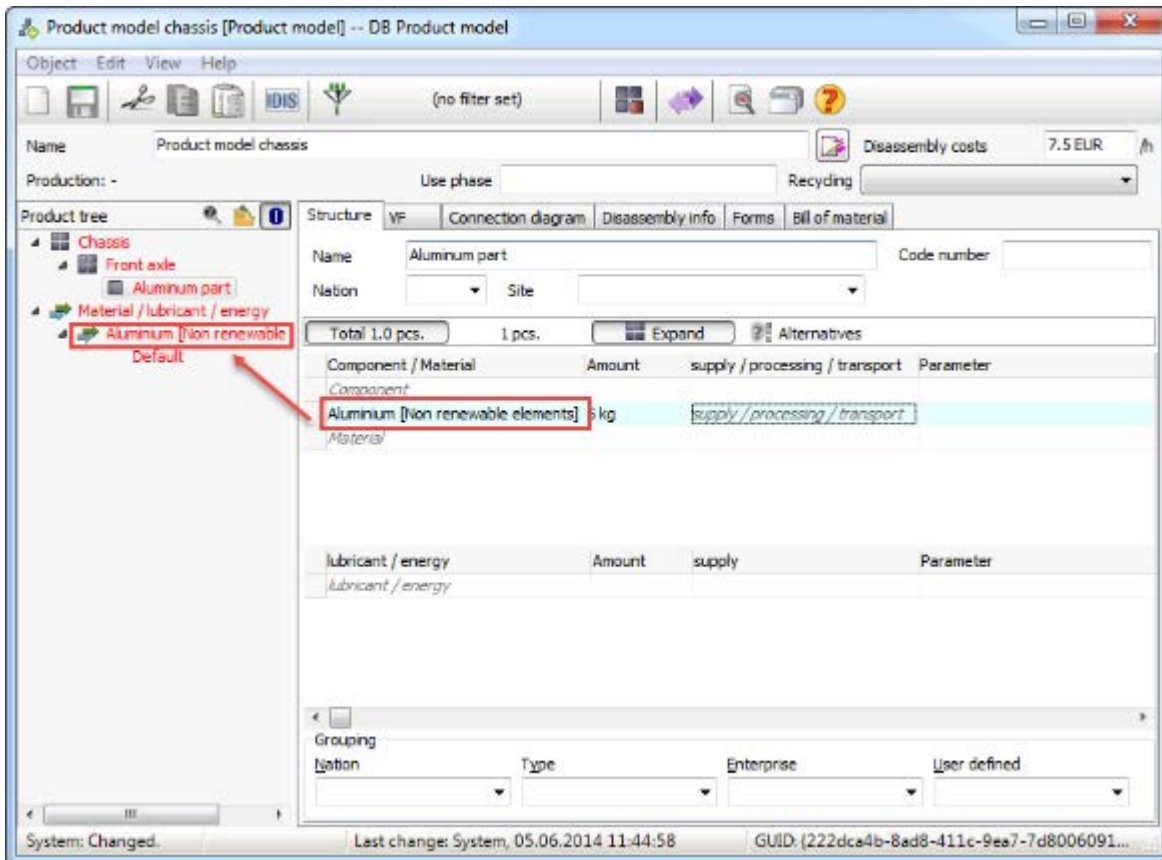


Figure: Adding materials to prouct model

If a product structure is defined with assembled parts and components, you should assign individual components with materials. The flows that are used for the materials should contain quantities. The material properties for the assembled parts are transferred automatically from the components below.

A plan or process representing the material supply can be assigned to any material flow. Any number of processes representing the "supply/processing/transport" can also be assigned - this creates a process chain.

6. If you enter information into the cell directly beside the material a search window will open to select a GaBi dataset. Components that have all their materials assigned to "supply/processing/transport" datasets are displayed in black in the product tree. By adding more processes into the new, a process chain or plan chain can be defined for every component or assembled part.

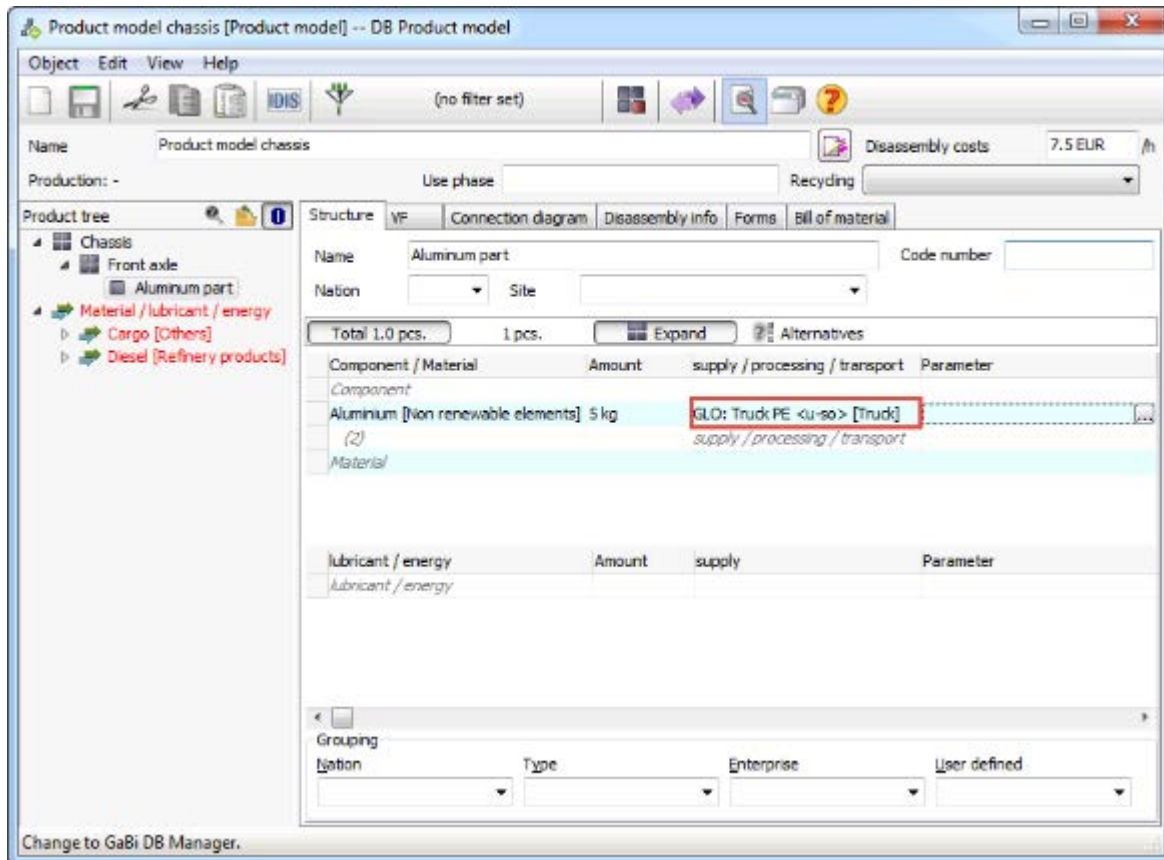


Figure: Adding transport to material

7. By clicking in the column "lubricant/energy" you can assign energy and lubricant to each component or assembled part. In turn, each of these materials can have a supply process assigned.

In contrast to other materials, lubricants and energies are only needed during the production of the component and therefore do not contribute to the overall weight of the product or the properties of the product.

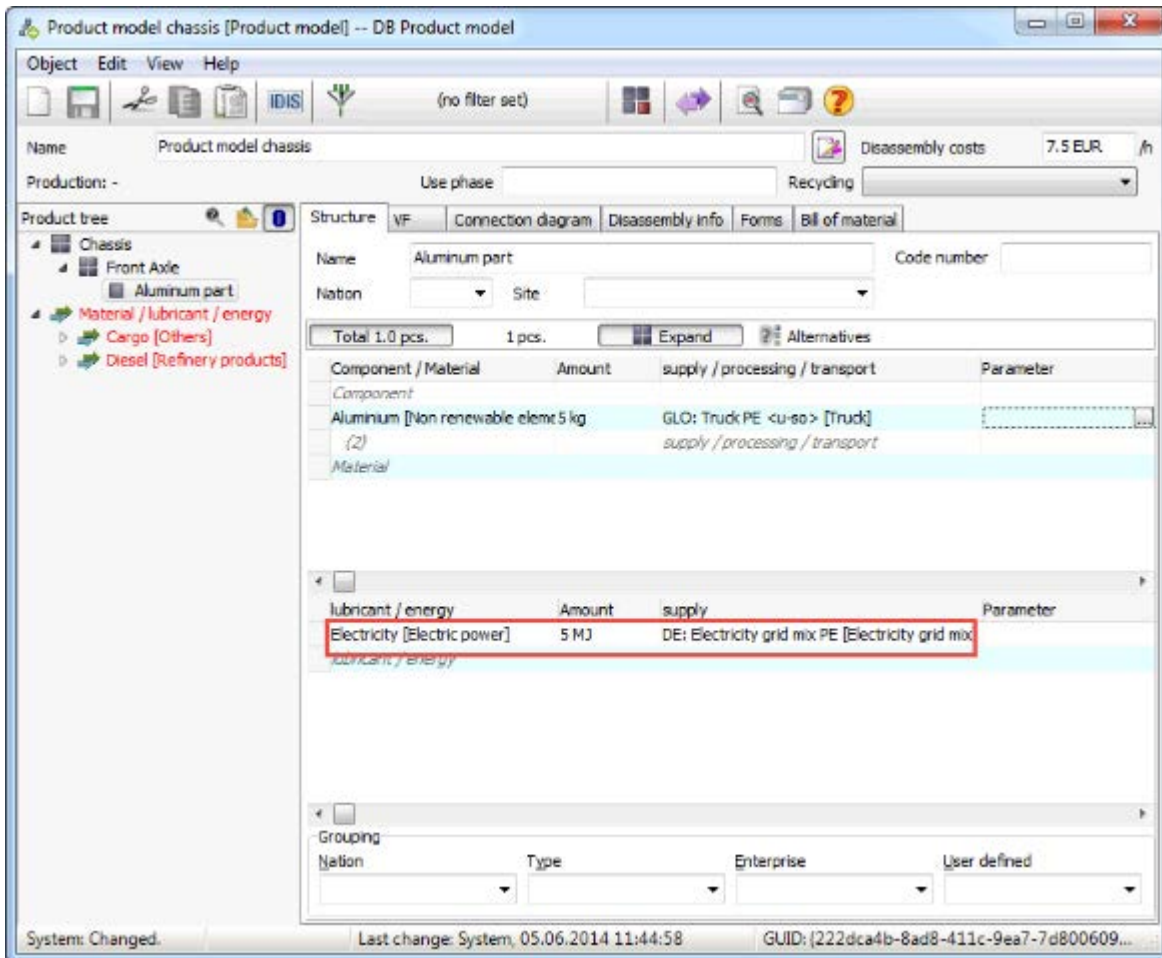


Figure: Adding electricity or lubricant to component

Any process/plan that has been entered to represent supply/processing/transport can contain parameters. The right column in this table serves for setting these parameters. For processes/plans with several inputs or outputs, one can be selected here enabling a process chain to be built up. A pop-up window appears when selecting a supply, processing or transport process.

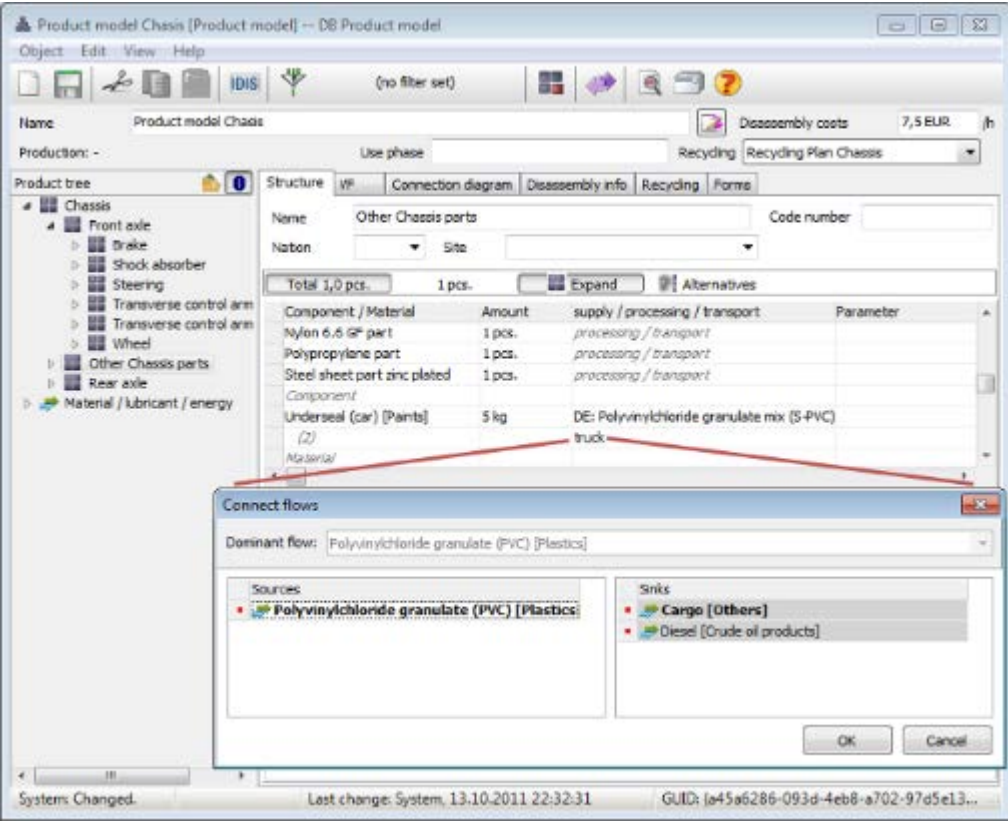


Figure: Product model window – Tab: Construction (VIII)

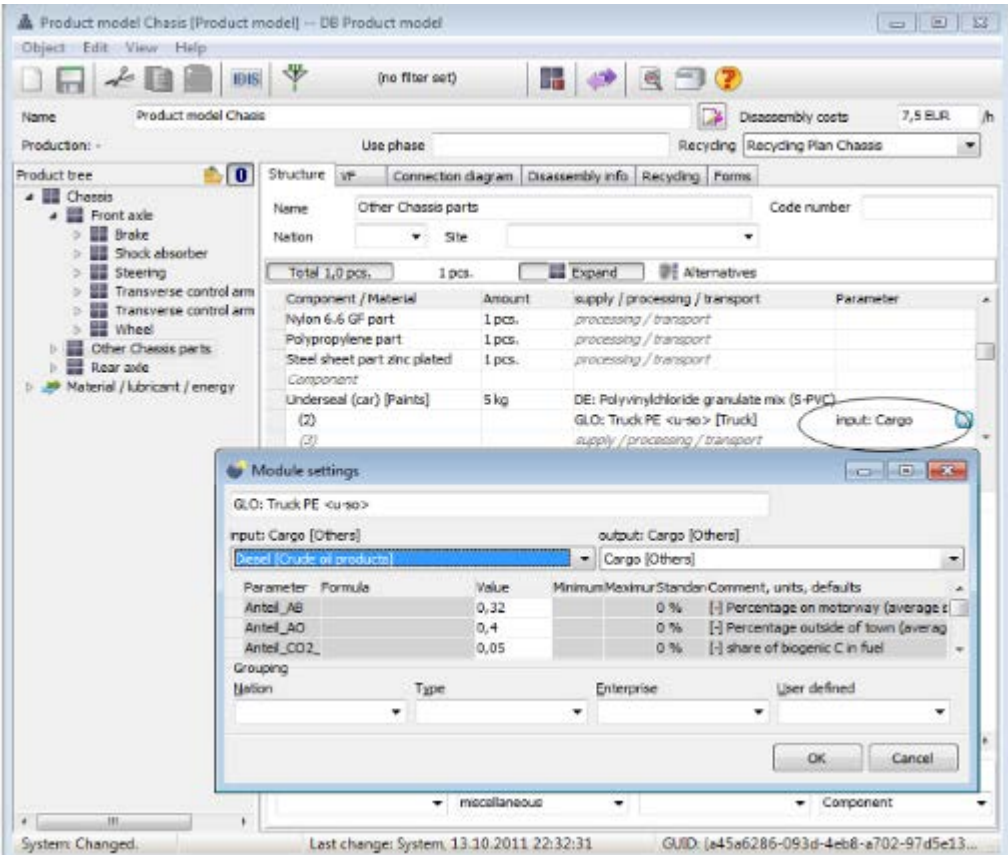


Figure: Product model window – Tab: Construction (IX)

The following graph displays the assignment list where the respective default dataset for the selected material can be entered.

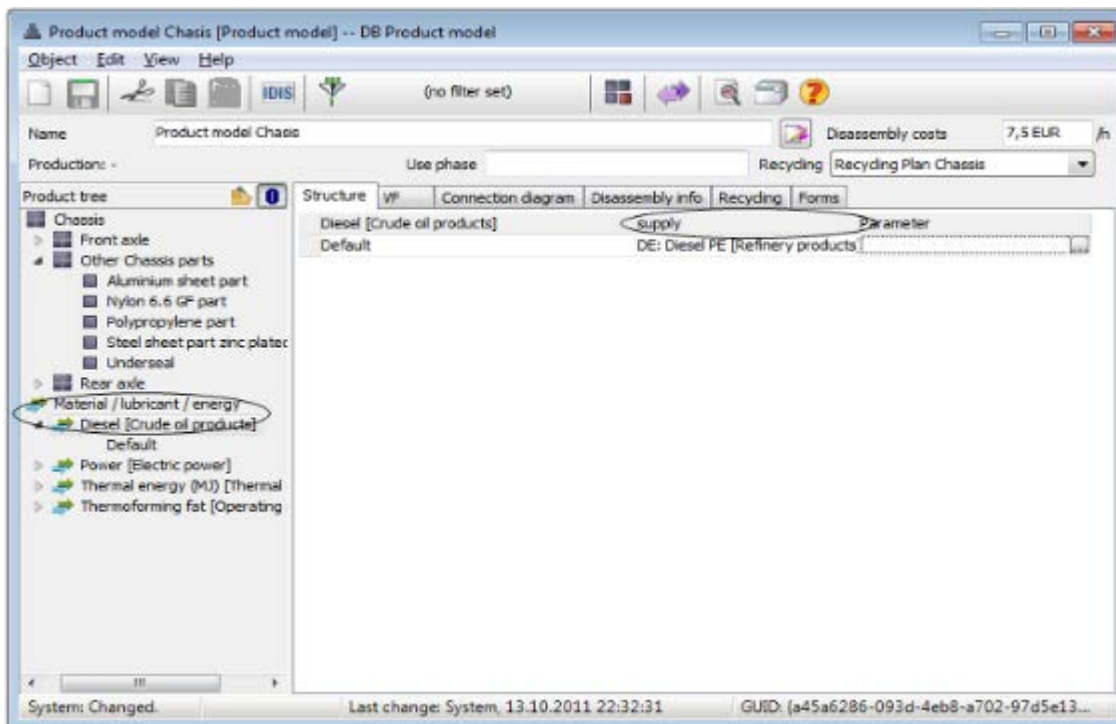


Figure: Product model window – Tab: Construction (X)

In case the given material in the assignment list is used in more than one component the GaBi function (right mouse click) 'Origin' allows showing the location of the used material in the complete product tree.

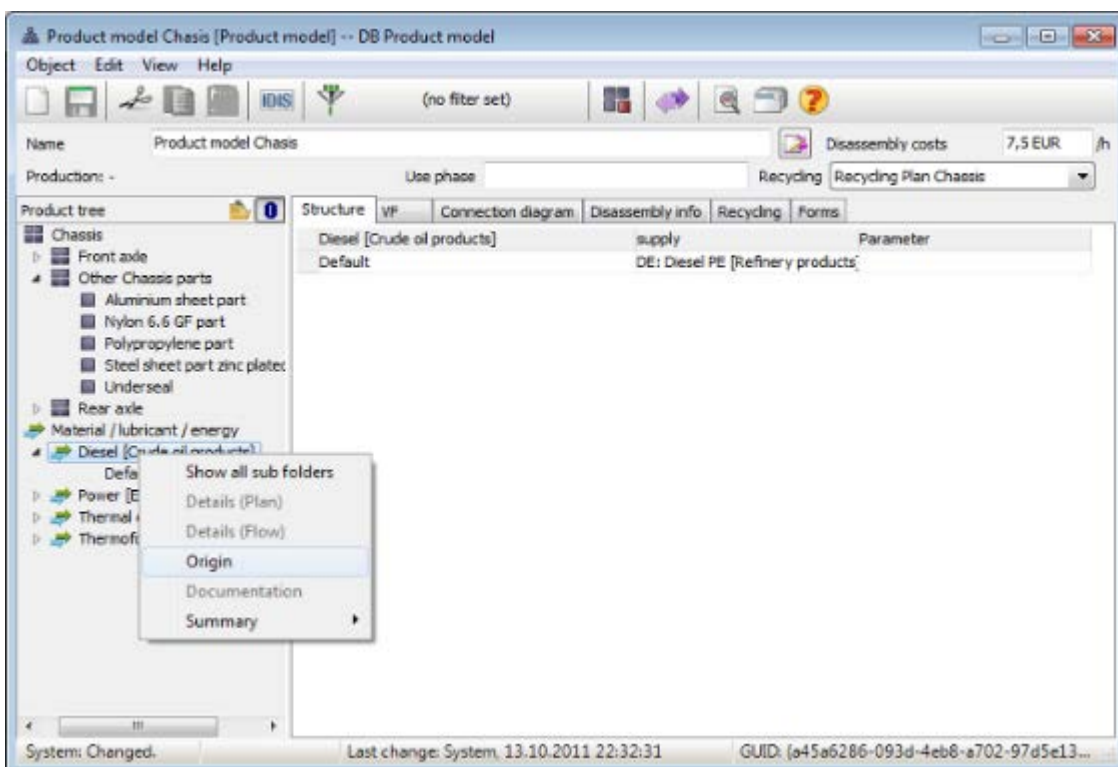


Figure: Product model window – Tab: Construction (XI)

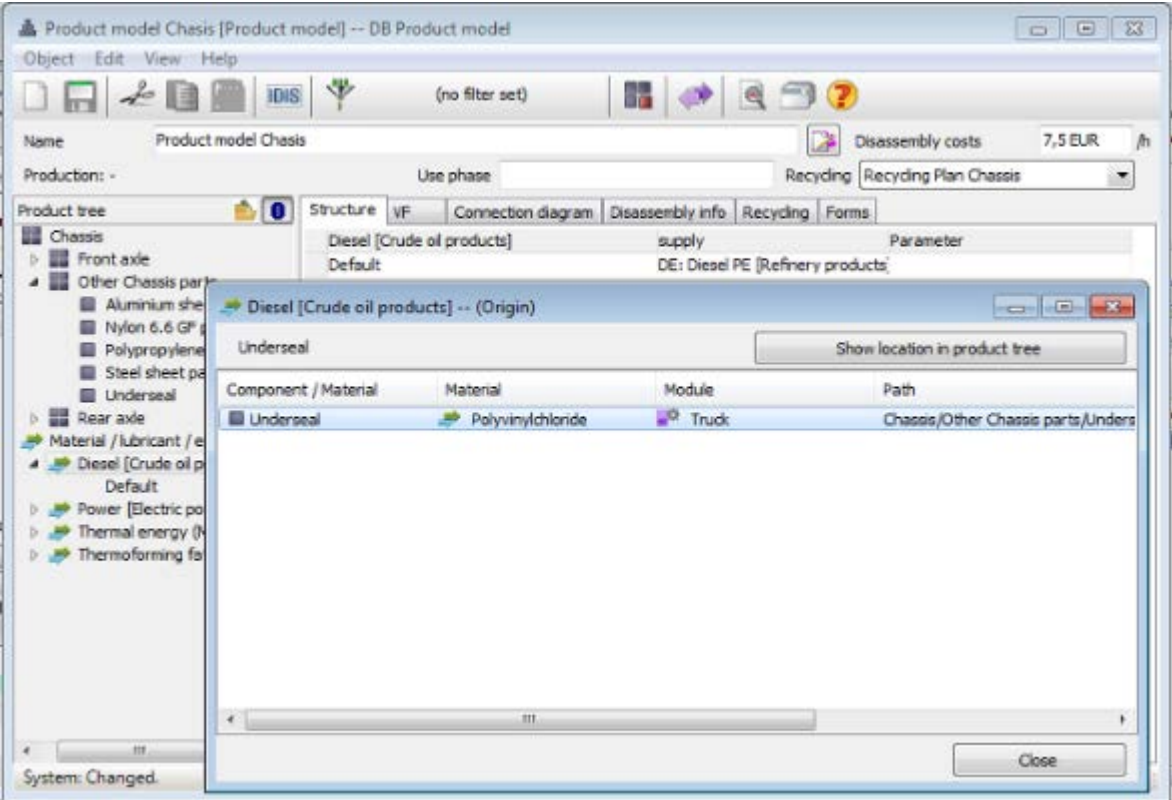


Figure: Product model window – Tab: Construction (XII)

Regardless of whether parameters exist or not, the local names of the processes and grouping settings can be entered here, analogous to the process instances on GaBi plans. This is achieved by clicking in the cell to the right of the process and clicking the  button.

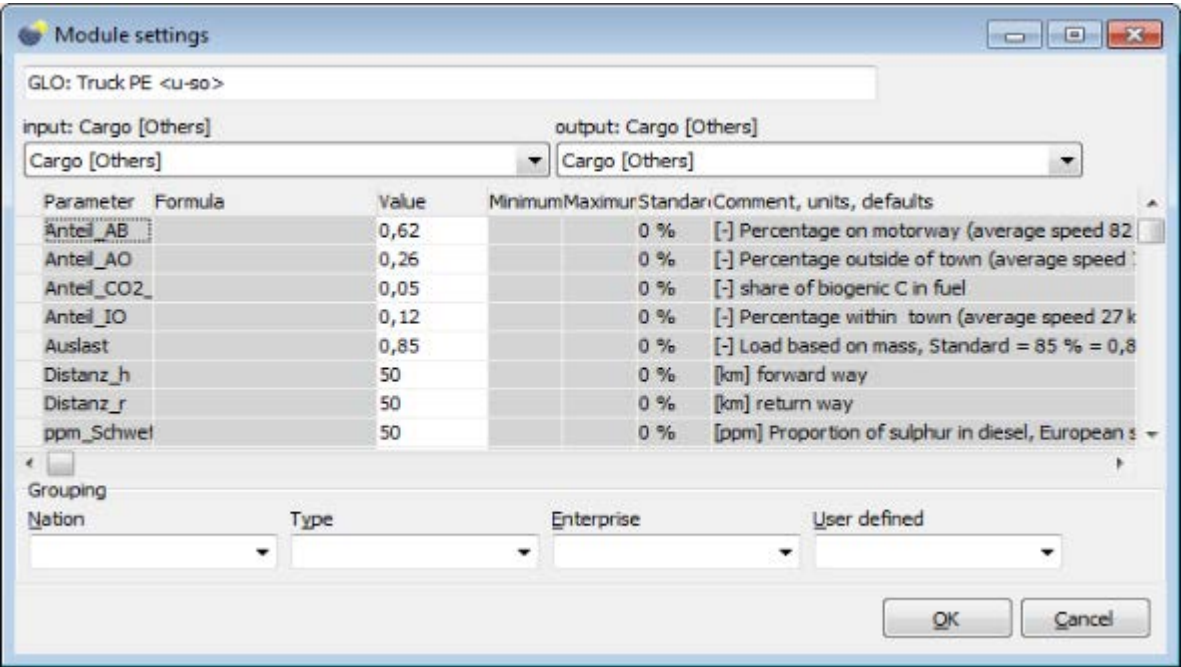


Figure: Product model window – Tab: Construction (XIII)

The content of the construction tab can be displayed in different modes.

When the  **Expand** button is pressed, empty rows are displayed for entering new components, materials and modules of the process chain. When this button is not pressed, the empty rows disappear to improve the clarity of the table.

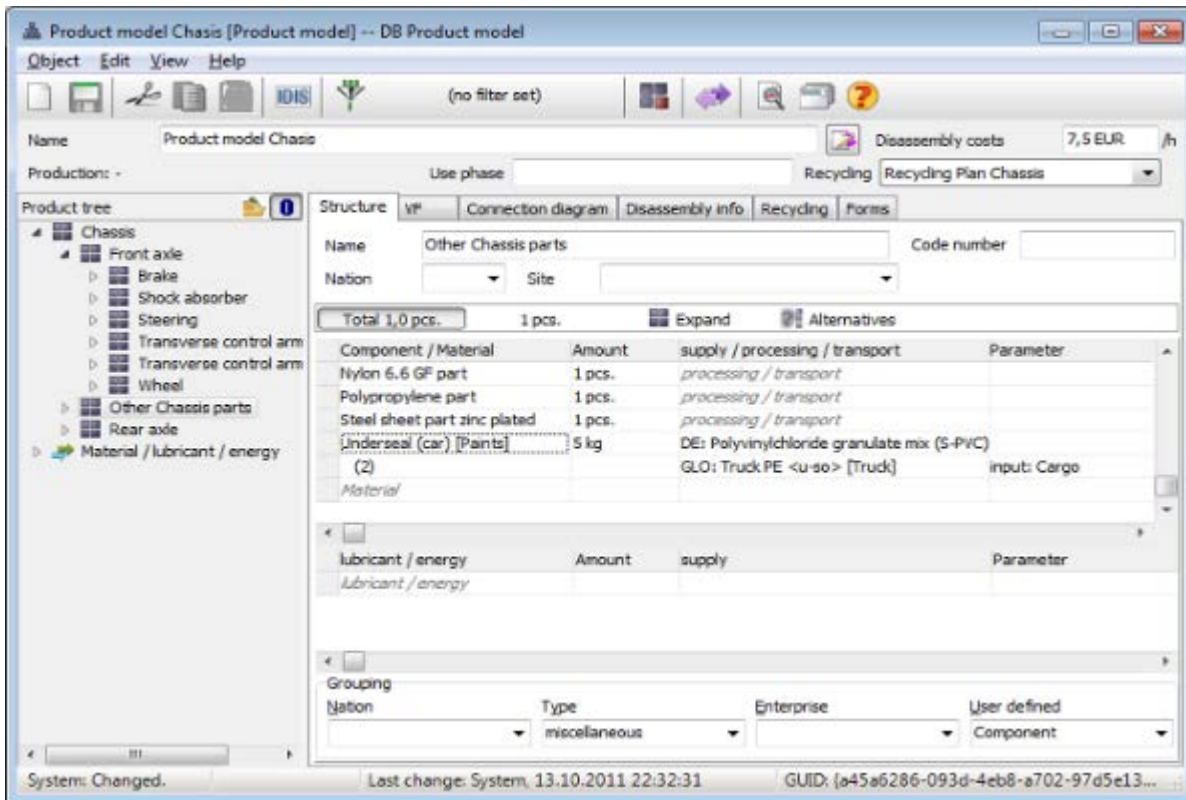


Figure: Product model window – Tab: Construction (XIV)

When a product contains the same component multiple times, you can choose whether the values shown should reflect the single weight of one of these components or if the total weight of its multiple use should be shown. Say, for example, the product is an automobile and, among others, it has 2 wheels in the front axle as components. When pressing the **1 pcs.** button, the weight of one component will be shown.

When the button directly to the left is pressed, the total weight of all the similar components will be displayed. This function is particularly useful when entering information directly from a bill of materials.

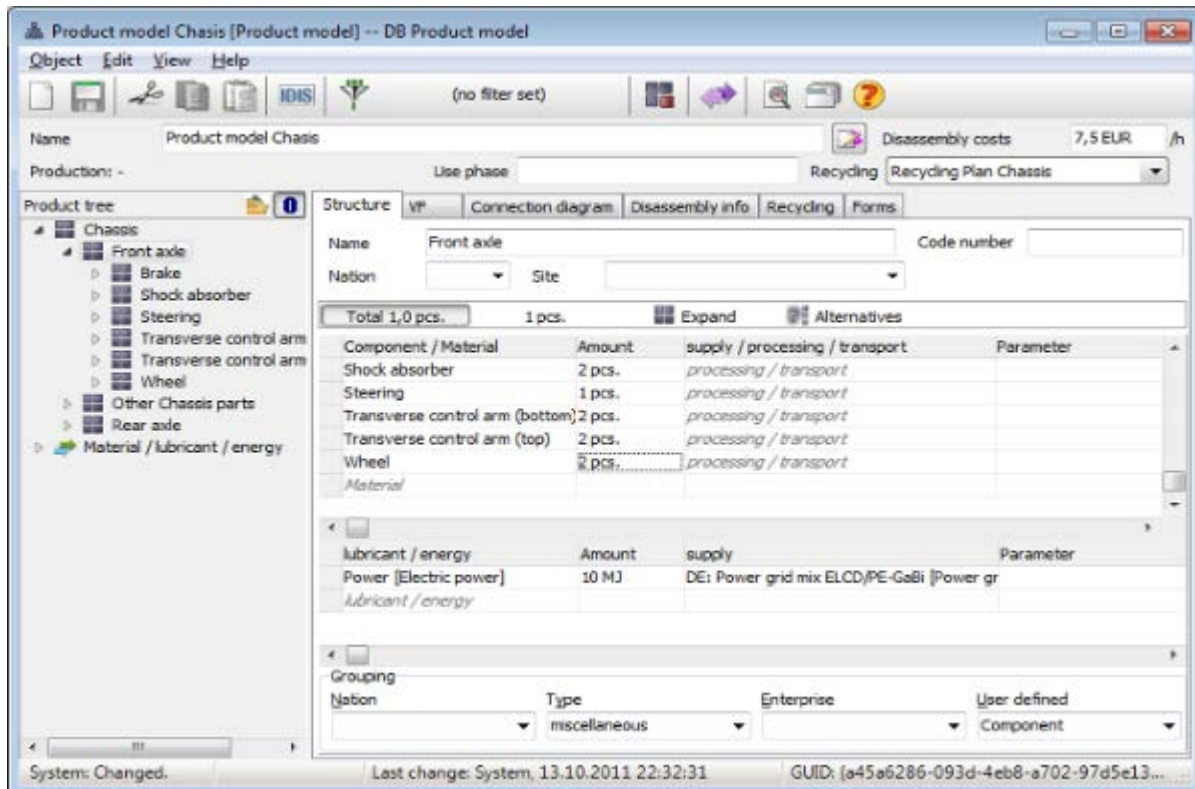


Figure: Product model window – Tab: Construction (XV)

10.5.1.1 Alternative parts

In reality, some components can be made from a choice of several different alternative materials (e.g., steel or aluminum rims). To account for this in the product model and enable simple switching between options, 'Alternative components' can be created.

To make a component into an 'Alternative component' (e.g., a steel rim) select it in the product tree and click the **Alternatives** button. This will cause a new level to be created in the product tree, characterised by the symbol for alternative components. Beneath this alternative component, you can now add further components next to the existing one, which should serve as alternatives (e.g., aluminum rim).

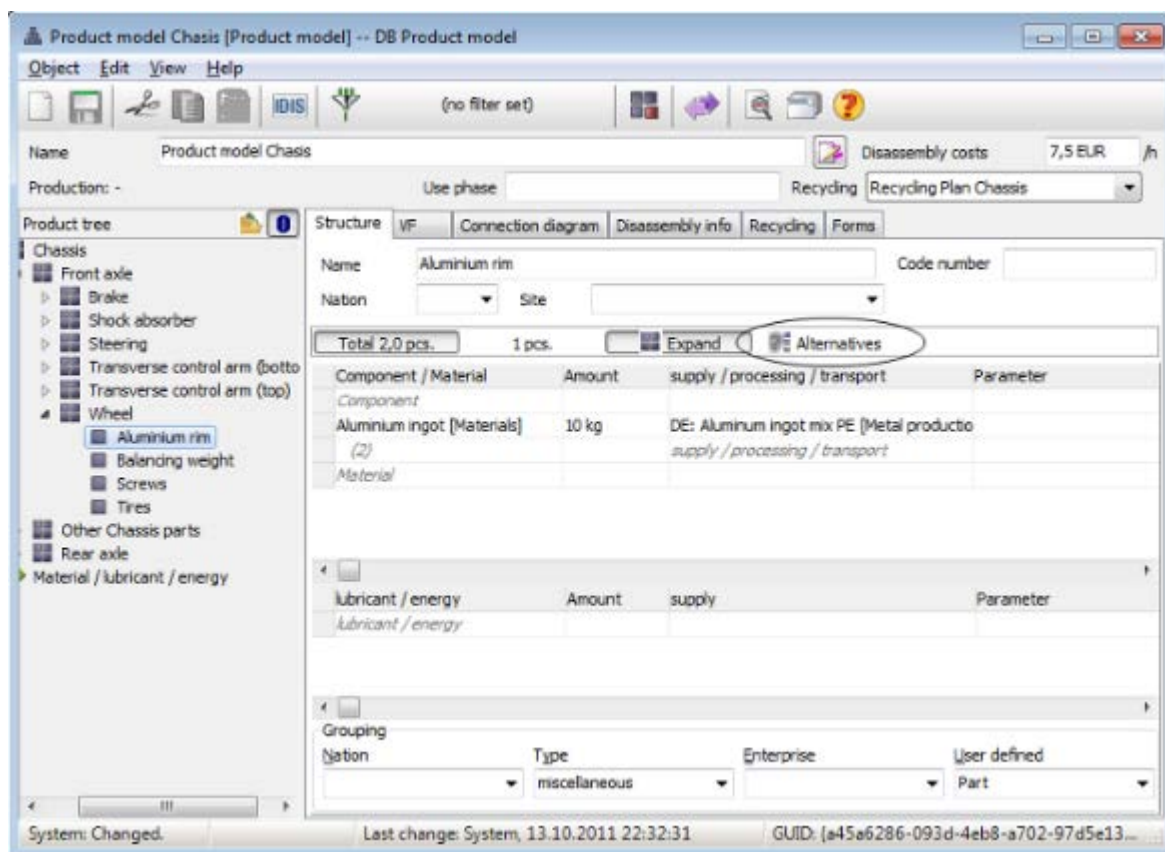


Figure: Product model window – Tab: Construction (XVI)

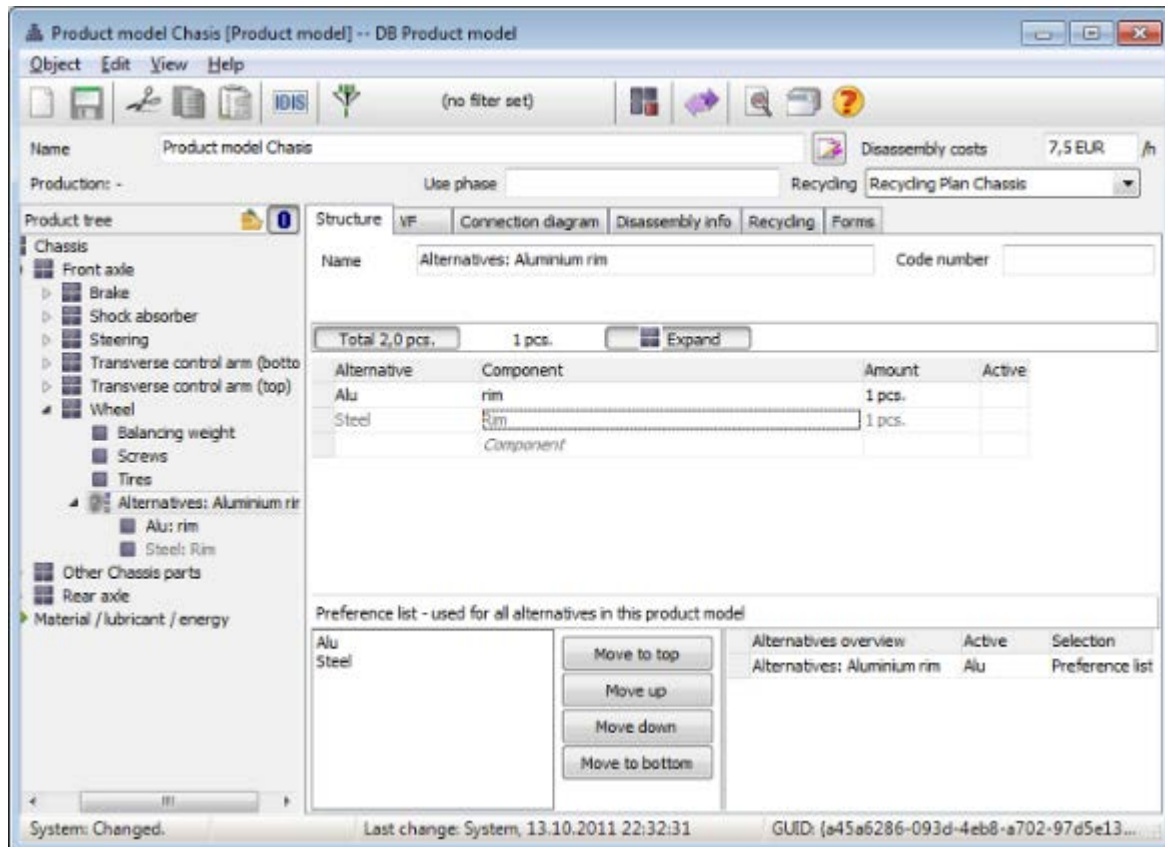


Figure: Product model window – Tab: Construction (XVII)

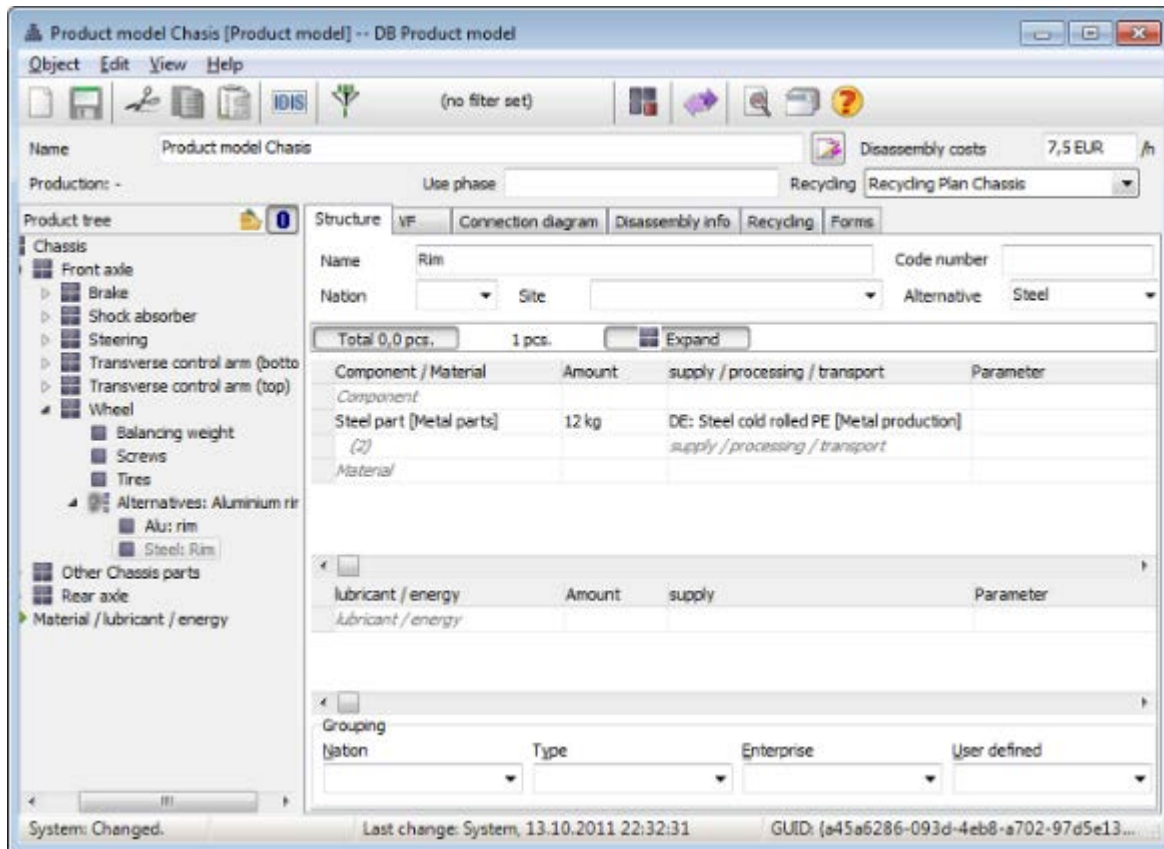


Figure: Product model window – Tab: Construction (XVIII)

Only one of the alternative components is active at any one time; the inactive ones appear in grey font. Only the active alternative's weight and properties contribute to the assembled part. The active component can either be selected directly via the 'Active' column or it can be determined via the alternative groups.

Any alternative component can be assigned to an alternative group (e.g., a group for where all steel alternatives are chosen or all aluminum alternatives). The active alternative will then be determined automatically according to the entry in the preference list. The alternative that is highest in the preference list will be activated. This allows multiple alternative components in a product model to be activated in one step; by simply making a change in the preference list.

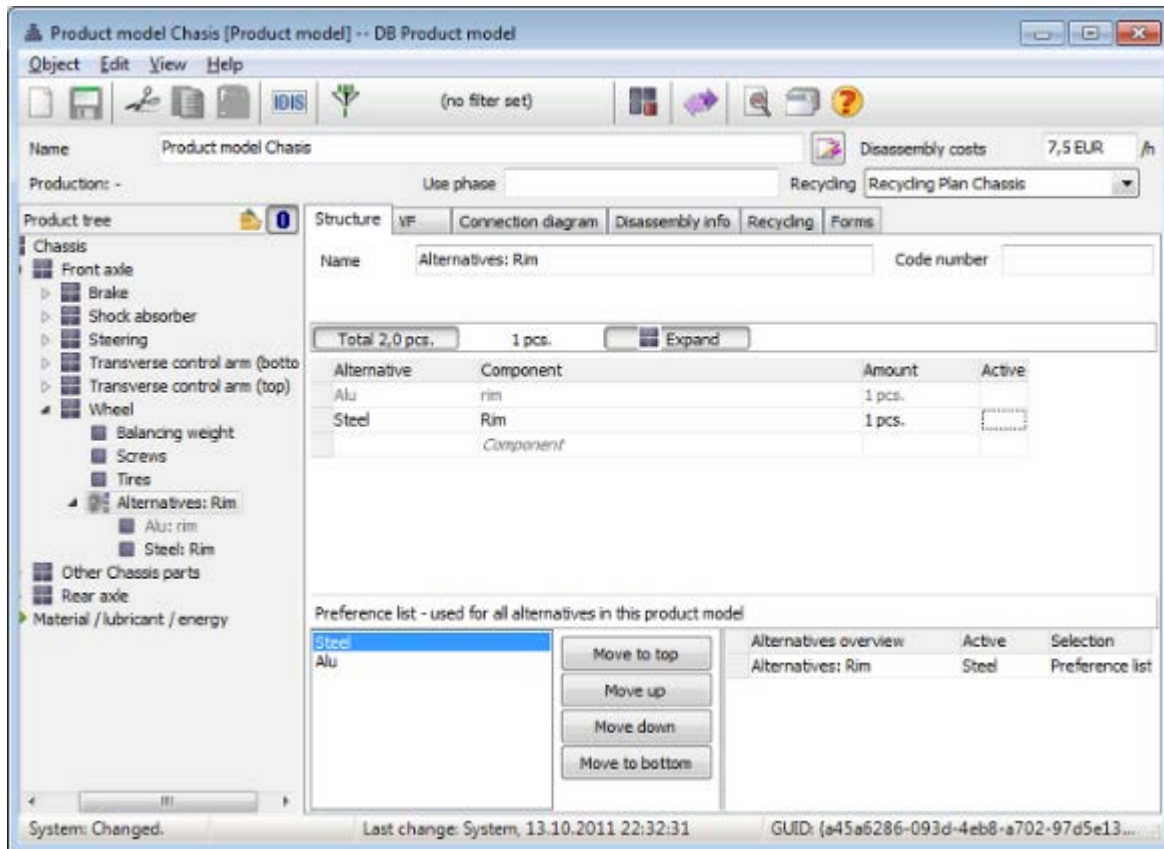


Figure: Product model window – Tab: Construction (XIX)

The preference list and the alternatives overview in the lower part of the window always refer to **all** alternative components in the entire product model.

10.5.1.2 The process assignment list

Whenever the construction tab is activated, the assignment list is displayed in the product tree frame. All flows that are used as materials, operating materials or energy in the product tree, or flows that have open inputs of supply, processing or transport processes automatically appear beneath the tree node “Material / lubricant / energy”. Until a supply process or plan has been assigned to a flow (in the cell to the left of it), the flow will be listed in the process assignment list and will be coloured red as a reminder.

A component or assembled part’s flows can be assigned with supply processes directly via the product tree. When this is done, the flow will no longer appear in the flow assignment list since you have provided the required upstream information and the flow therefore no longer needs to be highlighted.

However, any flow may have a number of alternative supply processes or plans assigned to them which best represent the geographical location of their upstream production. Country or site-specific processes can be assigned to flows via the process assignment list.

Every flow in the assignment list has sub-entries: the default value and the country code and site that were entered for the respective element in the product model.

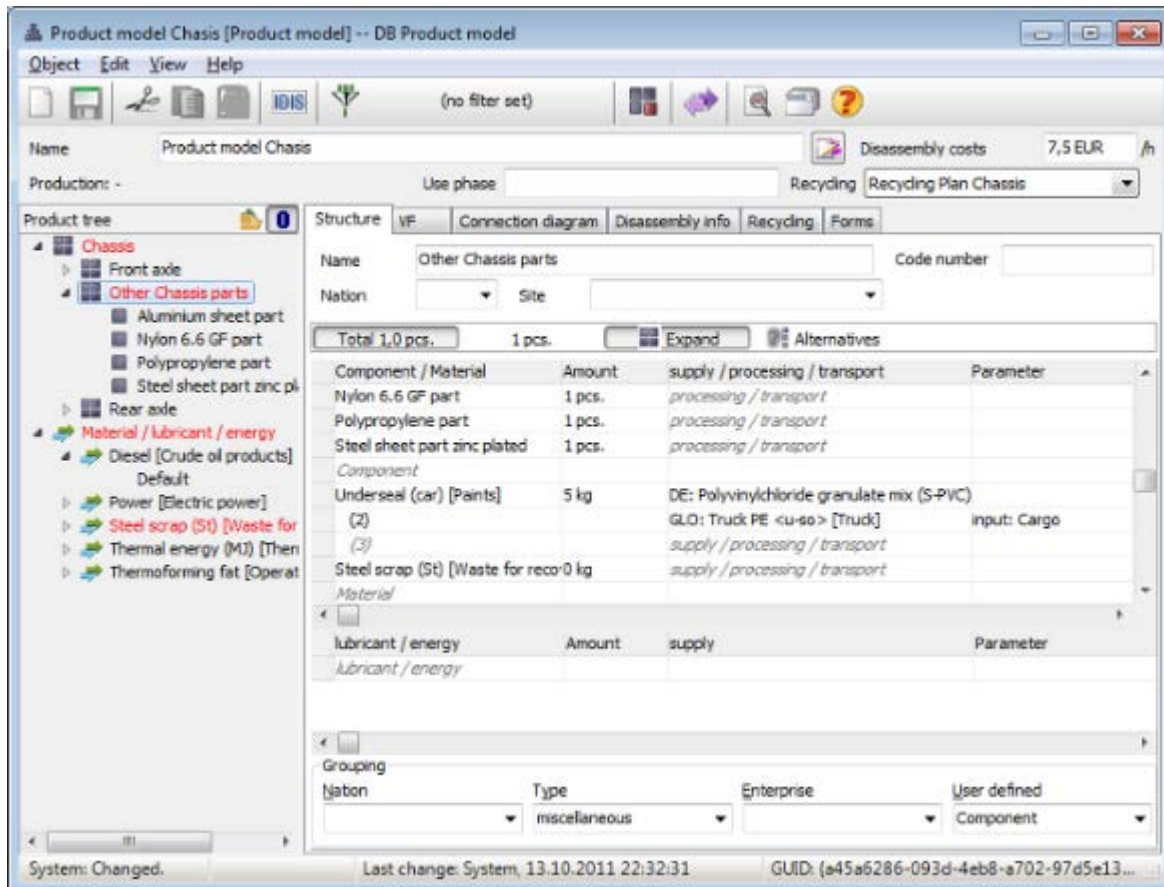


Figure: Product model window – Tab: Construction (XX)

When the user has entered processes for the flows via flow assignment list, they will no longer be displayed in red but instead will be shown in black.

When calculating the balance, 'open' flows will automatically be connected to the respective process/plan, whereby the site is considered first. If none exists, the country code will be considered next. If none exists here either, then the default will be assigned. When no supply process exists here either, the flow remains unconnected and appears as an input flow in the balance.

The functionality description of the product model in the following chapters is valid for two options. Either the user has created a GaBi plan and has converted this plan into a product model or the user has defined a product model without a physical GaBi plan.

10.5.2 Product model, Tab: Dismantling info

The 'Dismantling info' tab contains information on the individual materials of a product (components and assembly). The information related to the product component that is currently selected in the product tree is always shown in the three tables (predecessors, successors, connection) and the grouping list.

The user can get to the previous or next component by double-clicking on the precedence connection that is shown. Precedence connections are set in the **connection diagrams (Section 10.5.3)**.

Precedence		
Predecessors	Successors	
	Brake	

Connection		
Name	Component	Disassembling time
Screws	Brake; Wheel	2 min

Grouping
☐ Pretreatment (Fluids)
☐ Tires

Figure: Product model window – Tab: Dismantling info (I)

Connections of various components are presented in the Figure below. The connection name, the components connected and the disassembly time are displayed.

Precedence		
Predecessors	Successors	

Connection		
Name	Component	Disassembling time
Clips	Nylon 6.6 GF part; Polypropy	0,5 min
Screws	Nylon 6.6 GF part; Steel sheet	1 min

Grouping
☐ Pretreatment (Fluids)
☐ Tires

Figure: Product model window – Tab: Dismantling info (II)

10.5.3 Product model, Tab: Connection diagram

The product model also has a tab with the label 'Connection diagram' (Figure 5-4). This tab shows the product model in a graphical format. Right-clicking on the white background allows you to choose the menu point, 'Set visualized quantity'. After choosing the quantity (for example, of a material), the amount of each of these quantities (e.g. kg light alloys, Figure 5-5) will be shown for each of the product's components. The thickness of the product connections (the blue lines) is proportional to the amount, analogous to quantity representations in Sankey diagrams. In this sense, it is easy to trace components or building groups with a high content of a particular material or a hazardous material (e.g. according to the Used Automobile Ordinance).

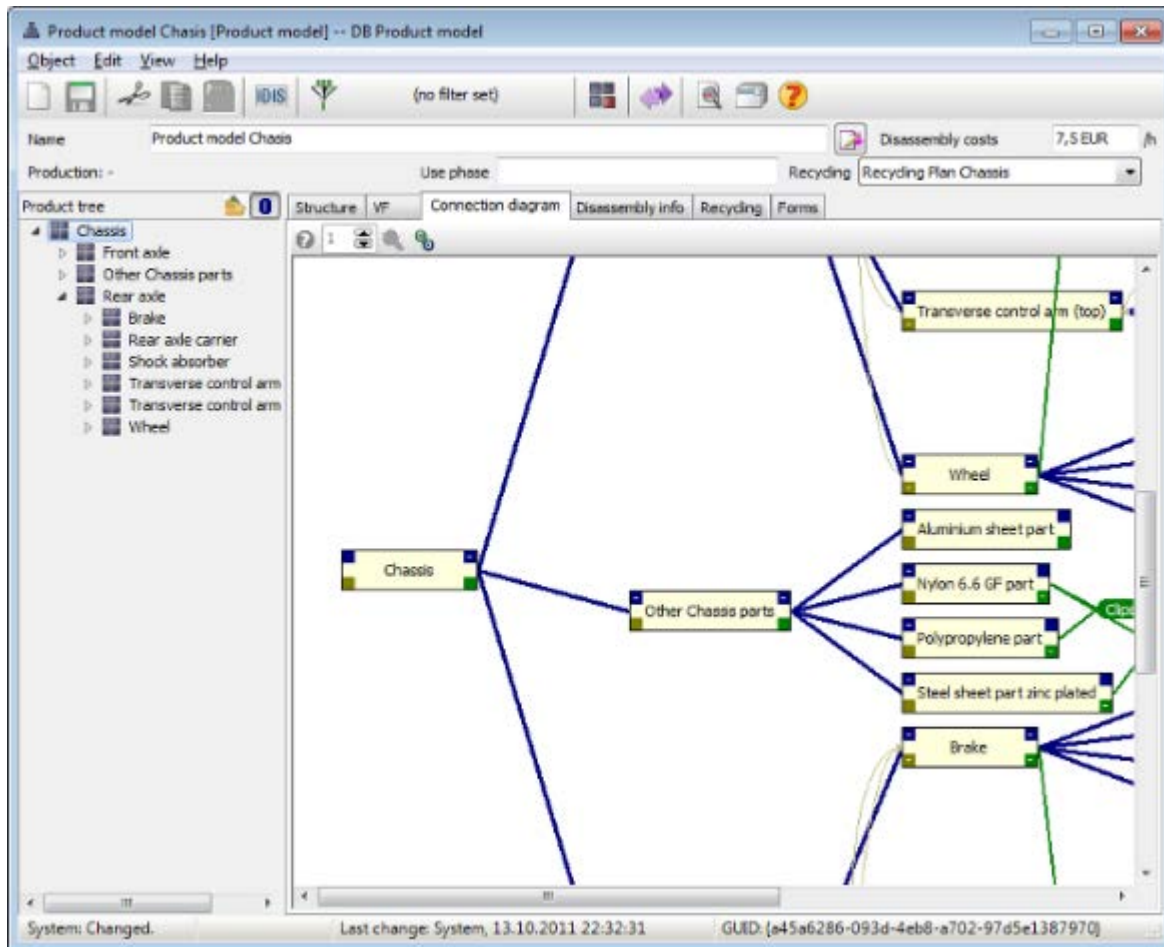


Figure: Connection Diagram (Chassis)

Product model Chasis
GaBi 5 Product model: Mass

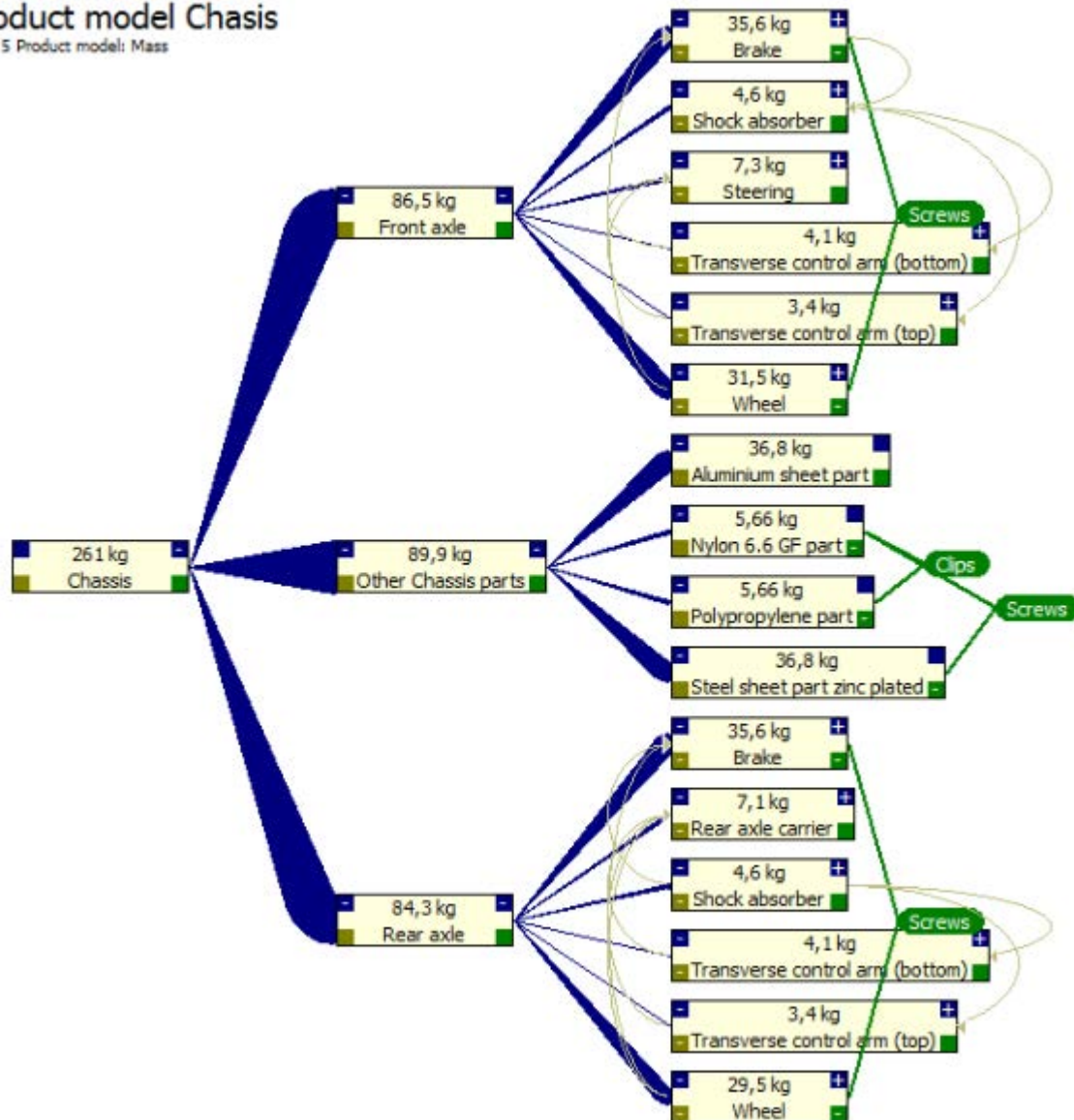


Figure: Visualisation of single material

Within the connection diagram, there are a large series of operations that can be carried out. These are described in the following.

10.5.3.1 Unfolding connections in the connection diagram

To show already existing connections in the connection diagram, click with the left mouse button on the blue corner of a product component (+ or -). All connections of a connection type of the respective product component are shown or hidden.

By clicking with the right mouse button on the corner of a product component, the single connection can be selectively shown or hidden (Figure below). By clicking with the right mouse button on the free diagram surface all connections of the total connection diagrams of a connection type can be shown or hidden.

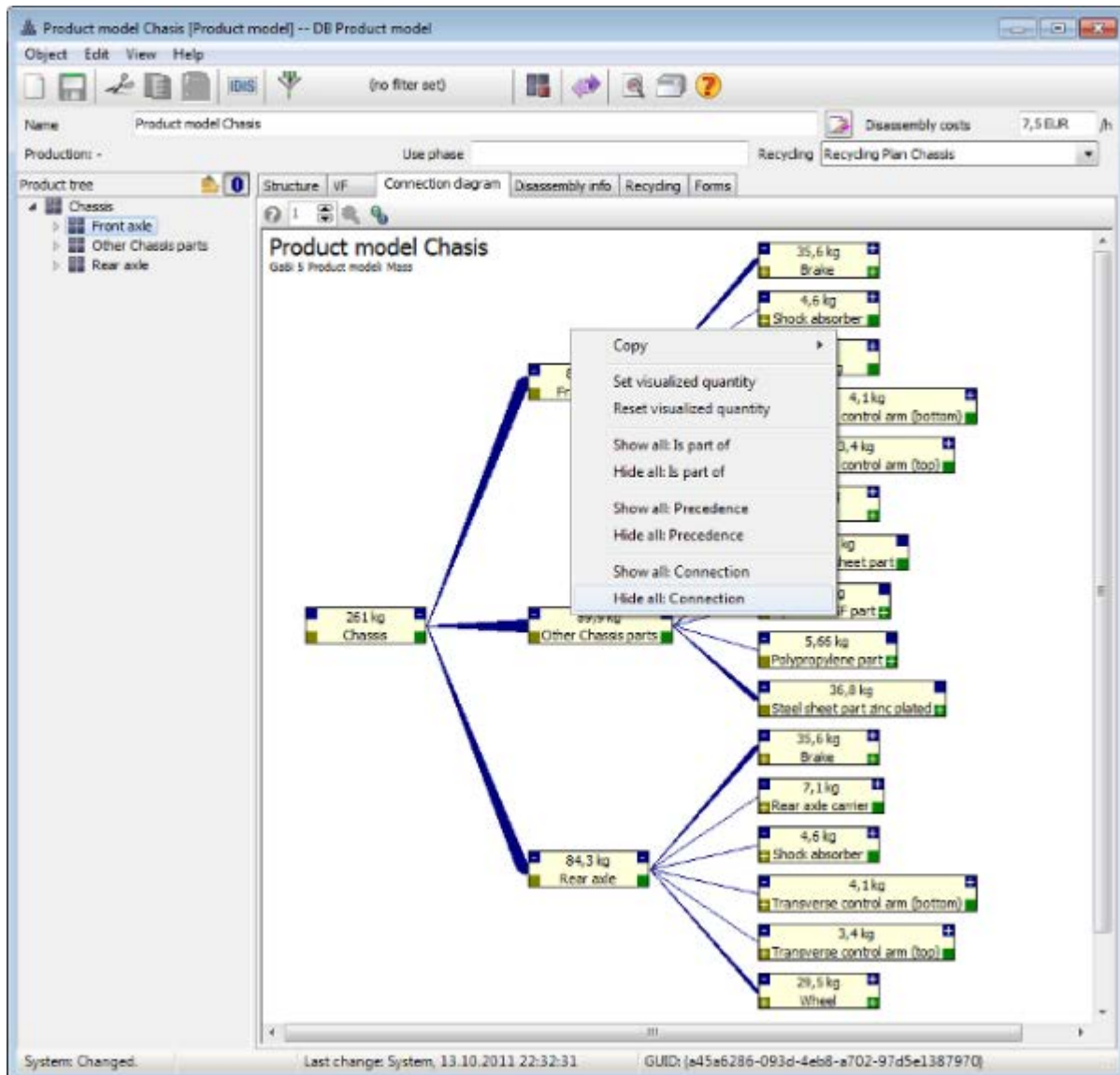


Figure: Selective Fade in and –out in the connecting diagram

These basic functions of the connection diagrams display the tree structure of the product, or better, of the individual product components. In contrast to the product model on the right side of the window, here the components of the middle hierarchy level can be displayed on their own, that is, without the structure levels above them. The definition of the connections for the disassembly analyses will be described in the following paragraphs.

10.5.3.2 Establishing new connections

New connections between product components can be established by drag 'n' drop from the bottom right corner of the box of a product component onto the box of another product component or an element of the product tree.

Specifying new connections is only possible for components that lie on one level.

The Figure below shows the new connection, 'New'. New connections can then be edited (see the following paragraphs).

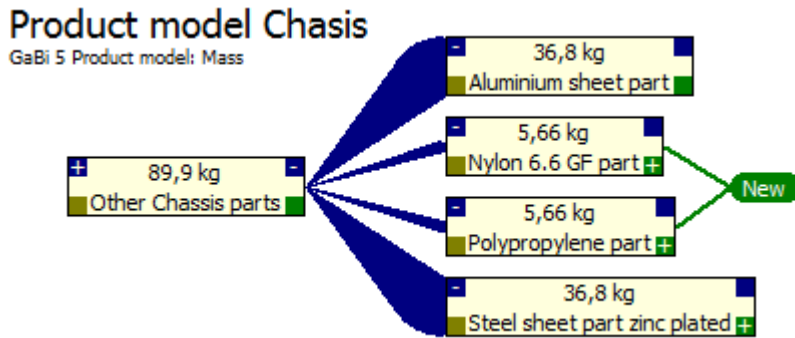


Figure: Defined connection ‚New’ in the connecting diagram

10.5.3.3 Editing connections, deleting parts of a connection

Begin by double-clicking the name or right-clicking and choosing ‘Properties’; this opens another window (Figure below). In this window, the connection can be edited or parts of it can be deleted. A specific name for a connection can also be entered. The duration of disassembly time for the connection can also be entered or alternatively the disassembling costs can be entered. The disassembling costs, or the duration of assembly, automatically arise from the disassembling costs defined for the product model in Euro per hour. Another way to make these changes is select a product component from the product tree that is part of a connection. With a double-click on the respective entry in the ‘Connections’ table, the ‘Dismantling info’ tab appears as well as a window in which you can make the changes.

Figure: Connection ‚New’

10.5.3.4 Deleting connections

Existing and displayed connections can be deleted by right clicking on their name or by right clicking on the bottom right corner of the product component box. Another alternative method of deleting connections is by selecting a product component from the product tree that is part of a connection and right-clicking on the corresponding entry in the ‘Connections’ table in the ‘Dismantling infos’ tab (a pop-up window will appear) and deleting the connection here.

10.5.3.5 Defining new precedence connections

New precedence connections can be defined by drag 'n' drop from the top left corner of the product component box onto another product component box or onto an element of the product tree. Defining a new precedence connection is only possible with components that are on one level.

10.5.3.6 Deleting precedence connections

Deleting of already existing precedence connections can be done by two options. One option is right click on the bottom left corner of the product component box. The second option is the selection of a product component from the product tree that is part of a connection. Then right click on the corresponding entry in the 'Predecessors' or 'Successors' tables in the 'Dismantling infos' tab. In the new appearing pop-up window the precedence connections can be deleted.

10.5.3.7 In general

Pop-up windows appear when right clicking in the connections diagram. Here, the following elements of the connection diagrams can be clicked upon: Corner of a product component box, surface of a product component box, name area of a connection, empty diagram surface.

10.5.4 Product model, Tab: Variable flow quantities

The VF tab displays the variable flow quantities of the product or of product components and their composition. In the left table, the quantity hierarchy can be expanded like a tree, in the same way as the GaBi database manager.

For the large folder, values are only given out when the units of all GaBi quantities beneath it are the same. For example, in the VDA material classification in the Figure below, all units are in 'kg'. A new quantity classification can be defined and analysed at any time.

The right table displays the composition of the quantity values in the left table in reference to the individual components of a product component.

The right table shows the partitioning of the quantity (that is highlighted in the left table) between the independent components. The partitioned component name is given at the top of the right table ('VDA material classification' in the Figure below).

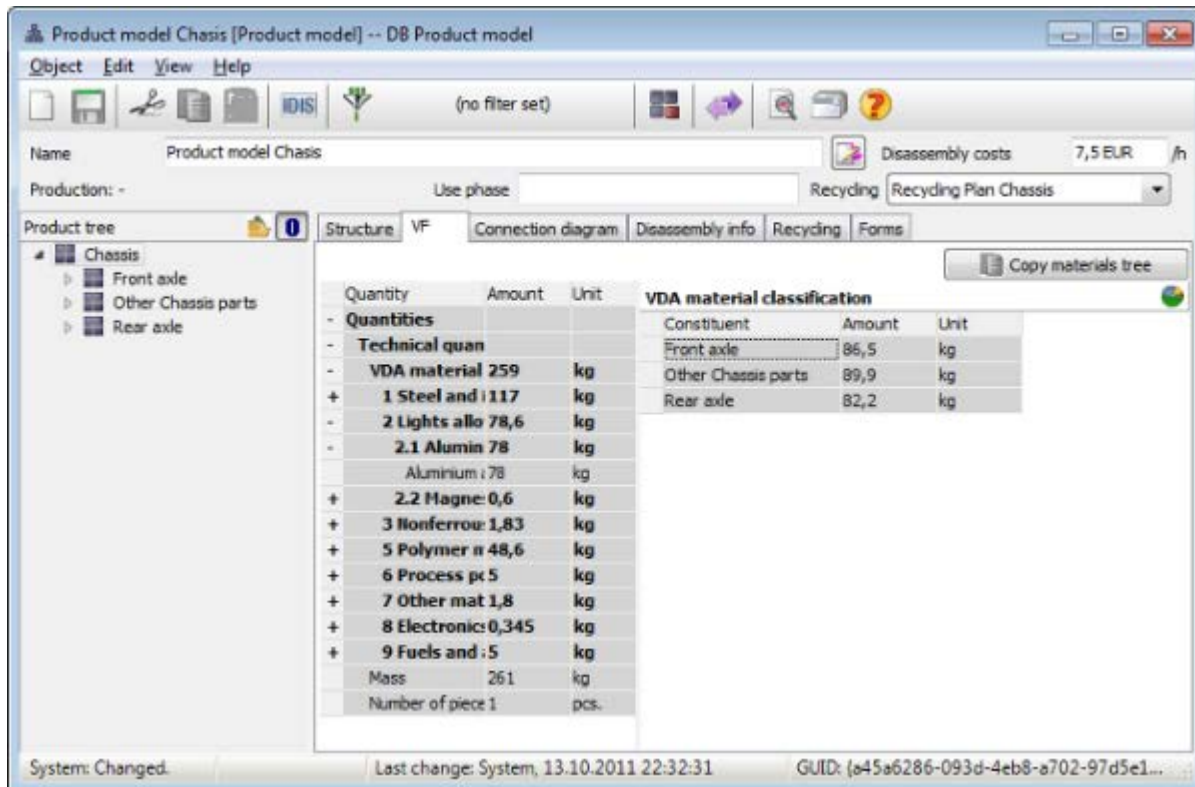


Figure: Product model – Tab: "VF" (Variable flow quantities)

10.5.5 Product model, Tab: Forms

Selecting the 'Forms' tab enables automatic calculations and the creation of forms. Via a pull-down menu, the form for calculating ISO-quotas according to ISO 22628 can be selected. Other forms can be implemented upon request.

In the 'forms' tab, the user is given two options to calculate the recycling quotas. The user can chose between the ISO 22628 form and the Computation of Standard ASR weight form for the calculation of the recycling quota via a pull-down menu.

10.5.5.1 Form ISO 22628

In the 'forms' tab with 'ISO 22628' selected from the pull-down menu, the recyclability rate and the recoverability rate can be defined.

The creation of forms is based on the following steps. First the components to be pre-treated or disassembled must be defined. To do this, it is necessary to specify a disassembly group (a so called grouping) in the 'Dismantling infos' tab. To create a new disassembly group you have to define a new group in the right 'grouping' tab by using the right mouse function.

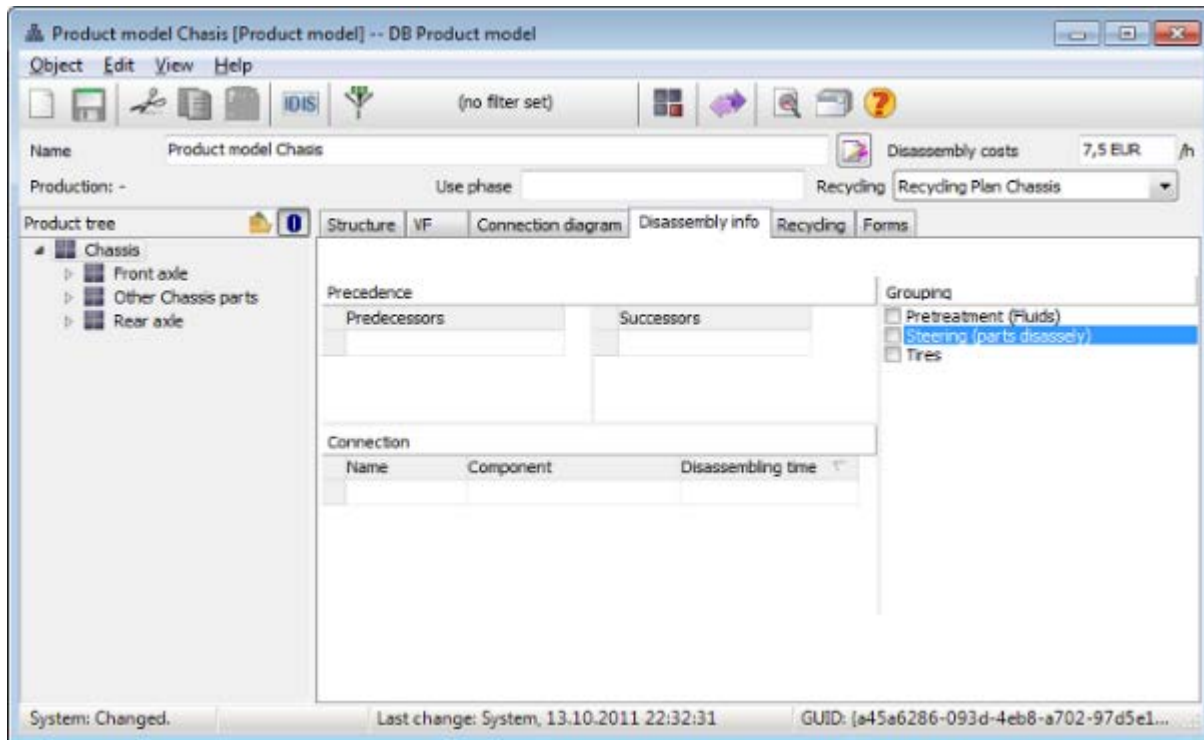


Figure: Definition of groupings, necessary for the calculation of the recycling quota

Then you must assign the corresponding components to the disassembly group by selecting the component in the product tree and activating the grouping.

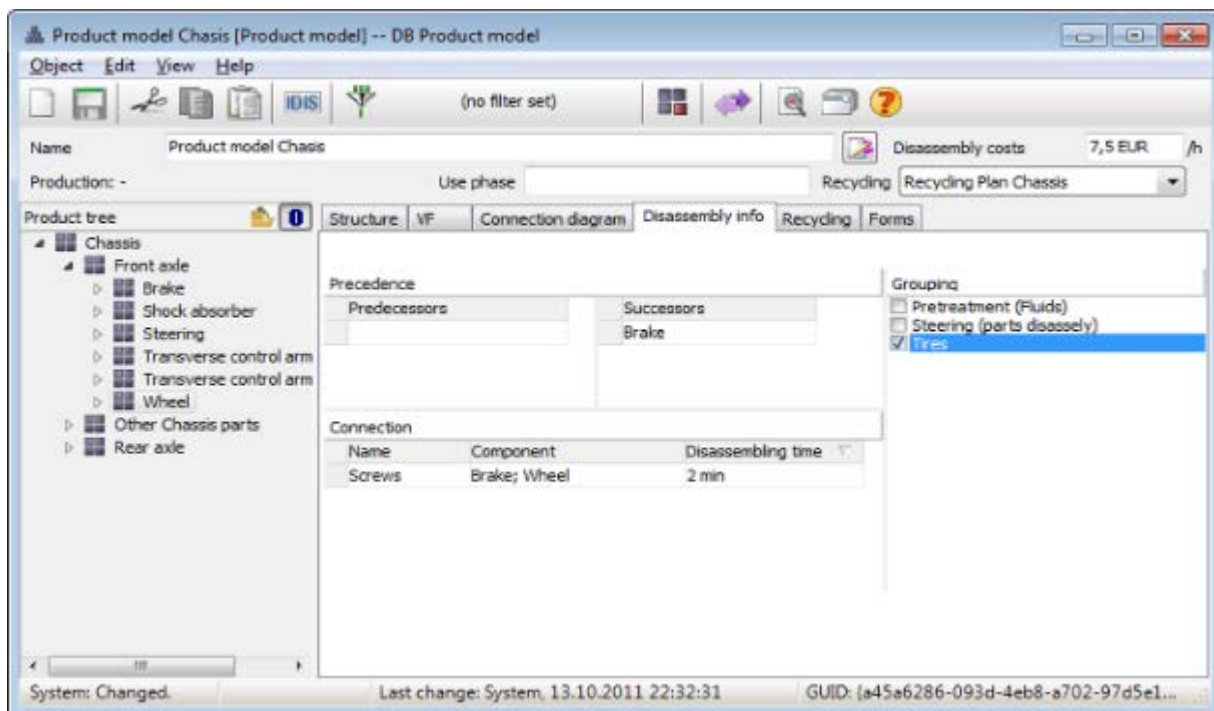


Figure: Groupings for the calculation of ISO-rate

When all components to be disassembled have been assigned to the disassembly group, the GaBi user switches to the 'Forms' tab.

Figure: Product model – Tab: Forms ISO 22628 (deactivated)

Press the refresh button in the 'Forms' tab. The form appears with a white background. In this step of calculating the recycling quotas, no grouping of the specific variable flow quantities (e.g. material classification according to VDA quantities) to the ISO-quantities has been done. This takes place in the next step.

Figure: Product model – Tab: Forms ISO 22628 (activated)

In the following step, the allocation of the VDA-quantities to the respective ISO-quantities metals, polymers (without elastomers), elastomers, glass, fluids, modified organic natural substances (MON) and others is explained.

Press the settings button and make the following changes:

The specific VDA-quantities are assigned to the corresponding ISO materials ('Materials' tab). This grouping is carried out by selecting the material on the left side and clicking the button 'Add' on the right. In the window that appears, the respective quantity now has to be selected. This procedure should be repeated for all materials. Groupings can be deleted using the 'Remove' button. (see Figure below).

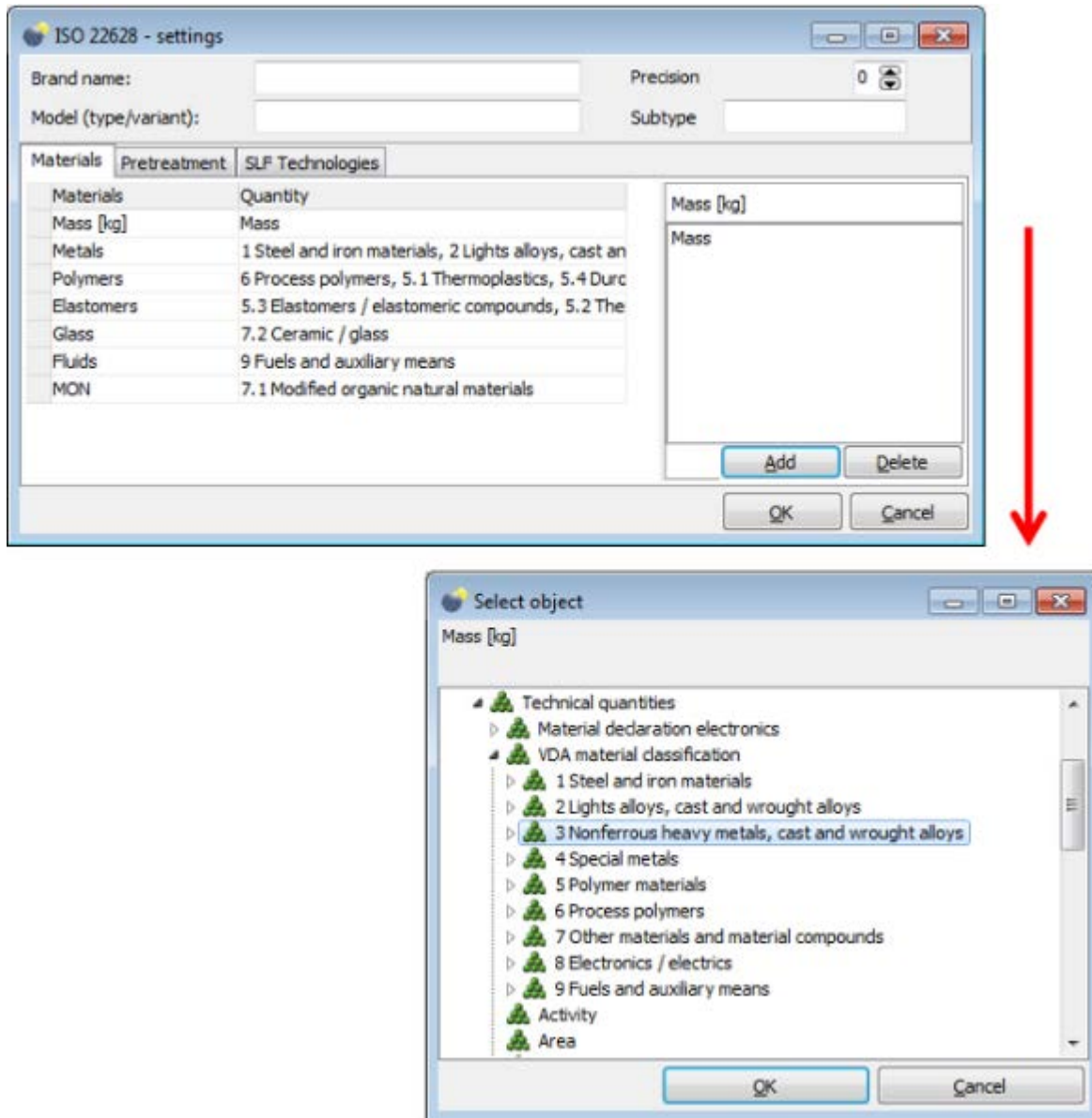
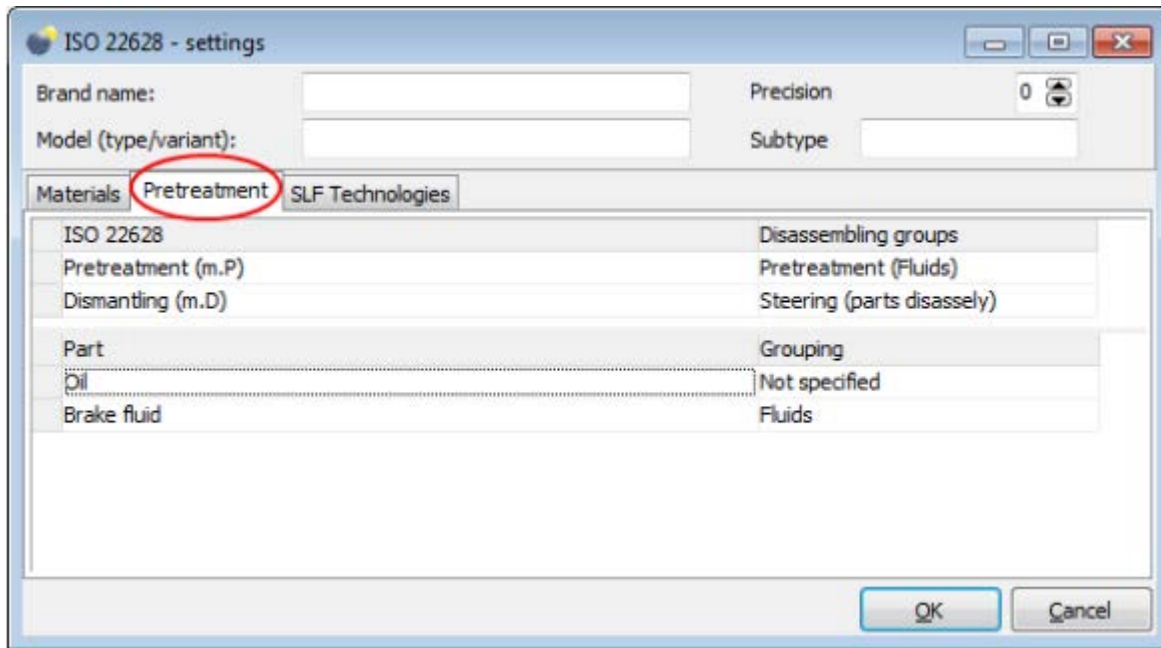


Figure: ISO 22628 Settings – Material definition

Before starting the analysis of the ISO quotas, the predefined disassembling groups have to be allocated to the single ISO disassembly steps. To do this, the disassembly groups are appointed in the 'Pretreatment' tab, analogous to the ISO structure. The disassembly groups can be allocated with a pull-down menu. In the lower part of the Figure below, one can see that the disassembled parts can be subdivided again in the single ISO disassembly step 'Pretreatment'. It is possible to arrange the components from the pre-treatment into the respective groups using the pull-down menu in the 'Grouping' column.



ISO 22628 - settings

Brand name: Precision: 0

Model (type/variant): Subtype:

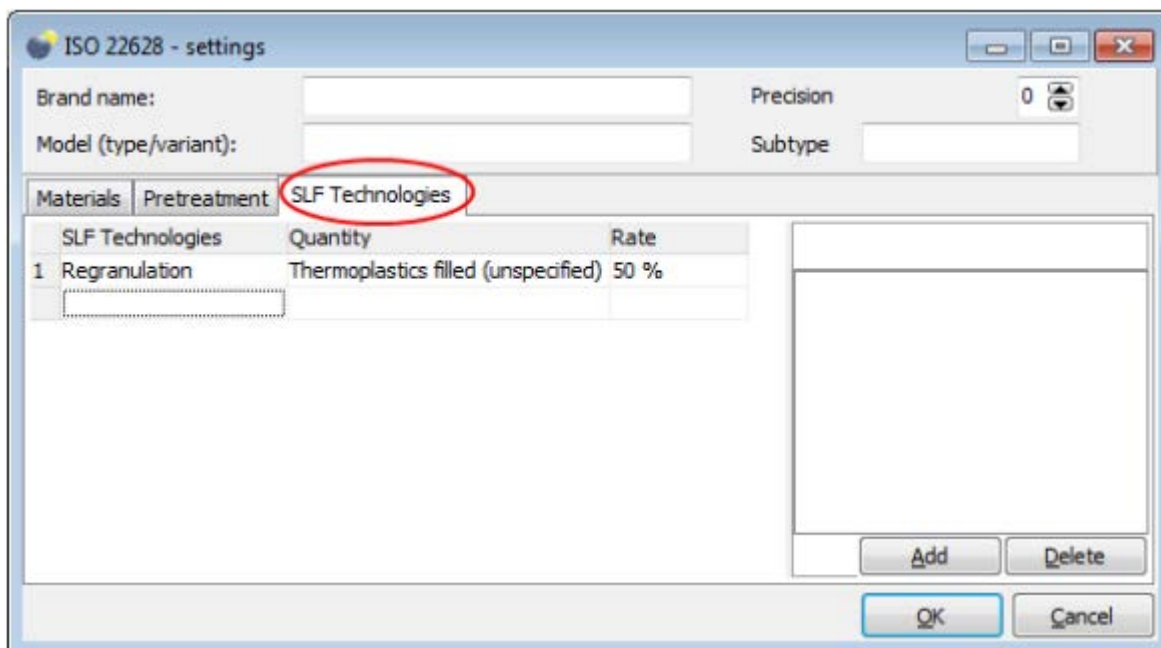
Materials | **Pretreatment** | SLF Technologies

ISO 22628	Disassembling groups
Pretreatment (m.P)	Pretreatment (Fluids)
Dismantling (m.D)	Steering (parts disassembly)
Part	Grouping
Oil	Not specified
Brake fluid	Fluids

OK Cancel

Figure: ISO 22628 Settings – Pretreatment classification

In the last step, before starting the ISO-analysis, recycling quotas for variable flow quantities can be defined in the 'SLF Technologies' tab. Figure 5-16 depicts the SLF-technology with the name 'Regeneration' as an example. The reference quantity should be the VDA quantity 'Thermoplastic filled'. The rate is set to 50%.



ISO 22628 - settings

Brand name: Precision: 0

Model (type/variant): Subtype:

Materials | Pretreatment | **SLF Technologies**

SLF Technologies	Quantity	Rate
1 Regeneration	Thermoplastics filled (unspecified)	50 %

Add Delete

OK Cancel

Figure: ISO 22628 Settings – SLF-Technologies

The Figure below shows the form for quota calculations according to ISO 22628 with the characteristics mentioned above. The materials balance displays the material composition, according to ISO classification, for the assigned VDA quantities and the corresponding disassembled components are displayed in the ISO step, 'Pretreatment'. All other ISO steps are also shown within this form.

ISO 22628
Road vehicles - Recyclability and Recoverability - Calculation method Date: 13.10.2011

Brand name: _____ Vehicle mass (m.v) [kg]: 262,6

Model (type/variant): _____

Materials breakdown	Metals	Polymers	Elastomers	Glass	Fluids	MON	Others
	Mass [kg]						
	197,9	17,4	36,1	0,0	5,0	0,2	5,9

Pretreatment (m.P)		Mass [kg]
Fluids	m.P1	0,0
Battery	m.P2	0,0
Oil filter	m.P3	0,0
LPG tanks	m.P4	0,0
CNG tanks	m.P5	0,0
Tyres	m.P6	0,0
Catalytic converters	m.P7	0,0
m.P total (sum m.P1 to m.P7)		5,0

Dismantling (m.D)					
Part	Name	Mass [kg]	Part	Name	Mass [kg]
1	Wheel	31,9			
2	Tires	18,0			
m.D1 total sum (1 to 2)		49,9	m.D2 total		0,0
			m.D total (m.D1 + m.D2 + m.D3)		49,9

Figure: Product model – Tab ‘Forms ISO 22628 (activated)

10.5.6 Product model, Tab: Recycling

In the recycling tab, the specific recycling plan selected for the product model is shown. The recycling tab only appears when a recycling plan has been selected. To do this, a DfX-specific recycling plan must be specified in the database manager. This plan must contain certain objects to be recognized as a product model in the recycling plan. The objects in question will now be described in more detail.

As mentioned above, the ‘Recycling’ tab only appears when a plan has been inserted with the ‘recycling’ button. Initially, the plan displays the product model with its total weight and with no disassembly stages.

10.5.6.1 Defining a disassembly plan

First, a new plan must be defined in the GaBi database manager. This plan must contain at least one of the ‘EoL source-processes’, otherwise it will not be recognized as a recycling plan in the product model.

EoL object sinks and disassembly process instances can be defined on this plan. However, these objects can only be created in the product model in the respective recycling plan. EoL object processes can be identified by a red triangle in the top right corner. It is not possible to show the DB dataset of such objects.

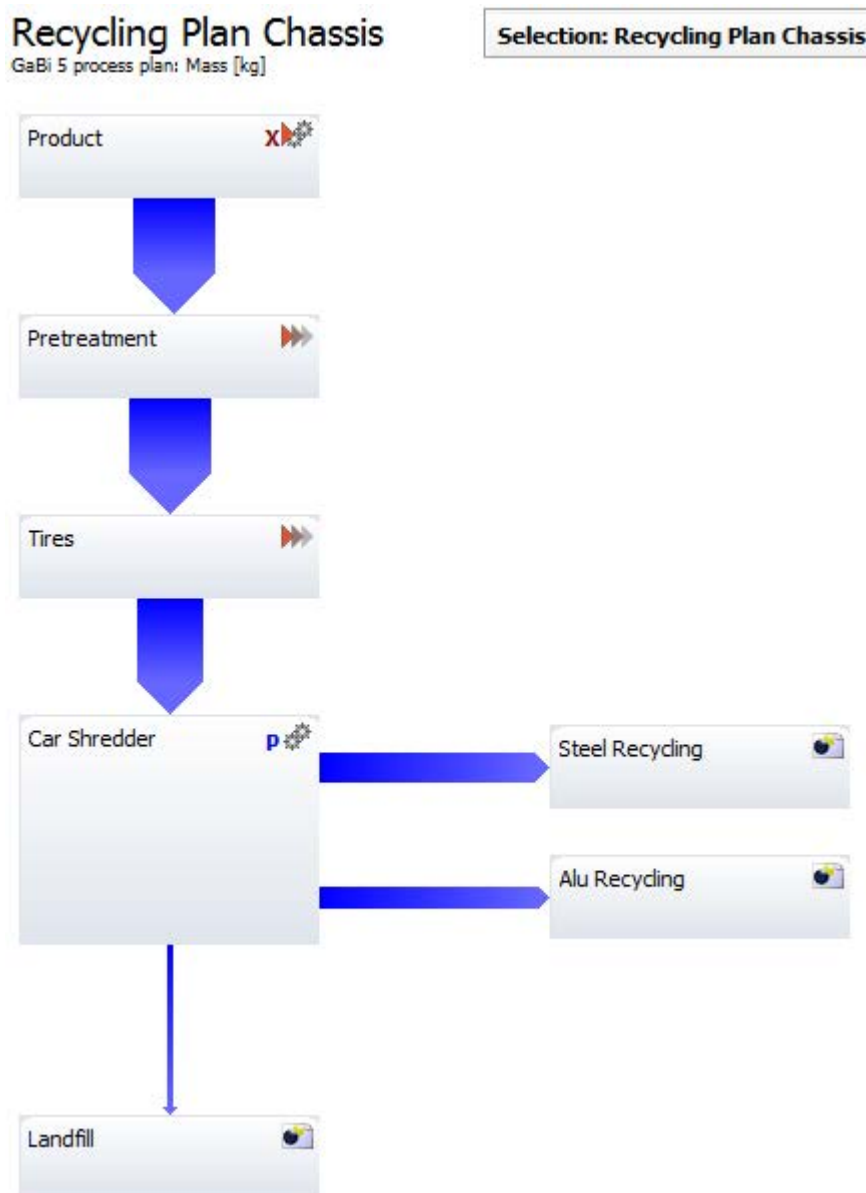


Figure: EoL-Object process on an example recycling plan

As mentioned earlier, the 'Recycling' tab only appears when a plan is entered under the 'Recycling' button. Initially, the plan displays the product model (without any dismantling) with its total weight.

10.5.6.2 Modeling the disassembly steps

In this section, the definition of disassembly steps in a recycling plan will be elaborated. To do this, it is necessary to specify a new disassembly group in the 'Dismantling infos' tab, by right-clicking the mouse and choosing 'Add'. Components will then be assigned to this newly-specified grouping by ticking the box next to the respective component in the product tree. To begin with, at least one component should be assigned to a new group, otherwise the group will not be saved in the system.

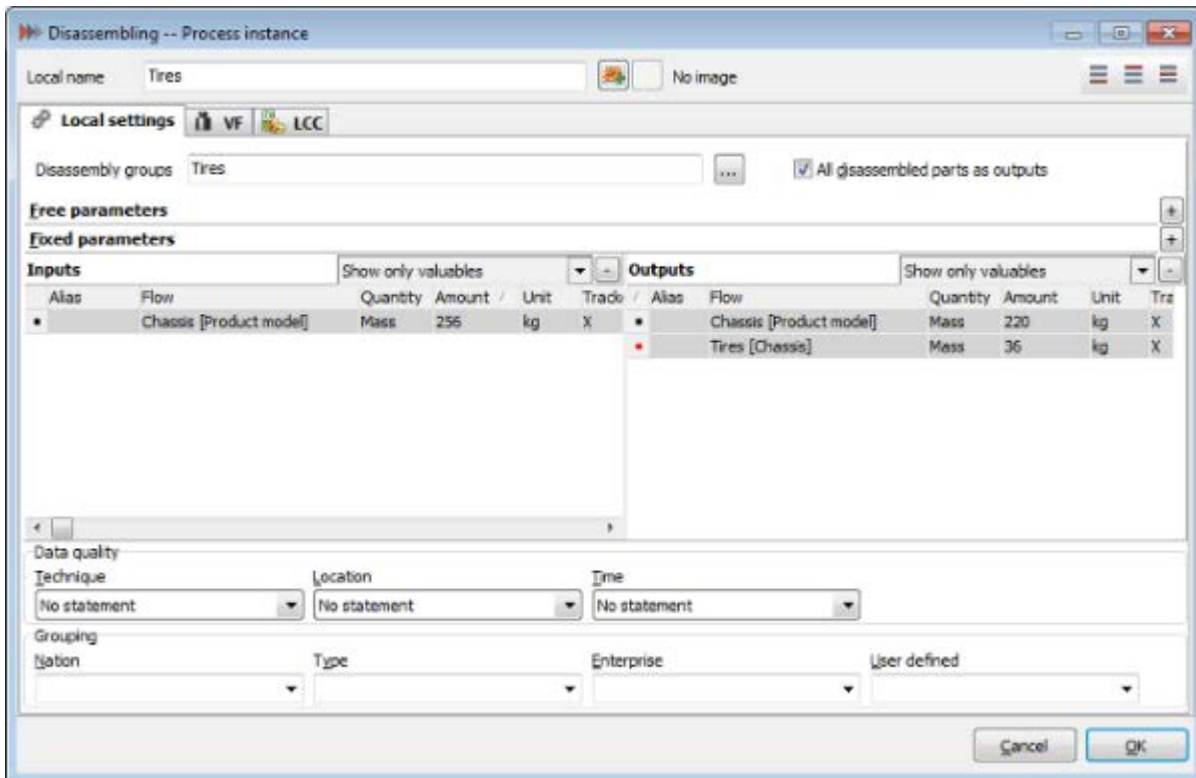


Figure: EoL-Disassembly-process instance – Example tires-process

These newly defined recycling plans can be called up via the 'Recycling' tab. With the EoL disassembly process instances it is possible to select the desired disassembly group via the process instance window. Using the function 'All disassembled parts as outputs', all the selected components assigned to groupings are shown as outputs. If this function is deactivated after the EoL disassembly processes have been connected, all unconnected (no connection with a recycling process) output components are traced back into the product flow. This means that all quantities contained in these output components are furthermore included in the rest of the product. This function is termed as the trunk function.

10.5.6.3 Modeling the disassembly process

When all the necessary EoL disassembly processes have been defined in the recycling plan, the GaBi specific disassembly processes are required. These are connected with the EoL process objects, in order to read out the corresponding outputs. To do this, new processes must be defined in the GaBi database manager. Input and output flows for each component disassembly are entered in the newly-defined processes. This means the user defines a copy of the component flow that is to be disassembled, in which the same quantities are stored. These quantities can be entered as output flows accordingly. In the next step, the VF type of the disassembly process must be selected (unspecific, EoL process or material separation). When choosing material separation, the 'Material separation' button can be clicked and a new window appears. In this window, specific recycling quotas of output quantities can be defined.

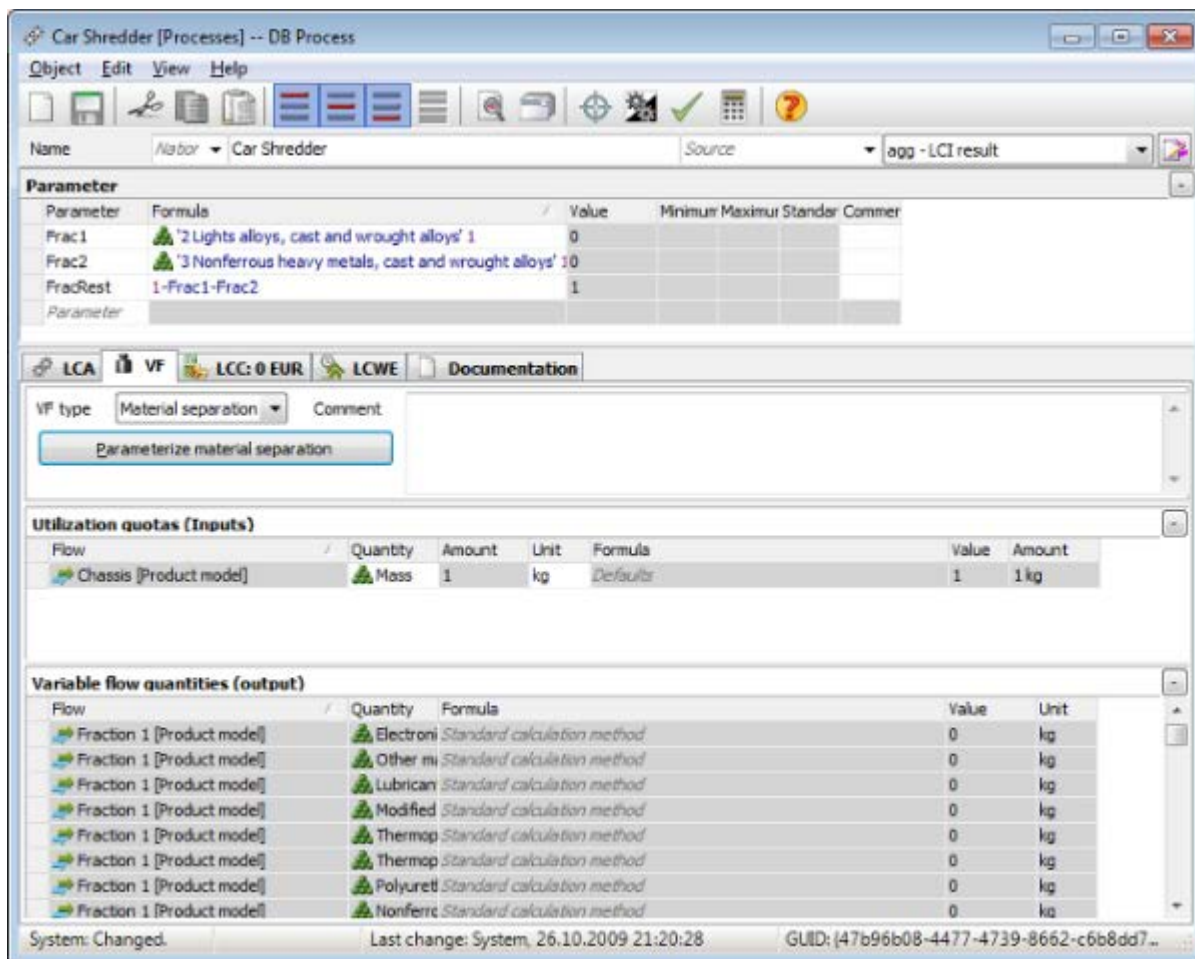


Figure: Disassembly process – Example Part disassembly (Car Shredder)

The VF type 'Material separation' is almost exclusively employed in the disassembly process. For the parameterisation of the material separation, a value of 1 should always be entered. The recycling quotas only contribute to the outputs of a disassembly or material separation process when they have a material quantity and when they are taken from another process. Caution should be exercised that the material quantities that an output flow possesses are still represented in the output flow at the end of the recycling plan. If not, the quota of this output is zero. Flows that are used during the intermediate steps need not necessarily contain these flows. In the recycling plan, processes and plans from the GaBi database manager can be integrated via the drag'n'drop.

Important to note in terms of accounting for plans in a product model is that one must be aware of the hierarchy on the left (like in the parameter explorer). Only here is the actual information read and processed.

10.5.6.4 Starting the Disassembling evaluations

The disassembly evaluation of a product model begins in the 'Recycling' tab. The 'Disassembling evaluations' button must be clicked.

The disassembly report appears, in which the various disassembly steps are summarized. Selecting the neighbouring tab, 'Rates', the recycling quotas for the specific disassembly is calculated.

Only the quotas for which there are materials are considered in the evaluation. The technical quantities as well as the masses are not relevant for this evaluation. The total costs of the product evaluation are displayed under the 'LCC' tab, divided into process steps and by flow costs, disassembling costs, machine costs and personnel costs. The total cost - that is, the sum of process costs, disassembly costs, flow costs and personnel costs (which are can be stored in GaBi) - is that what must be spent on the disassembly and evaluation.

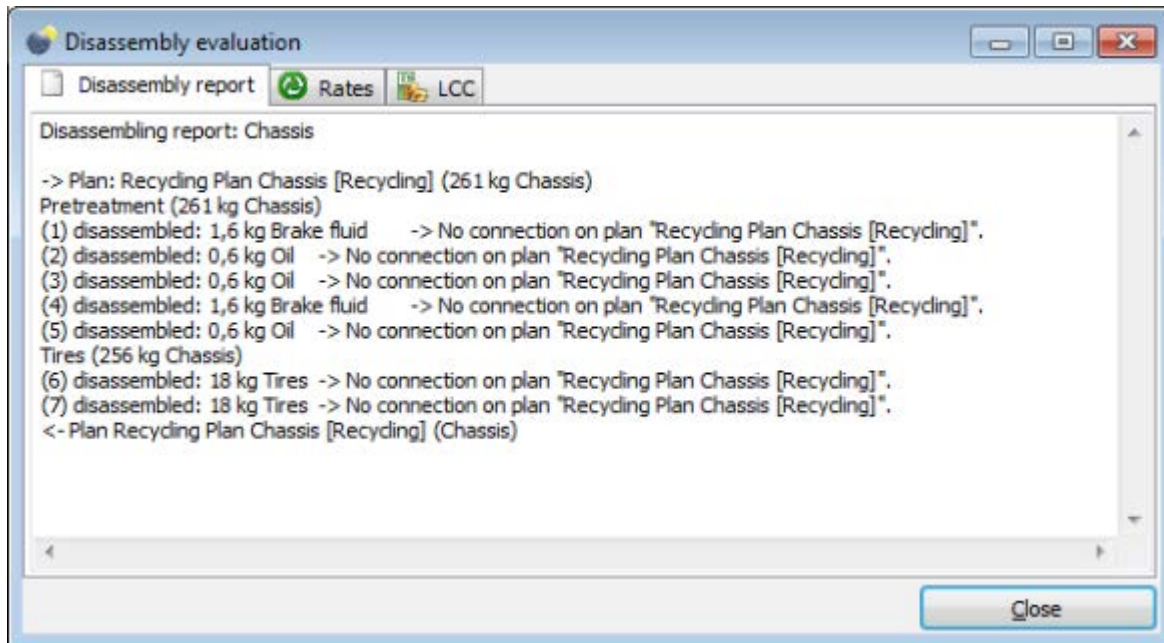


Figure: Disassembling evaluations – Example chassis (View disassembly report)

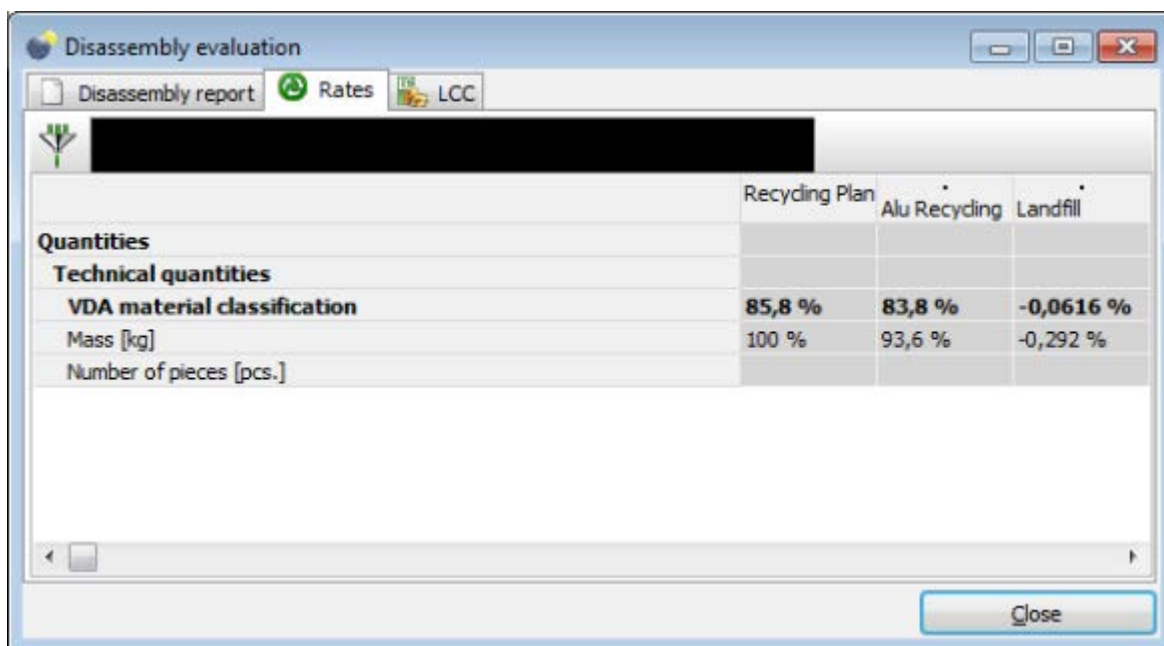


Figure: Disassembling evaluations – Example chassis (view rates)

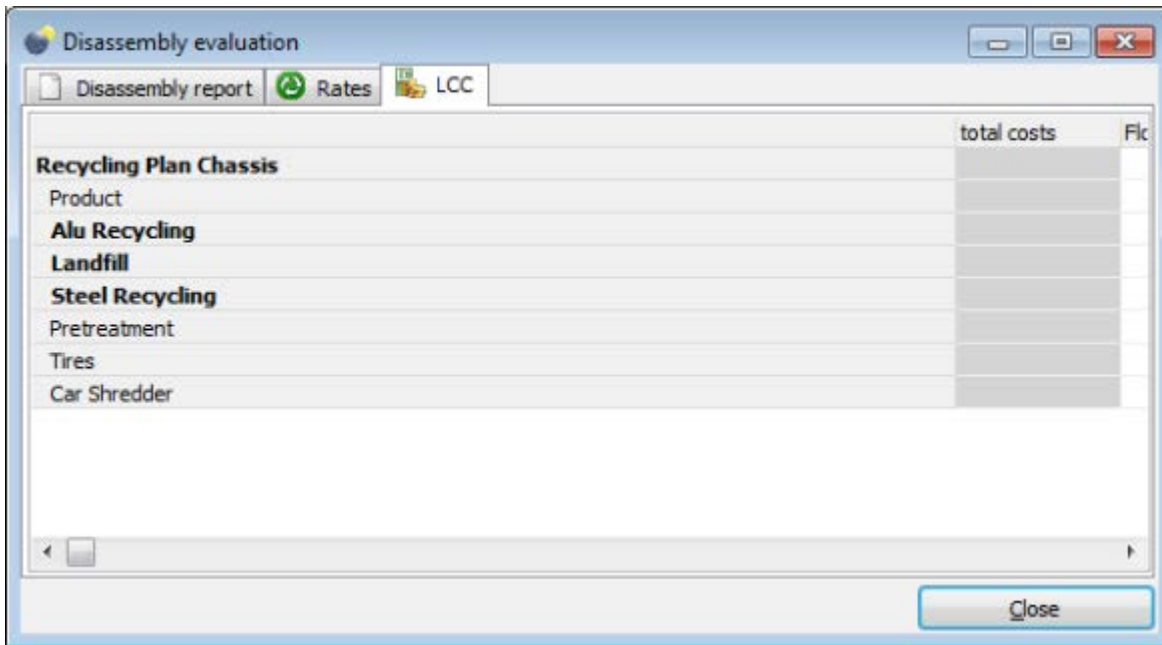


Figure: Disassembling evaluations – Example chassis (view LCC)

10.6 DfX functionality IDIS-Report

A further DfX functionality is the generation of an IDIS report (IDIS = International Dismantling Information System) from a product model. However, there are certain preconditions for creating an IDIS report; for instance, that flows are stored in GaBi IDIS information.

This is achieved by right-clicking a component in the product tree (while in the tab 'Dismantling infos') and choosing 'Details (flow)'. Select the tab 'Documentation' in the window that appears and tick the 'IDIS information' box (see Figure below). A new tab is created in which the IDIS information can be entered.

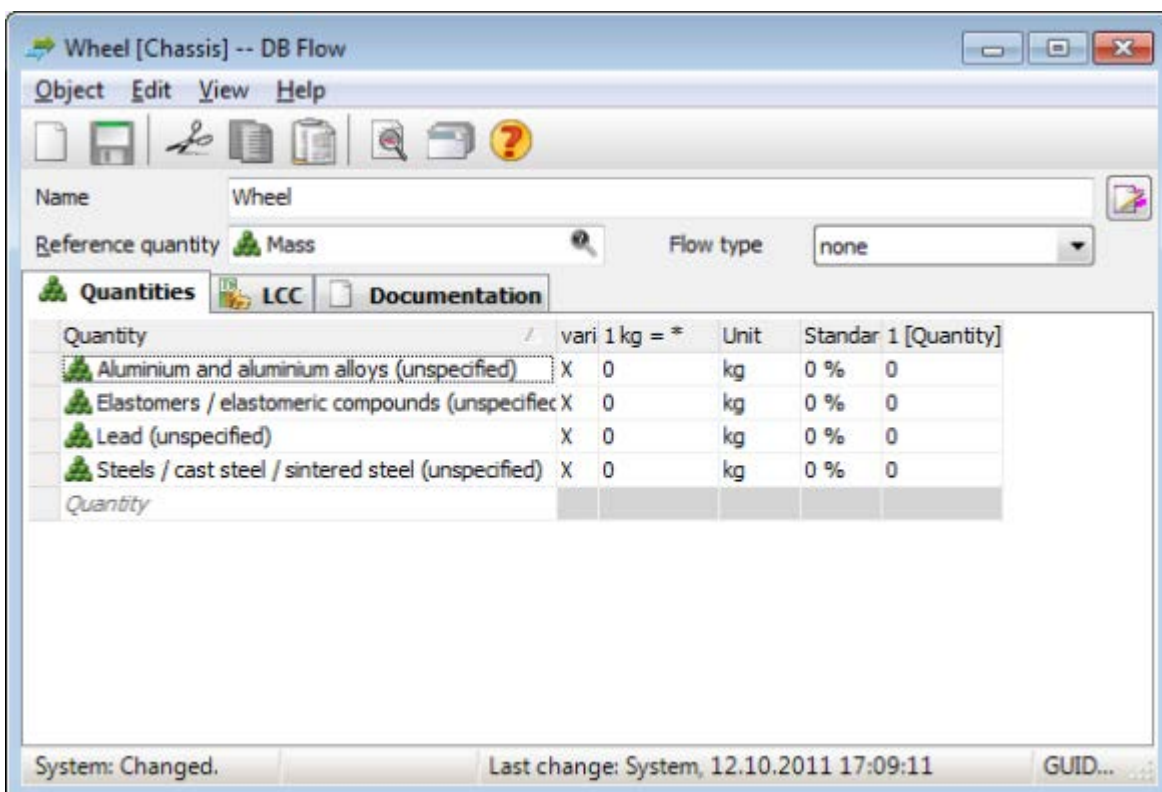


Figure: General flow properties – Example wheel

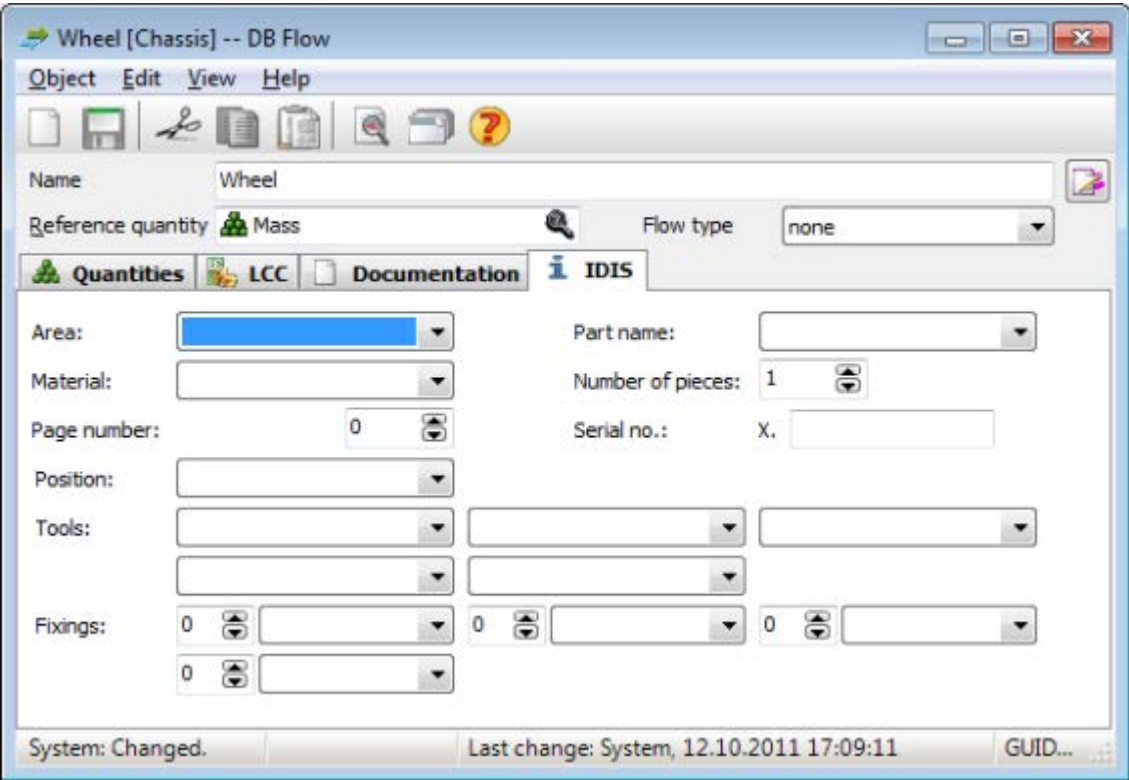


Figure: Flow properties IDIS information – Example wheel

Once IDIS information has been stored for all the desired components, the report can be generated, either by clicking the IDIS Report button (see Figure below) or going to the menu Object / IDIS Export in the product model window.

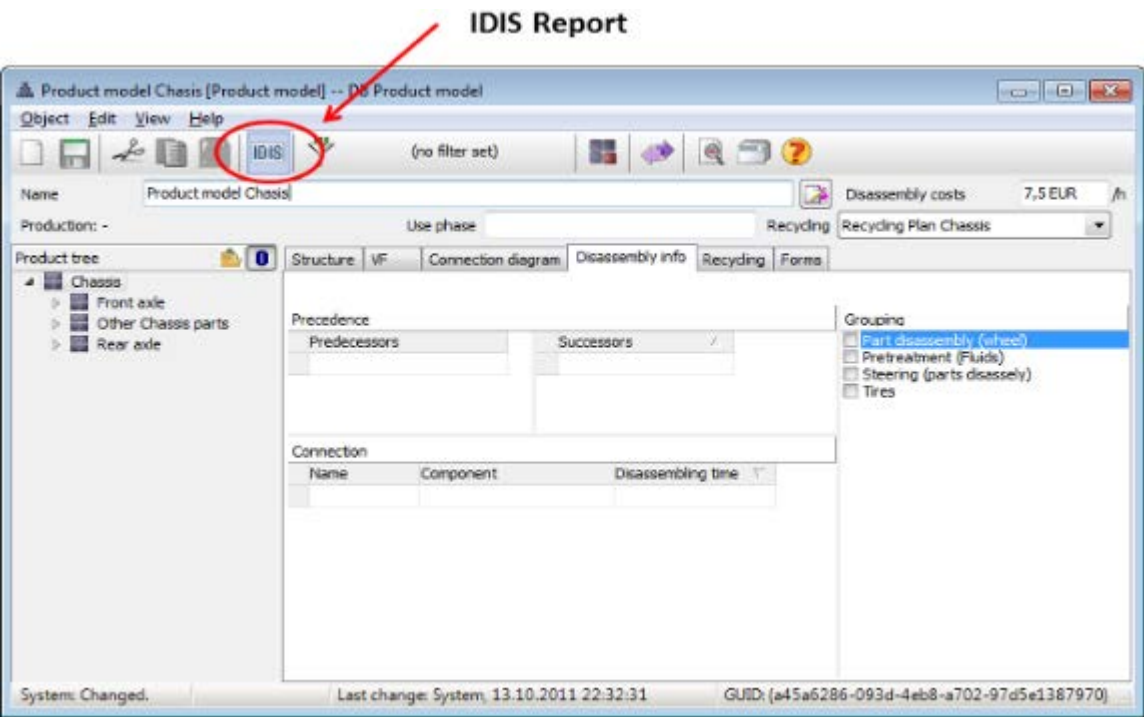
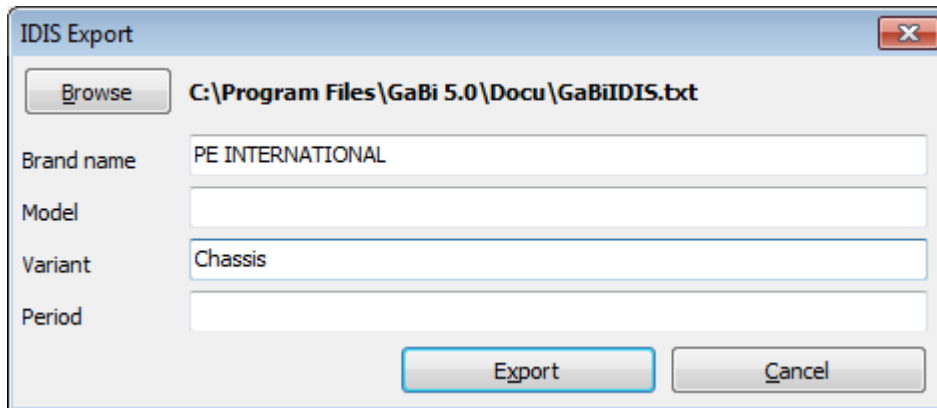


Figure: Product model – IDIS-report

When an IDIS report has been requested, a new window appears (see Figure below) in which specific information for the report can be entered. This information will be made available as a text file when the 'Export' button is clicked. It will be automatically saved in the database folder.



The screenshot shows a dialog box titled "IDIS Export". At the top left is a "Browse" button, and next to it is a text field containing the file path "C:\Program Files\GaBi 5.0\Docu\GaBiIDIS.txt". Below this, there are four input fields labeled "Brand name", "Model", "Variant", and "Period". The "Brand name" field contains the text "PE INTERNATIONAL", and the "Variant" field contains the text "Chassis". The "Model" and "Period" fields are empty. At the bottom right of the dialog box are two buttons: "Export" and "Cancel".

Figure: IDIS export window

11 Optional Features: GaBi Publisher, GaBi Envision

The GaBi extension features, GaBi Publisher and GaBi Envision are described.

11.1 Introduction to GaBi Publisher, GaBi Envision

11.1.1 Overview: GaBi i-report

The GaBi i-report is a tool for creating interactive reports which can also be delivered as static reports.

Interactive reports (i-reports) simplify the communication of GaBi results and can be useful for conducting ecodesign of a product.

The GaBi i-report enables

- generation of report templates which can include text, tables, graphs, etc., and which are applicable on any GaBi balance,
- export to MS Word and distribution of **static reports** to clients,
- creation of **interactive reports** including selected variable parameters,
- definition of scenarios, the results of which immediately change the results in the report,
- distribution of interactive reports to clients using GaBi or GaBi Envision.

The benefits of the GaBi i-report are

- time saving reporting,
- faster balance analysis by defining and applying report templates,
- efficient communication of LCA results to internal or external clients,
- easy creation and communication of scenarios,
- no LCA software knowledge needed to understand and interactively change an LCA system.

Creation of a GaBi i-report is a standard feature in the Balance View of GaBi.

11.1.2 Overview: GaBi Publisher

GaBi publisher is a tool for the export of GaBi results or GaBi objects as a .gbm file to be used in GaBi Envision.

The GaBi publisher enables

- sending of GaBi result files to a user who has no GaBi license,
 - free definition of user rights:
 - plan level visible for the user
 - classic balance view visible for user
 - access to parameters
 - definition of 'black boxes' to hide data and model structure
- possibility for the user to create their own scenarios by modifying parameter values.

11.1.3 Overview: GaBi Envision

GaBi Envision is used for the communication of results to non-GaBi users. It is a tool for reading selected GaBi objects (balances/plans/parameter explorer/i-reports) which have been exported from GaBi by means of the GaBi publisher. GaBi Envision is a web-based or desktop application.

11.1.4 Connection between GaBi/ GaBi i-report / GaBi publisher / GaBi Envision

A user may create static reports and interactive reports (gbp-files) through the i-report feature in the GaBi Balance View, and export them with the GaBi Publisher (gbm-files) to be used in the GaBi Envision software. These export files may include plans, balances and parameter explorer.

GaBi Envision is a stand-alone software not based on the GaBi software. The user of GaBi Envision does not need to have GaBi and does not need to be a GaBi user. The outcomes of GaBi results can be communicated with GaBi Envision (in the form of i-reports, plans, balances, parameter explorer) for internal use or for external use. Therefore, the external user needs only the GaBi Envision software and the respective gbm-file.

11.2 GaBi Publisher

The GaBi publisher is an optional addition to your GaBi system. The GaBi publisher is a tool for the extraction of GaBi results or GaBi objects into the GaBi Envision software, enabling large groups of users to access scenario analysis and reporting options.

11.2.1 Introduction to the GaBi publisher

The GaBi publisher creates a GaBi model file (gbm-file) which can include different views of GaBi objects. The gbm-file can also include GaBi Report files (gbp-files). Select the GaBi object to be exported and click 'Database / Export / GaBi model file' in the GaBi Database Manager.

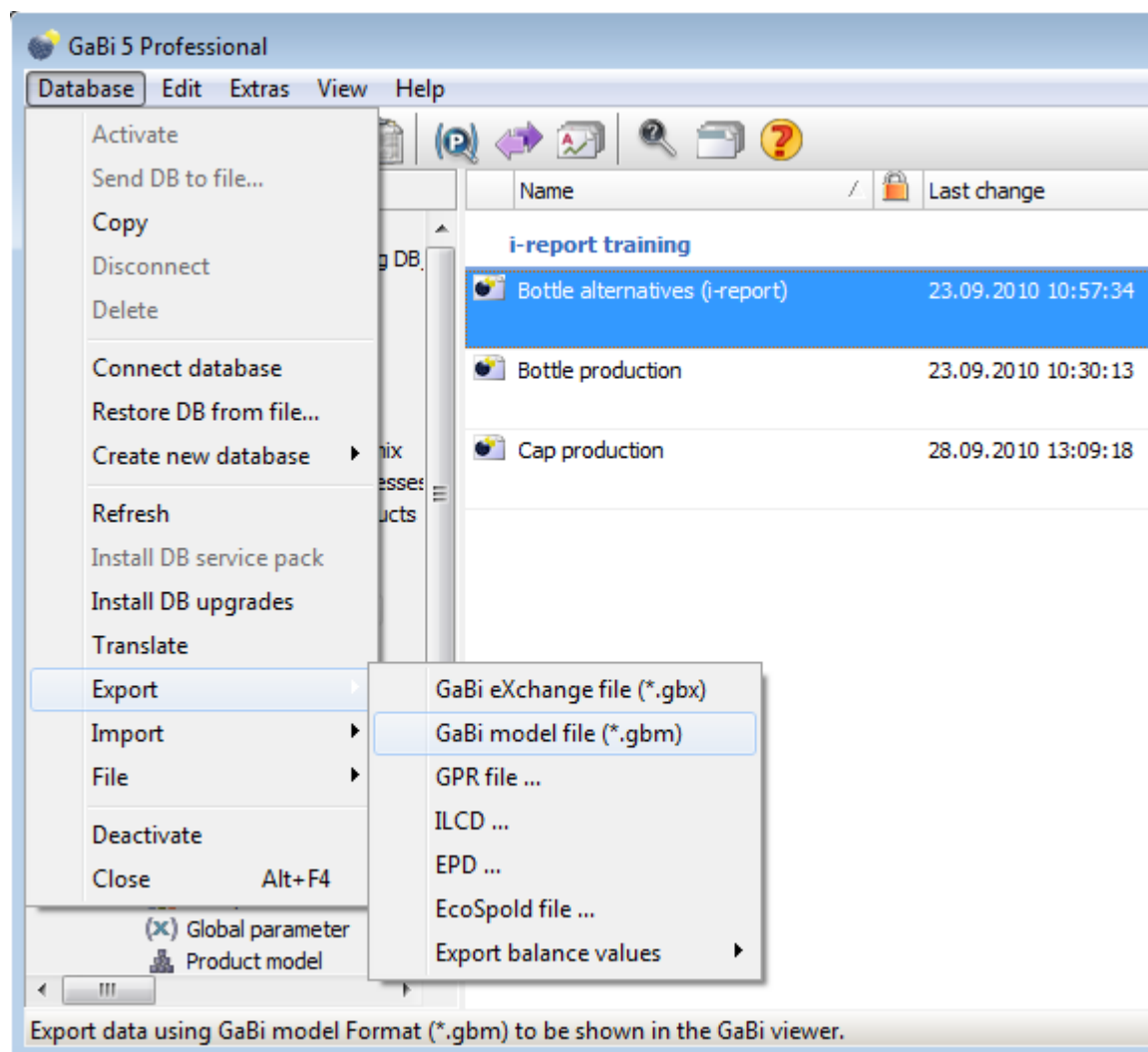


Figure: Export of a gbm-file

11.2.2 Creation of a GaBi Model file (gbm-file)

The configuration of the gbm-file is done by a GaBi expert. The GaBi expert decides which objects should be included or available as black box modules. The view settings of the GaBi Envision user are defined at this stage.

The GaBi publisher allows different view settings for GaBi Envision to be configured. The creator of the gbm-file is free to decide if all four view options (plan, parameter explorer, balance or report) or only single specific ones should be seen by the GaBi Envision user. The options are depicted with check marks.

The report is activated by clicking on the report view button (... Report view:). After the respective gbp-file has been loaded, gbp-file name appears in the gbm-file window. The start view of the gbm-file can also be defined.

Within the creation of the gbm-file it is possible to define which plan hierarchy should be visible or which GaBi objects should be black box modules. Details of the datasets for the respective GaBi objects are only visible for those with a check mark.

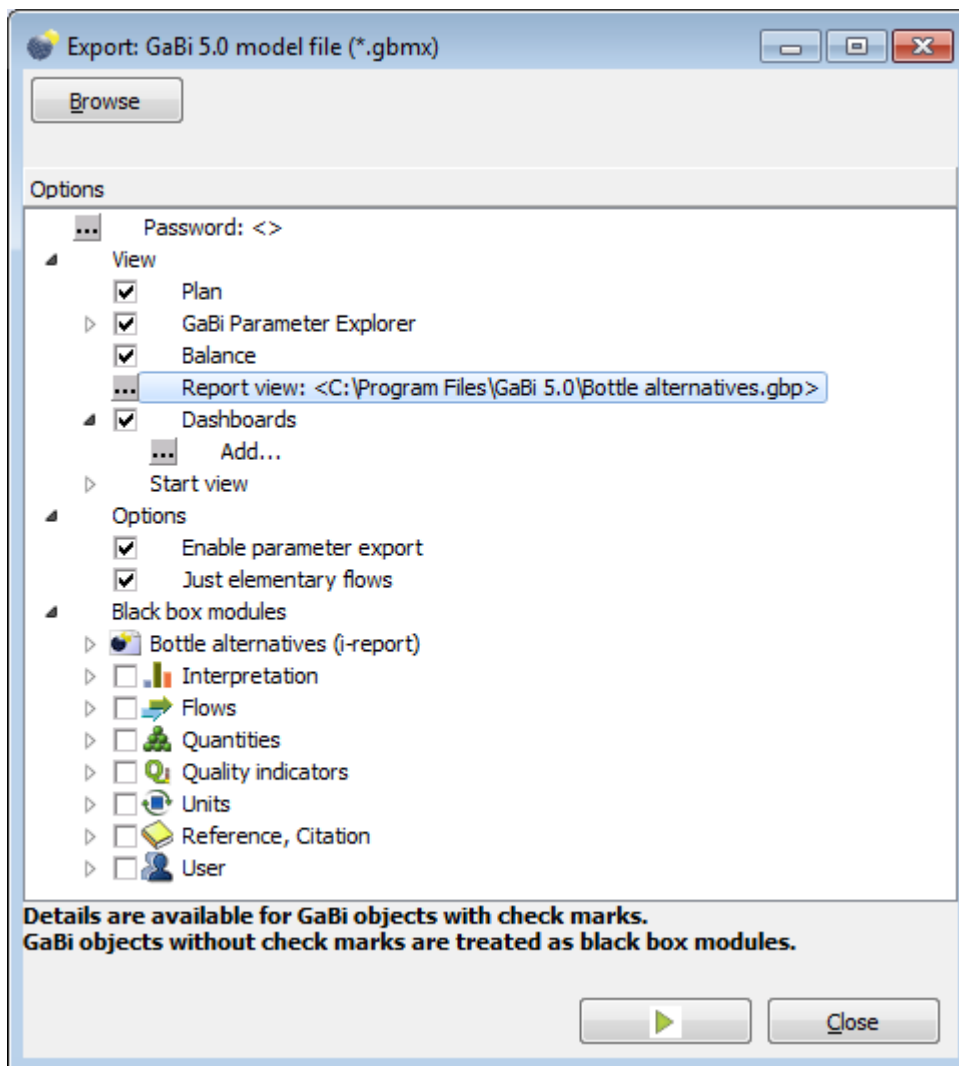


Figure: Creation of a gbm-file

The gbm-file can be password-protected. To set this, click on the password button and enter a password.

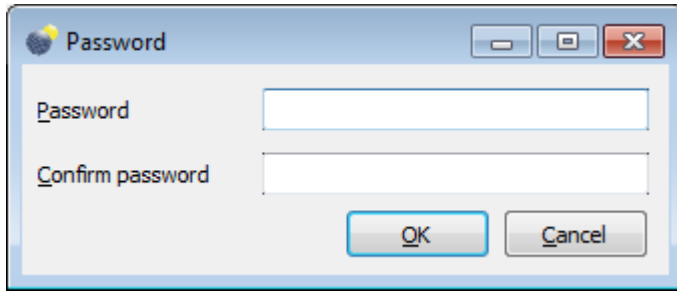


Figure: Screen of the GaBi password creation

The last step of creating a gbm-file is to name the file and export it. To name the file you have to click on the button 'filename', type in a name and save it. To export the file you have to click on the green arrow button.

The successful generation of the gbm file will be confirmed with a message.

11.3 GaBi Envision

GaBi Envision is a tool for reading selected GaBi objects (balances/plans/parameter explorer/i-report) and can be used for the communication of results.

11.3.1 Introduction to GaBi Envision

GaBi Envision is used to view GaBi Model files (*.gbm). Plans, parameter explorer, balances and i-reports can be included in a GaBi Model file.

GaBi Envision isn't just a typical viewer application. It is also possible to dynamically change model parameters and recalculate the report results. These interactive reports are also very useful for non-expert users, since the predefined parameters can be modified without any expertise in GaBi or LCA knowledge and the results are delivered immediately.

11.3.2 GaBi Envision view options

The following view options are available for GaBi Envision:



Plan, parameter explorer, balance and i-report.

11.3.2.1 View option: Plan

All plans in the model which have been selected during the creation of the gbm-file can be viewed when the plan button is pushed. The user can open the dataset of the respective plans by right-clicking the mouse, thereby depicting a stage or a sub-stage of the system.

GaBi plans can be nested in order to display complex balance systems. Thus you can also nest a plan within another plan - in the same way that you use processes. For example, you can develop a process plan for a manufacturing process, and use it in several places in your model. The nesting level of process plans is unlimited, however circular references are not allowed in the software.

For further information see the plan object in the Technical Reference Manual for GaBi.

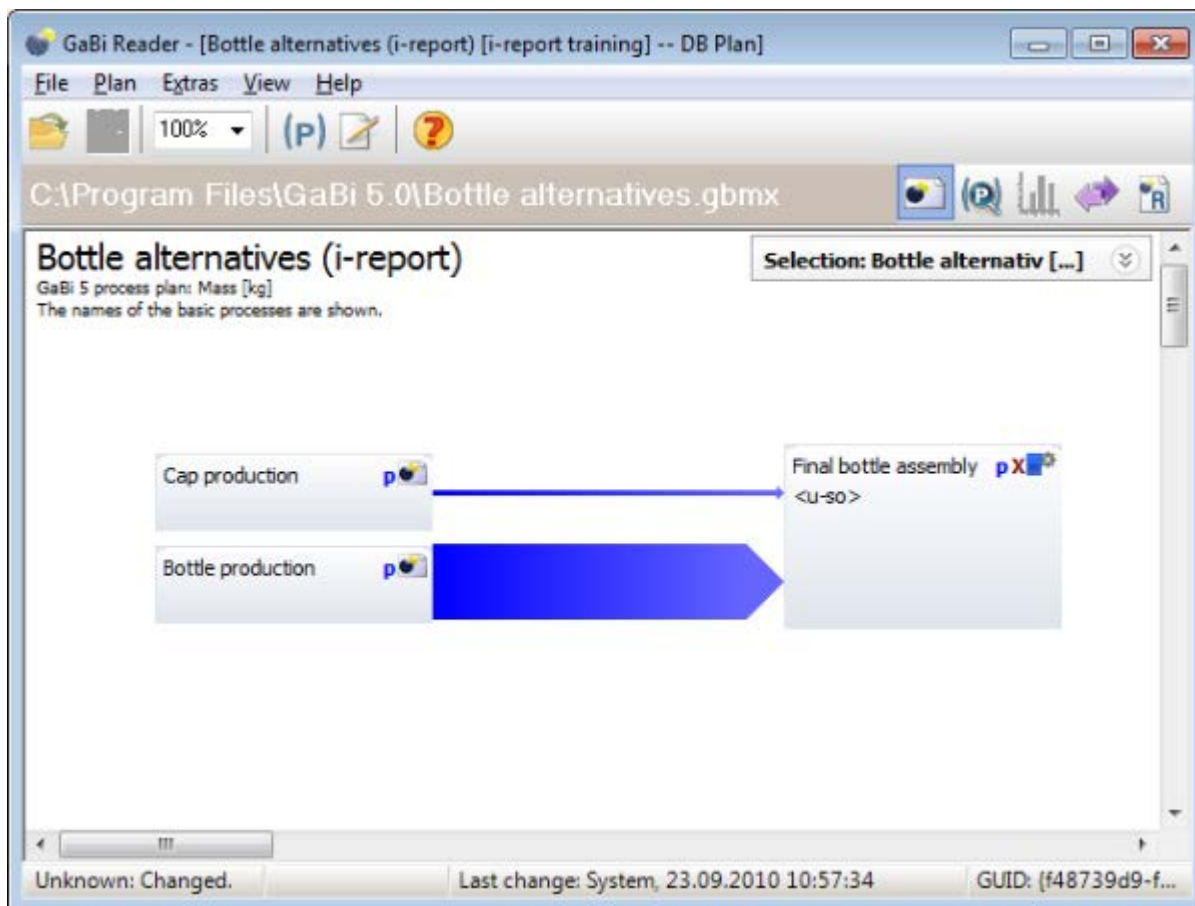


Figure: Screen of the GaBi object 'plan'

11.3.2.2 View option: Parameter explorer

The parameter explorer functionality enables the user to track the parameters used in the model and where and how the parameters are connected together. This tracking is complex when using plan parameters. To ensure the transparency of parameters and their application, they are identified with process and plan symbols and names. The GaBi parameter explorer is to aid in the transparency and management of parameters in complex models. Additionally, the parameter explorer provides a clearer overview of complex plan networks and the ability to efficiently modify parameter values at several points in the system from a single location.

The hierarchy tree on the left shows all *sub-plans* and *sub-processes*, used for the active *plan*.

You can navigate the plan tree in a similar way to Windows Explorer. In principle, *plans* are represented as folders while *processes* are represented as files. The first folder shown in the plan structure contains the global parameters, which are managed centrally in their own directory. The plan structure is displayed underneath.

All *plans* and *processes* which are shown in blue font, in the plan tree, contain parameters.

- a red point • behind the plan/process names indicates a non-linked input or output
- a yellow point • indicates a broken *flow* and
- a pink point • indicates a negative *flow*.

By right-clicking the mouse on a *plan* in the tree you can show or hide all sub-folders.

Two different views are possible for the right hand side of the window: parameter view and plan view.

In parameter view the parameters of the level which is active, in the tree to the left are displayed. Dependent parameters are shown in grey and cannot be modified; independent parameters are shown in white and can be modified. Changes made in the parameter explorer are made in all affected *plans* and *processes* on saving, and are permanent. *Processes* or *plans* that have been modified are shown in **blue italics**.

Plan view shows the selected plan and all associated *processes* and *flows*. If a *process* is selected in the directory tree, the *plan* on which the *process* is located is displayed. You can view the plan properties by clicking on the plan background with the right mouse button. Flow properties can be viewed with a click of the right mouse button on a flow. Clicking with the right mouse button on a *process* shows the process properties and allows you to perform a consistency test. If you click on a sub-plan with the right mouse button, you can call up the plan properties or the *plan* data set. The zoom can be set in the plan view toolbar. It is also possible to adjust the view (inputs/outputs visible, flow names, flow quantities and process images). You can also load the *plan* onto the clipboard using "Copy All" to import it into other programs as a screenshot.

The GaBi 6 parameter explorer simplifies the analysis of complex plan structures, in addition to enabling the access to and location of parameters.

For further information see the Technical Reference chapter about **Scenarios and the Parameter Explorer (Section 8.18)**.

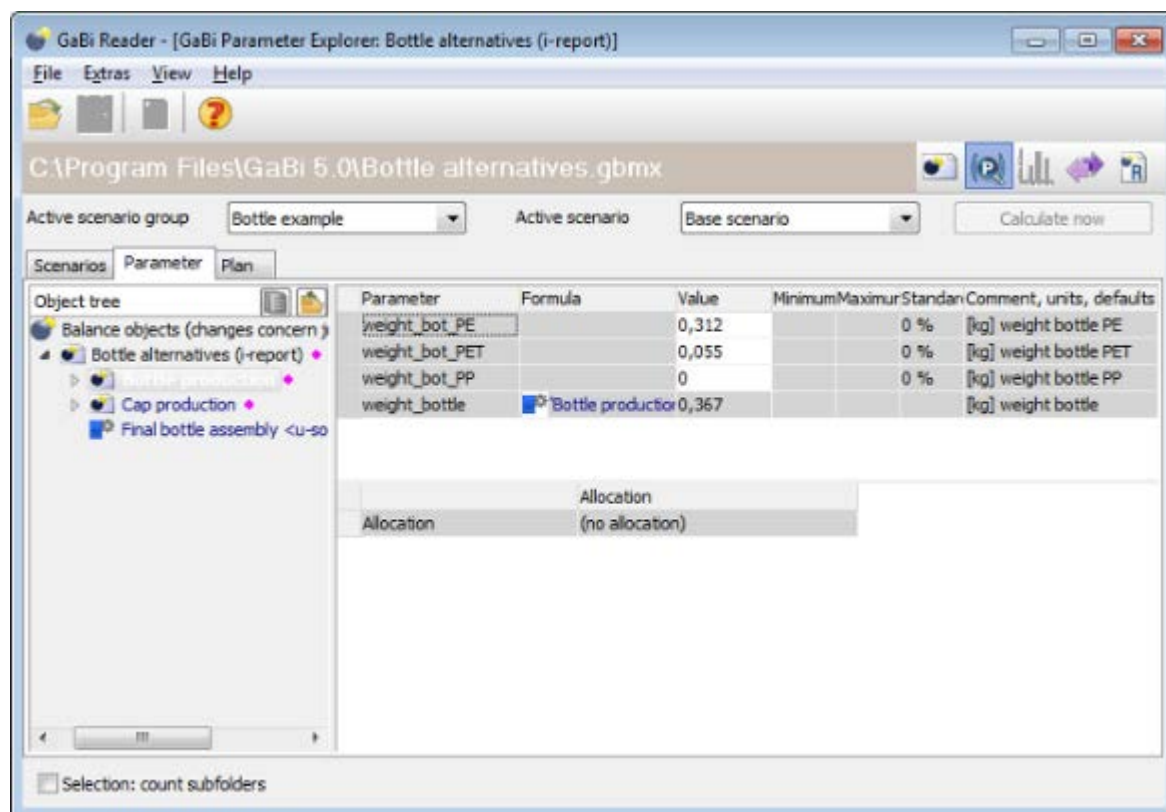


Figure: Screen of the GaBi 6 object 'parameter explorer'

11.3.2.3 View option: Balance

The 'balance' functionality enables the user to compare all inputs of the respective balance system with their outputs.

Balances are calculated based on the system model. GaBi 6 balances contain the results of the life cycle inventory. Balances can be viewed multiple ways, using different units, category filters, impact categories, etc. Thus the balance window can be used to perform life cycle inventory analysis, impact analysis and interpretation.

For further information see the Technical Reference Manual for GaBi 6.

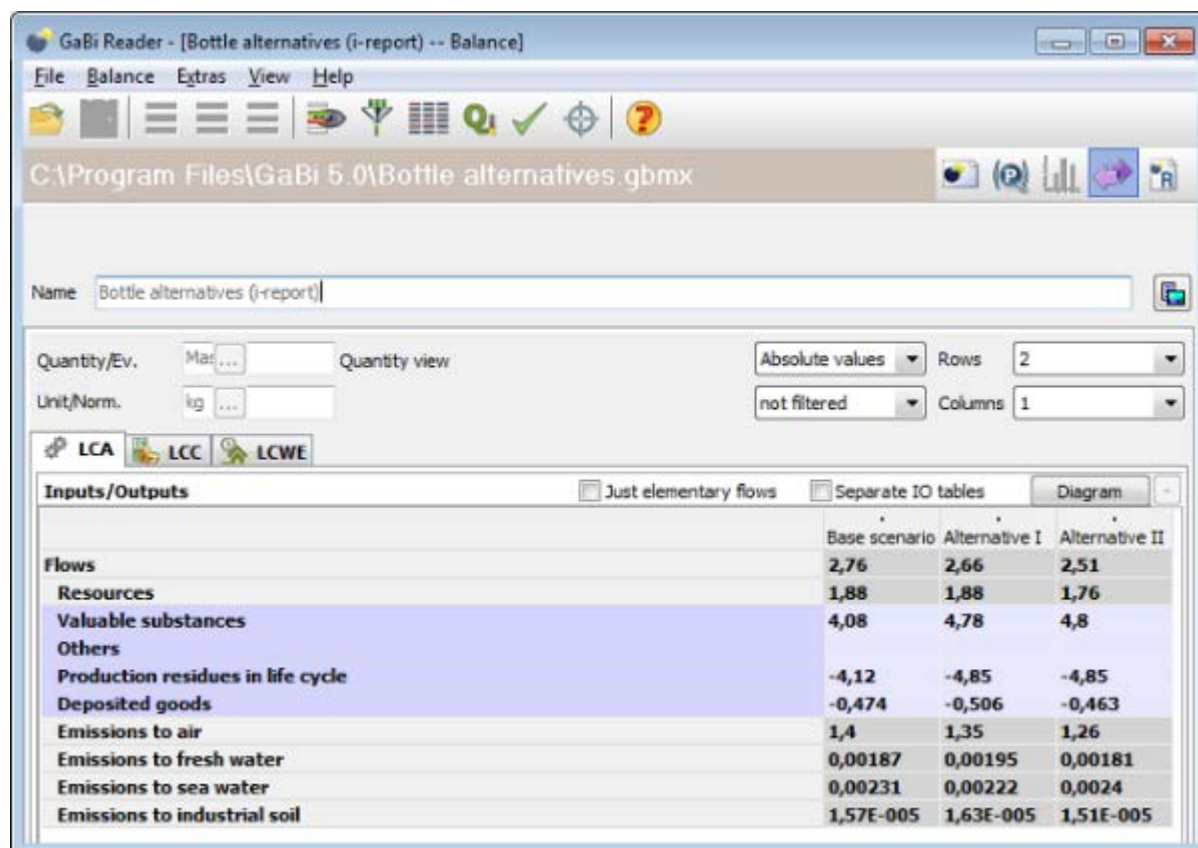


Figure: Screen of the GaBi 6 object 'balance'

11.3.2.4 View option: i-report

This functionality presents the report (gbp-file) that was included into the gbm-file. The parameter values of the report can be changed freely. The results inside the report are subsequently recalculated automatically and the results are updated. The updated report can be saved under a new name and the report can be exported as an .rtf or .pdf file.

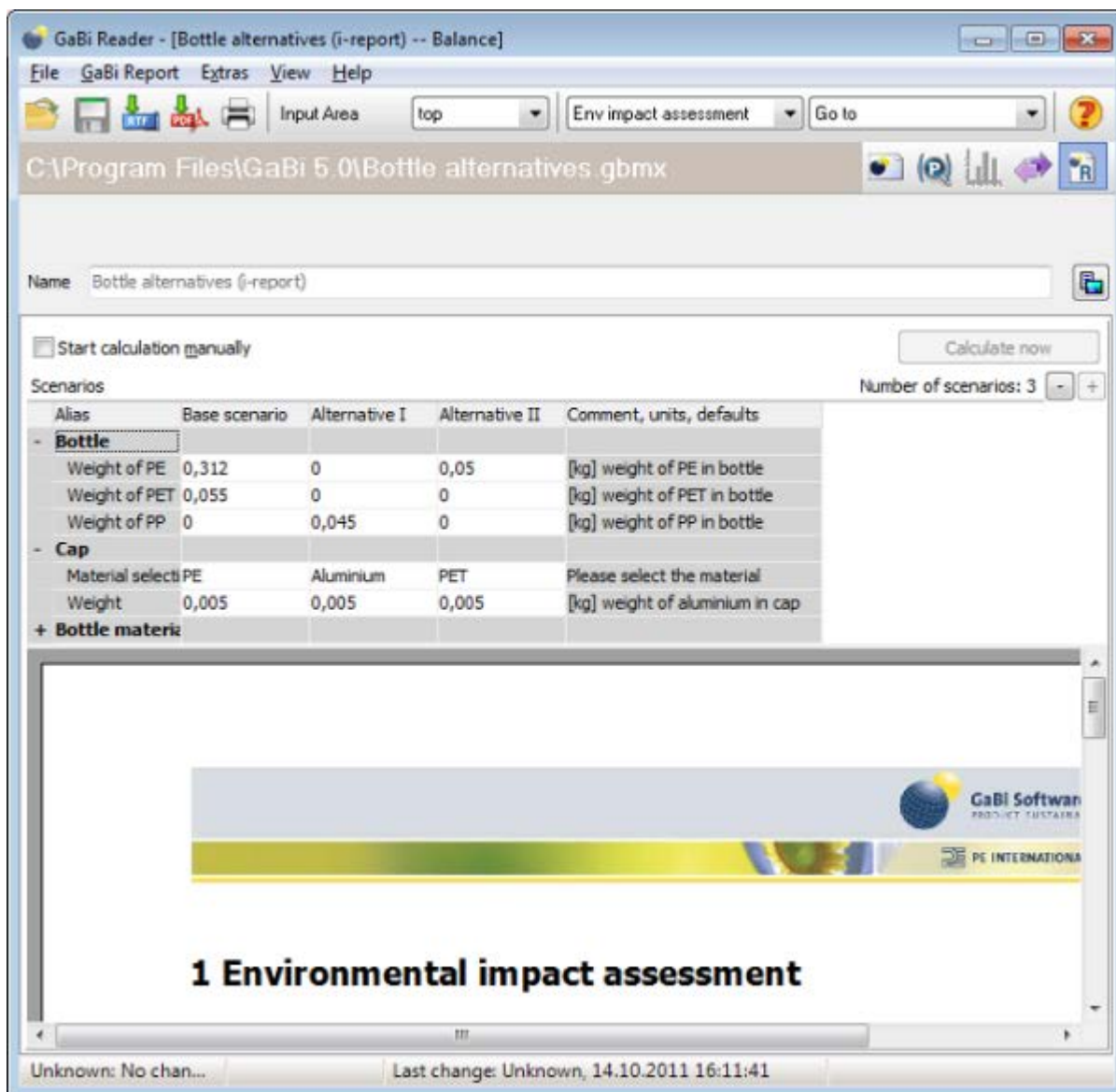


Figure: Screen of the GaBi object 'i-report'

12 GaBi Server

12.1 Introduction to GaBi Server

Welcome to the manual of GaBi Server. GaBi Server supports LCA collaboration, quality assurance and a centralized workflow management, dramatically accelerating LCA modelling, increasing quality, consistency, and reducing risks. GaBi Server also facilitates the re-use of models and centralized updates saving time and reducing costs. Furthermore it also provides centralized user management so that team members can have different access and editing rights depending on their project roles.

Please be aware that the installation of GaBi Server is subject to the GaBi Server Administrator's Guide. If you require this document, please do not hesitate to contact PE INTERNATIONAL. For more information on contact details, please check chapter 5.

Please be aware that this manual deals with the status quo of GaBi Server 1.0. GaBi Server 1.1 will introduce a group functionality which will allow sorting content into groups so that users only see the content of their own group.

12.1.1 GaBi Server Terminology

This table provides an overview about the GaBi Server related terminology that is used throughout this manual.

Term	Explanation
GaBi Server	The GaBi Server software is installed on a server and hosts GaBi server databases. Every GaBi installation (6.3 or later) can communicate with the GaBi Server, as soon as this feature is unlocked via licensing.
Local database	A local database is a database which is connected to your local GaBi installation. The GaBi software always works with the local databases. Local databases are the "working databases" of the GaBi software. Local databases are always exact copies of server databases.
Server database	Any local database can be published on the GaBi Server as a server database by an Administrator. It can be downloaded by other users. Then the local databases of several users are connected to one server database and the users work in their local databases which they synchronize with the server database via update and submit.
Publish database	Upload of a local database to the GaBi Server. This can only be done by an Administrator of GaBi Server.
Download database	Download of a server database from the GaBi Server and storing it as a connected local database.
Update my database	Update the local database with the most recent version from the connected server database (get new objects, update existing objects with newer versions from other users connected to the same server database).
Submit my changes	Submitting your changes to the server database. Modified, new objects and also deletions, which you submit to the server database, will be available as an update to all other users who are connected to the same server database.
Connected database	This is a local database, which is connected to a server. This occurs by either upload or download of a database.
Unlinked database	Any user can unlink the local database from the server. This unlinks a connected local database from the server database. A disconnected or unlinked database can never be reconnected to the server database, but it can be published again as a new server database.

Offline database	A local database that is still linked to the server database, but the connection to the server is temporarily unavailable (no network connection, server down...). Even though the connection is not established, users can still open the database.
Offline use	A GaBi user is working with a connected database in offline mode. The next time he logs in, GaBi checks the server connection again and changes can be updated and submitted, once the server is available again.

12.2 Working with GaBi Server

12.2.1 Prerequisites

In order to be able to work with GaBi server a number of preconditions have to be met. GaBi Server has to be installed on a server in your company. Please contact your IT department for the setup of the software on a server. The delivery of GaBi Server contains the GaBi Server Administrator's Guide with detailed step-by-step instructions for the setup of the component.

The GaBi version installed on the computers of the GaBi users has to be at least 6.3.1.14. Furthermore PE INTERNATIONAL has provided the users who will have access to GaBi Server with an activation key to activate the GaBi Server feature. Only after entering this activation key, you will be able to see the GaBi Server functionalities GaBi user interface.

Finally, a stable connection has to be established. When uploading or downloading a database, the connection to the server can be tested. If the result of this test is **Connection established** you can perform all actions described in the functional description (chapter 3). If no connection to a server is established the display will show **Connection failed**.

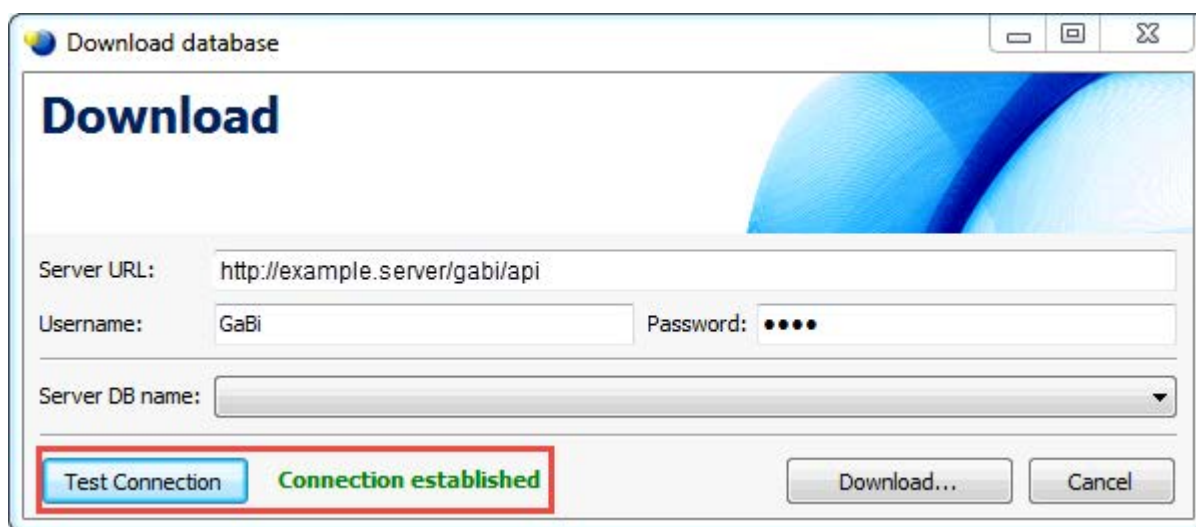


Figure: Connection to server established

12.2.2 Workflow for collaborative LCA

It is important to understand that working with a number of individual databases stored on different computers has become obsolete when using GaBi Server. It is therefore no longer necessary to exchange entire GaBi databases or use GaBi's file exchange format GBX.

The graphic below shows how a database has to be rolled out before a group of GaBi users can jointly work on it. First the database has to be published to the server by an Administrator (for more info on the different user roles,

please click **here (Section 12.2.3)**). When this is done other users can download local database images to their computers. Now users can start working on this database. This is symbolized by the round green arrow.

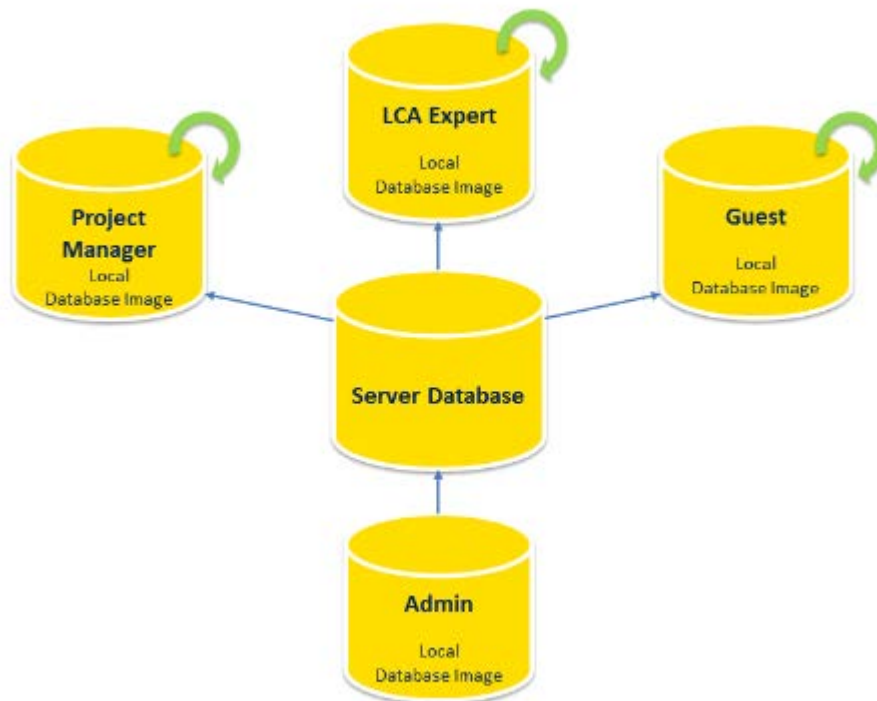


Figure: Database rollout

GaBi Server allows several users to work with the same database in parallel. When a user is satisfied with the changes applied to a local database image, those changes can be submitted to the server database. Once this has been completed, other users can update their local databases again, to have direct access to the changes. This way, different users can synchronize their work with each other via a collaborative server database.

In order to coordinate the work efficiently it is paramount to understand that before submitting changes a user always has to update his local database to the newest version available on the server.

Note: The standard user for GaBi databases “System”, which does need a password, cannot be used once a database is connected to the server. User rights management takes place in the **GaBi Server Web Interface (Section 12.3.2)**.

12.2.3 User roles

GaBi offers four different user roles that allow for different actions in a GaBi database. Their special implications on the Quality Assurance statuses are covered **here (Section 12.2.4)**.

Guest:

- You cannot edit any content or create new objects.
- You can do is look at the content of the database and calculate a balance, which however, cannot be saved.

LCA Expert:

- You have full rights to add new objects in a local database.
- You can only change or delete objects created by yourself.

Project Manager:

- You have full rights to add new objects in a database.

You can edit and delete all objects in a database, independently from who created those objects.

Administrator:

You have full rights to add new objects in a database.

You can edit and delete all objects in a database, independently from who created those objects.

You can access the GaBi Server Web Interface to manage the databases and the users.

You are the only user who can use the GBX import and export functionality.

	Read & exchange objects	Create objects	Change objects	Quality review
Guest	✓	x	x	x
LCA Expert	✓	✓	Change own objects	set own processes to "Ready for QA", "Draft"
Project Manager	✓	✓	✓ N/A for quality assured objects	set all processes to "Ready for QA", "Draft"
Administrator	✓	✓	✓	✓

Figure: User roles overview

12.2.4 Quality Assurance statuses

GaBi supports a quality assurance process by using the different user roles and their ability to edit objects and therefore their Quality Assurance status (QA status). The ability to select the different QA statuses depends on the user rights. To change a QA status:

1. Right-click on the object.
2. Select "Change QA status" and select the desired QA status.
3. A message will prompt the user to confirm this change.

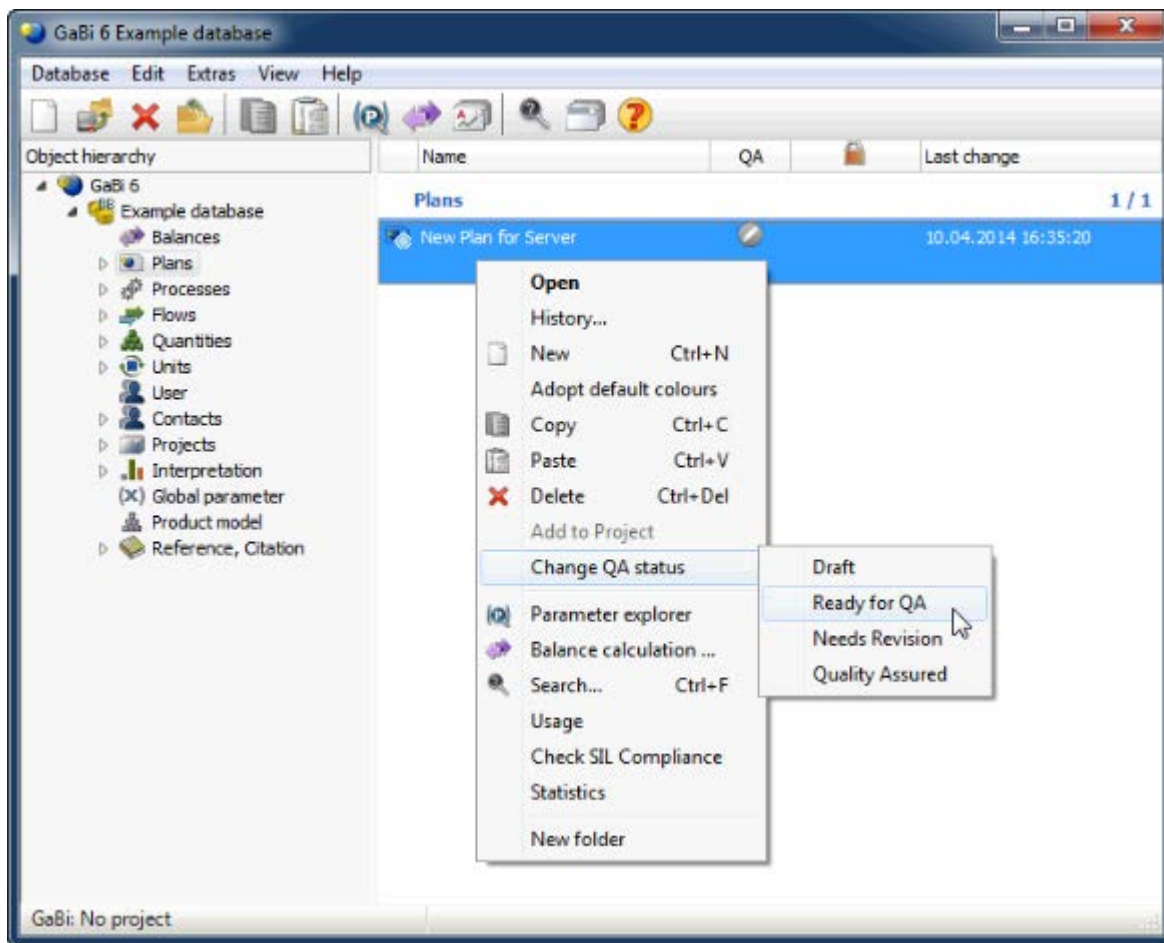


Figure: Changing QA statuses in GaBi

There are four different QA statuses. The figures show the icons as displayed in GaBi. A Guest cannot change any QA statuses while Administrators can change any object and select any status. Objects locked by PE INTERNATIONAL cannot be changed at all.

Draft: The default QA status that is set when a new object has been created. This QA status shows that the generation of this object is still in progress. It may be used for objects that do not have to pass through quality assurance like dummy processes or example models. As an LCA Expert you can set it if your own object shows the status Ready for QA or Needs Revision. As a Project Manager you can set it if any object shows Ready for QA or Needs Revision.



Figure: Draft

Ready for QA: This status shows that – in the opinion of the modeler – the work on this object is completed. The user can hand over this object to the quality manager by submitting the changes to GaBi Server. As an LCA Experts you can set it if your own object shows the status Draft or Needs Revision. As a Project Manager you can set it if any object shows the status Draft or Needs Revision.



Figure: Ready for QA

Needs Revision: This object failed the expectations of the quality manager. It has to be revised by one of the modelers. For the quality manager it makes sense to leave a comment as to how the object did not meet the expectations. Only as an Administrator you can select this status.



Figure: Needs Revision

Quality Assured: This object met the expectations of the quality manager. You can use it in the modelling process use its results for reporting (e.g. in an i-report). Only as an Administrator you can select this status. Once

an object has this status, it cannot be edited unless you are an Administrator. It is therefore write protected for you if you have another user role.



Figure: Quality Assured

12.3 Functional description

Note: If the connection to the server gets lost during any of the functions described below GaBi and GaBi Server will trigger a rollback process that restores the state of the database as it was before the function was executed.

12.3.1 GaBi Server functionalities in the GaBi software

12.3.1.1 Publishing a database to the server

In order to enjoy the benefits of GaBi Server, a database has to be published to the server in the first place. This has to be done by an Administrator.

1. Select the respective database and activate it in GaBi.
2. Go back to the GaBi portal. You can click GaBi 6 in the “Object hierarchy” to do so.
3. Click button “Publish DB...” which is now active. Alternatively you can select “Database”, “GaBi Server”, “Publish DB...” in the GaBi menu.



Figure: Initiate GaBi Server use

4. A new window will open, prompting you to enter the server URL as well as your username and password (for more information on how to setup user accounts please click **here (Section 12.3.2)**).

Note: You can check whether the server URL is correct and whether a connection to the server component can be established by clicking on “Test Connection”.

5. Define a name for this database on the server in the field “Server DB name” and enter additional information about the database in the field “Server DB description”. Neither the name nor the description can be changed again after the initial publish has been performed.

6. When you are ready click “Upload...”.

Figure: Publish database

7. You will receive a message indicating whether the upload was successful. Directly after the upload GaBi will prompt you to enter login credentials to open the database by showing the login window.

In the bottom left corner of the window there is a box called “Offline use possible?”. If you tick this box users can work with their local image of the database even if they are not connected with the server. Making offline use possible reduces some administrative controls. If the offline use for a database is not granted, nobody can activate a local database with GaBi when their computer is not connected to the server. This ensures a high level of security for your intellectual property.

Please be aware that with increasing database size (and hence complexity) the upload can be quite time consuming. Make sure that a connection to the server is guaranteed until the database upload is completed.

12.3.1.2 Downloading a database from the server

In order to start off the work with a database, you can download it from the server.

1. Click the button “Download DB...” It will only be active if databases have been uploaded to the server beforehand. Furthermore it will only be active if no database is active in this instance of GaBi at this moment.



Figure: Download DB... button

2. A new window. Enter the server URL, your username and your password.

Note: You can check whether the server URL is correct and whether a connection to the server component can be established by clicking on “Test Connection”.

3. In the dropdown menu “Server DB” select the database you want to download.

4. When all information has been entered, click “Download...”.

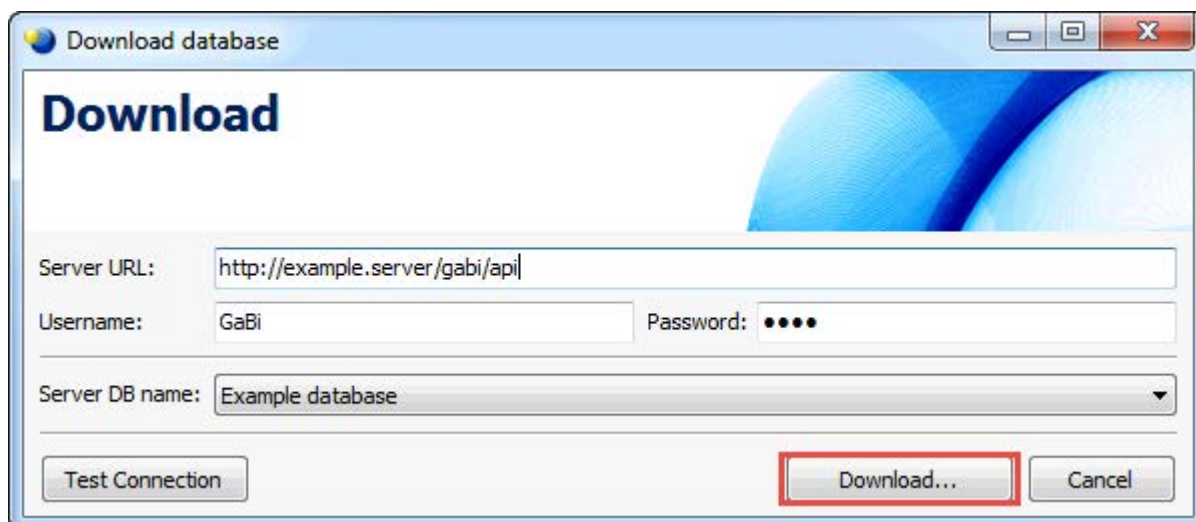


Figure: Download database

5. A window will open, prompting you to select the location of storage to which the local database should be saved on your computer. When location and name have been selected, click “Save”.

6. You will receive a message indicating whether the download was successful.

Please be aware that with increasing database size (and hence complexity) the download can be quite time consuming. Make sure that a connection to the server is guaranteed until the database download is completed.

You are able to download those databases, for which you have specified user rights. If you do not have user rights for an existing server database, then this is invisible for you and cannot be selected in the dropdown list for download.

Note: Alternatively to publishing and downloading a database as an initial setup to enable collaborative LCA with GaBi server there is an additional method. An Administrator can also publish a database and make a local copy of this published database. Each local copy of this published database is connected to the server already like the original database, which was published. The Administrator can give those local copies to other users, so they do not have to download it from the server. All databases will be connected to the server database simultaneously and synchronize with each other via the server database.

12.3.1.3 Submitting changes on a database to the server

After working on a database you may want to submit your work done to the server.

1. With the database you worked with activated, go to the GaBi portal (you can click GaBi 6 in the “Object hierarchy” to do so).
2. Click the button “Submit my changes...”.



Figure: Initiate submit of changes

3. A new window will open in which the Server URL is automatically displayed. You can enter a message for the upload. The message can be viewed by the Administrator in the GaBi Server Web Interface. It is highly recommended to use this field since the administrator does not have an option to see an overview of the exact changes submitted.

4. You can also see a list of changes that will be submitted. The table displays the following information (from left to right): Object icon; object name; object type and type of change (added, modified, deleted).

5. Click "OK" to submit your changes.

6. You will receive a message indicating whether the submit was successful.

In order to coordinate the work efficiently it is paramount to understand that before submitting changes a user always has to update his local database to the newest version available on the server. If two or more users work on the same GaBi object (e.g. a particular process) in parallel, the one who submits changes first, will overwrite the changes made by the others in their local database.

If you changed an object that has been changed and submitted by another user this object will be overwritten by an update from the server. This object will be listed in red in the update message window. It will be overwritten during the update and so will be your changes! We recommend the following procedure:

1. In the update dialogue window, check if objects to be updated are listed in red, those are your changed objects which will be replaced by a newer version of the objects from the server.
2. If you do not want to lose your changes, remember the affected objects, stop the update and create a copy of your changed objects.
3. Update your database after created a copy of those objects. Your changed objects will be replaced by a newer version from the server.
4. Compare the updated objects with you changed copies and implement your changes to the updated objects again if required.
5. Then send everything back to the server.

Furthermore only one user can submit changes at a time. The other users will be prompted that the line is busy.

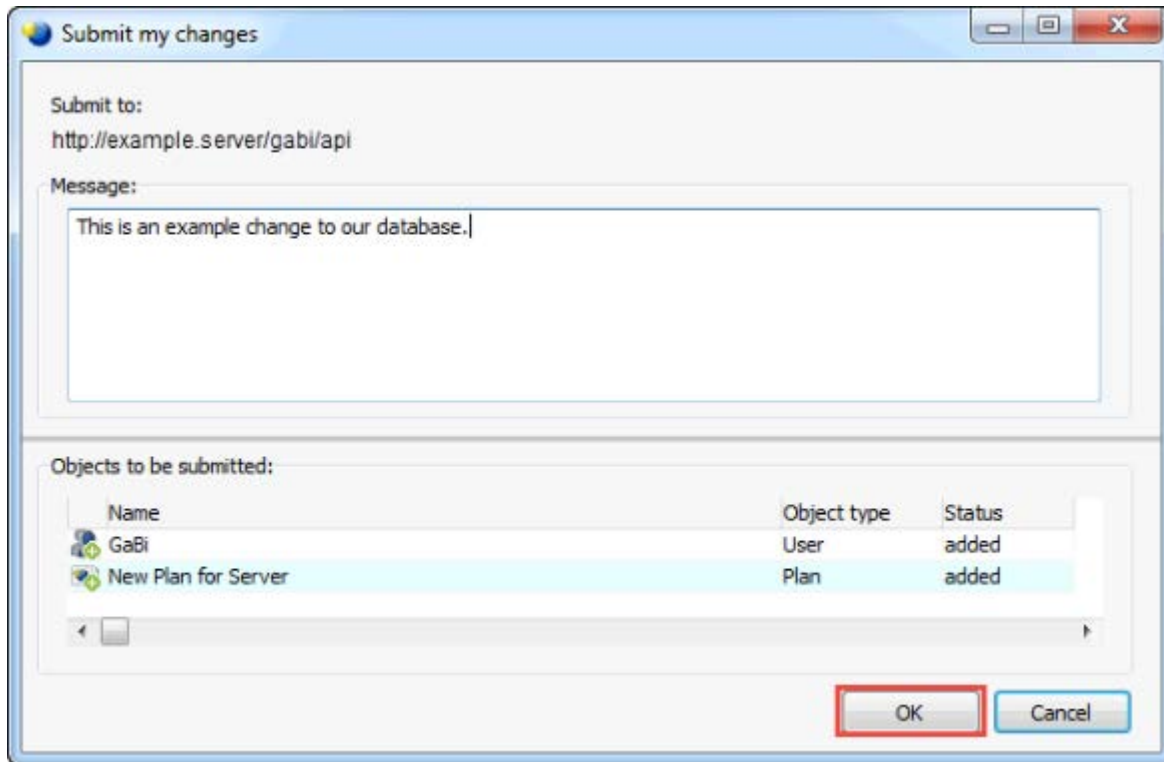


Figure: Submit my changes

12.3.1.4 Updating the Local database form the server

When you open a connected database a window may appear that informs you that the local version of your database is not up-to-date and that you might want to update your database. You can both perform the update in this moment or decide to do his later. Please be aware that you cannot submit new changes if you did not update your database to the newest version beforehand. The window will therefore also appear when you approach to submit changes before updating the local database.

1. In this window click “Update”.

If two or more users work on the same GaBi object (e.g. a particular process) in parallel, the one who submits changes first, will overwrite the changes the other users made in their local database images.

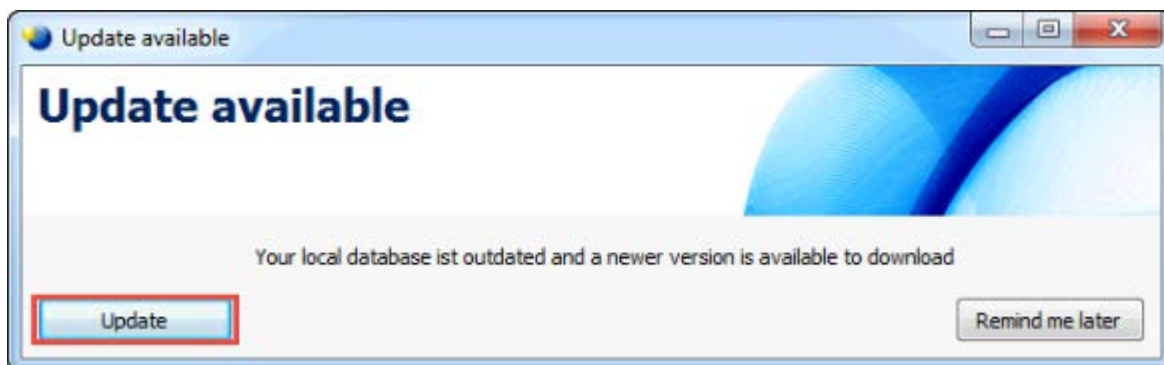


Figure: An update is available

Note: Another way to update your database is to navigate to GaBi portal (you can click GaBi 6 in the “Object hierarchy” to do so) and click “Update my DB...”.

2. A new window will open and inform you which database objects will be affected by the update. The table displays the following information (from left to right): Object icon; object name; object type and type of change (add; update; delete).
3. Click “Update” and the database will be updated.

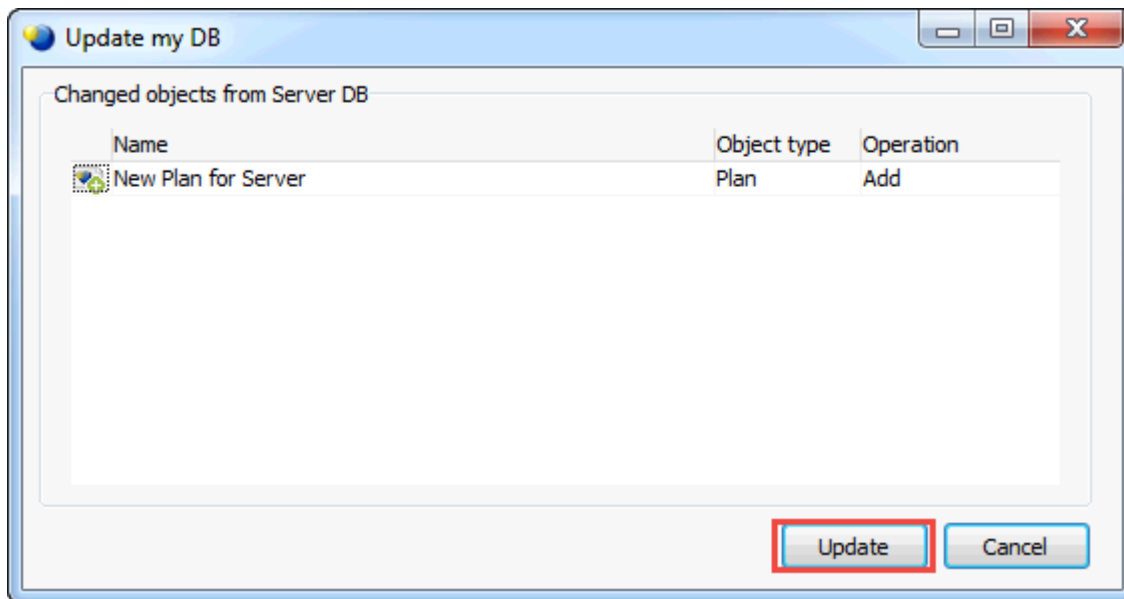


Figure: Update my DB

4. You will receive a message indicating whether the update was successful.

If you changed an object that has been changed and submitted by another user this object will be overwritten by an update from the server. This object will be listed in red in the update message window. It will be overwritten during the update and so will be your changes! We recommend the following procedure:

1. In the update dialogue window, check if objects to be updated are listed in red, those are your changed objects which will be replaced by a newer version of the objects from the server.
2. If you do not want to lose your changes, remember the affected objects, stop the update and create a copy of your changed objects.
3. Update your database after created a copy of those objects. Your changed objects will be replaced by a newer version from the server.
4. Compare the updated objects with you changed copies and implement your changes to the updated objects again if required.

After successfully updating the database, a log file will appear. You may save or ignore this log file. We recommend saving it since it contains a record of all changes that have been made to the updated local database.

12.3.1.5 Unlinking a database from the server

If you do not want to have a connection between the local version and the server version of a database, you can unlink the connection.

1. Make sure the connected database has to be deactivated.
2. Right-click on the database icon in the GaBi Object hierarchy.
3. Select "GaBi Server", "Unlink DB".
4. GaBi will ask you to confirm this action and then provide you with a confirmation when it has been completed.

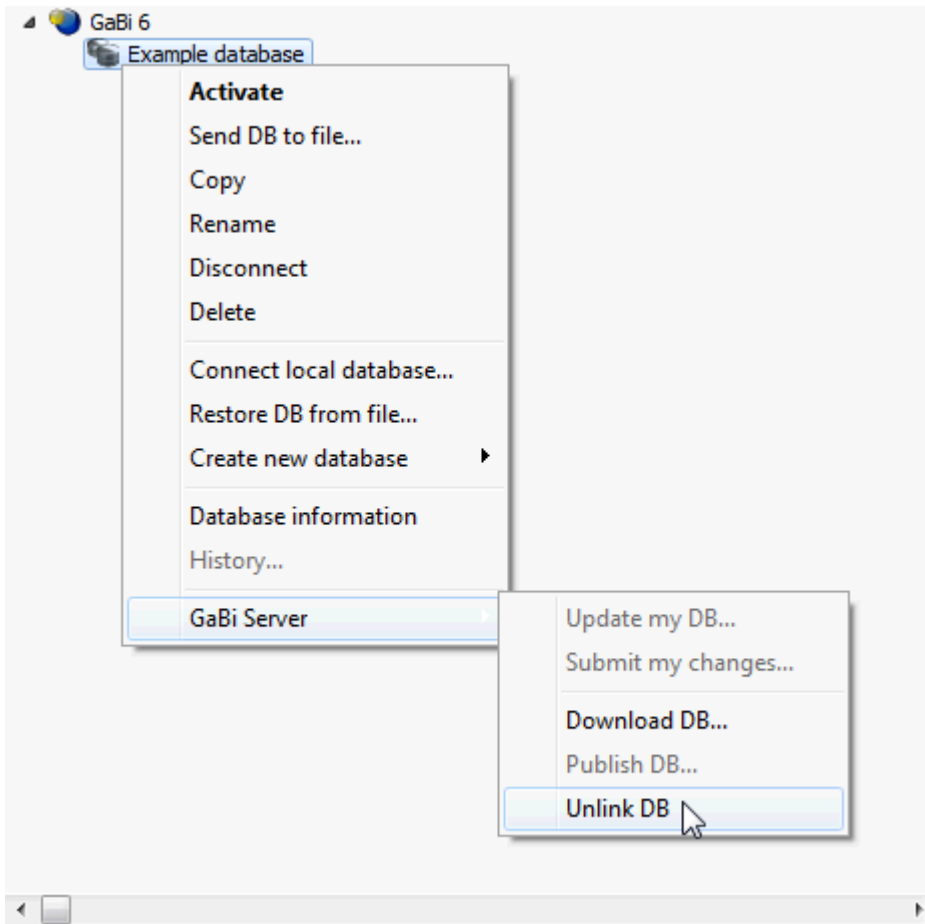


Figure: Unlink DB

While every login into a connected local DB is checked against the server, this does not work anymore after a local database has been disconnected from the server. An unlinked database contains all user account information from those users, which logged in, while the database was still connected to the server. This means you are still able to log into an unlinked database if you logged in once before. It will not be possible to log into an unlinked database with a user account, which exists on the server, but which was never used to log into this local database before. Only Administrators can create new users

Once a database has been unlinked it cannot be linked again. In order to share its content with other users again, it has to be uploaded anew.

12.3.2 GaBi Server Web Interface

When using GaBi Server a component that is accessible via web browsers is installed as well. Only as an Administrator you can access this component by entering your login credentials (the same ones you would also enter when opening a connected database). In the web browser you can manage user rights and access information about the server databases.

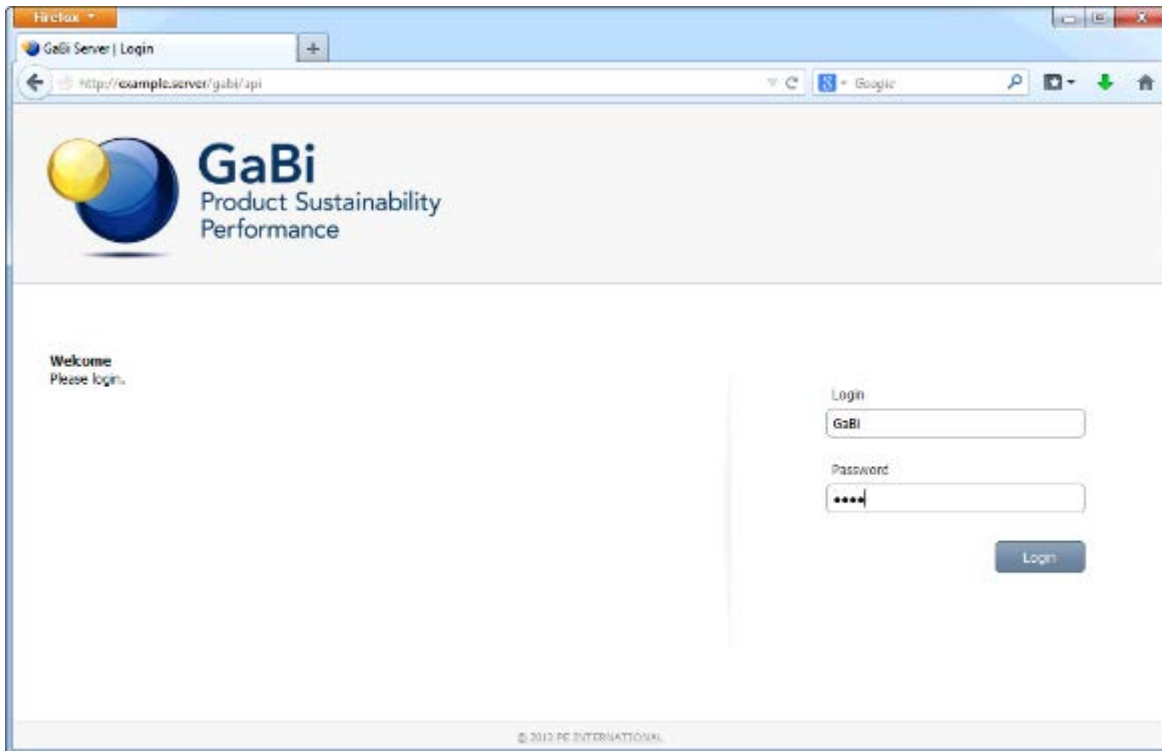


Figure: Login screen Server Web Interface

After the login you will see four tabs:

- Contacts
- Changes
- Repositories
- Users

In **Contacts** you can access the exact contacts that are also contained in the database when accessing the object group “Contacts” in a GaBi database. A dropdown menu in the upper right corner of the browser allows you to switch between the server databases. Clicking on an entry will show you additional information about the contact.

In **Changes** you can retrace every submit that was made to the server database that is currently selected. A dropdown menu in the upper right corner of the browser allows you to switch between the server databases. Clicking on an entry in the list on the left side of the window will display additional information about it the changes that were executed with the particular submit. This does not provide a detailed list of all changes applied but the information users entered when submitting changes to the server database (for more information about this please click [here \(Section 12.3.1.3\)](#)).

In **Databases** you can access additional information about each of the server databases. Clicking on an entry will open the information that was entered during the upload of the database. On the right side of the screen, the tab “Statistics”, displays a pie chart about how many objects of which object type are contained in the database. In the tab “Information” additional useful information about the database version, language etc. are given. In addition you can see whether or not the database is available for offline use.

In **Users** you can handle the user rights management of the server databases and the local databases connected to it. Clicking on an entry on the left side of the window will show additional information about the user. This is furthermore the place to manage the user rights and add new users.

1. Click “Add” to create a new user or click “Edit” to manage the rights of an existing user.
2. Tick the box “Administrator” is ticked to automatically allow users full read and write access to all data-bases and logging into the GaBi Server Web Interface.

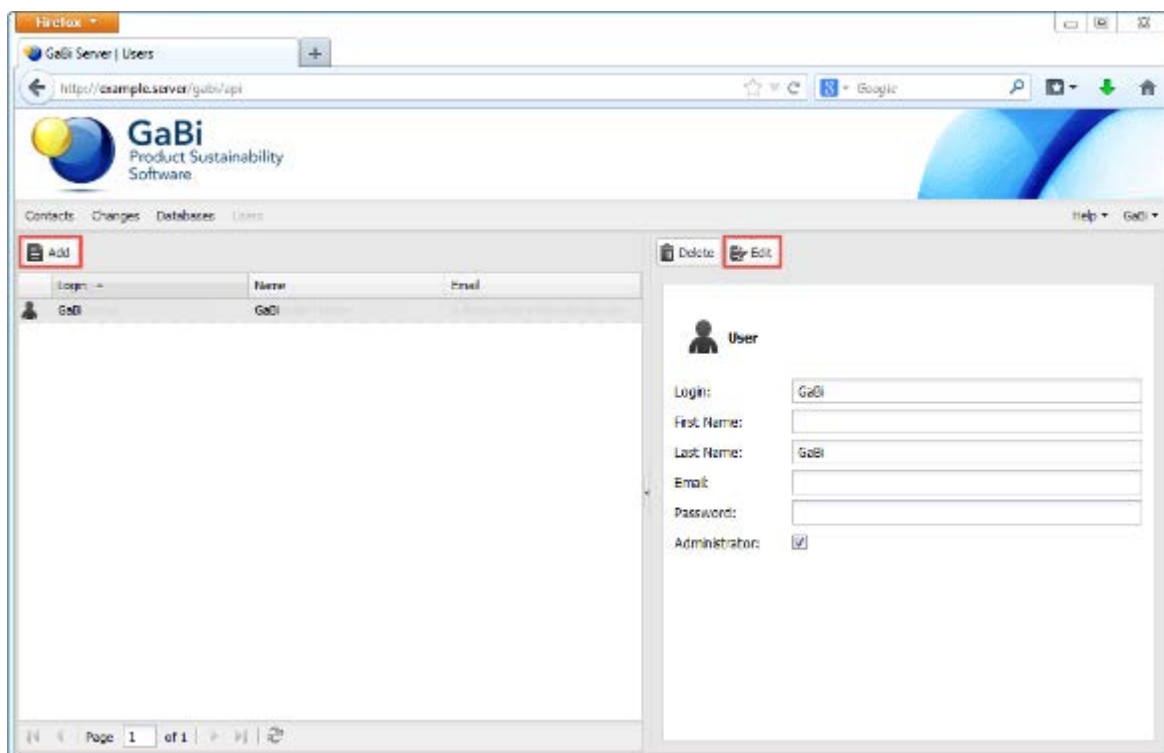


Figure: User rights management in the Server Web Interface

3. If the box “Administrator” is not ticked, click the button “Assigned roles...”.
4. A new dialogue will open in which you can manage the user rights for each server database.

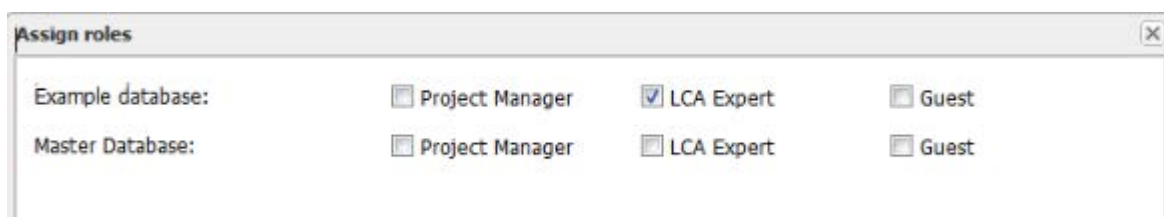


Figure: Assign roles in the Server Web Interface

12.4 Changes in the GaBi user experience

When using GaBi server, some changes in the GaBi user experience are taking place since a number of functionalities are directly influenced by it. This chapter is especially relevant if your organization has used GaBi prior to the introduction of GaBi Server.

12.4.1 Updating GaBi databases

There are two different types of database updates. Structural database scheme updates and content updates.

12.4.1.1 Structural updates

Every once in a while PE INTERNATIONAL updates the database scheme structure to increase the functionalities that GaBi offers when handling databases. When such an update is necessary, a message will prompt you to update the database. You will not be able to use GaBi server without updating your local GaBi installation to the newest version and you will not be able to open any old database in this new version, without installing a structural update. Such a schematic update of the database structure does not change any content in the database, and all objects will stay the same. No results will change. Usually such a structural update takes less than a couple of minutes. Technically any user can trigger this structural database update, we do however strongly recommend to

dedicate a particular team member (ideally an Administrator) to perform these updates.

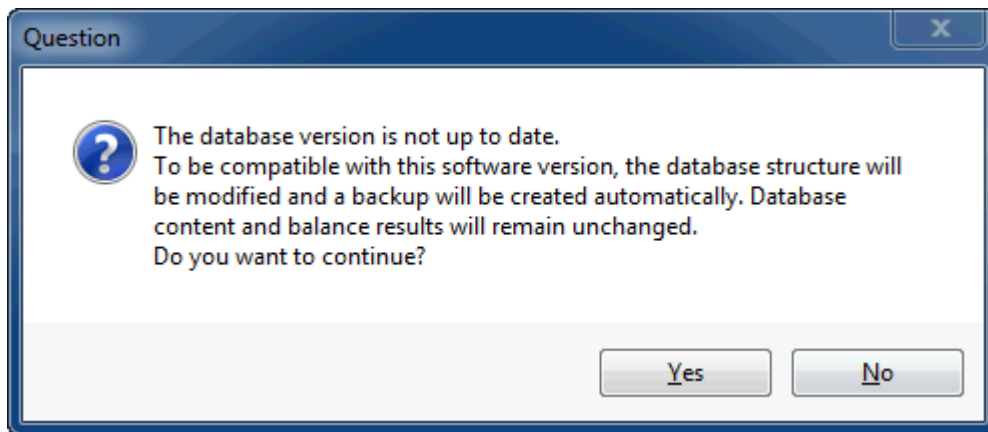


Figure: Structural database update available

You can perform such an update on a database while it is connected to GaBi Server. Only users who applied the GaBi software update that triggered the database update will be able to download changes from the affected server database in the future. It is therefore important to make sure that the users working collaboratively are using the same GaBi version.

12.4.1.2 Content updates

On a regular basis PE INTERNATIONAL updates the database content. When such an update is published there will be no message prompting you to update the database. PE INTERNATIONAL will however inform you accordingly. You are always able to continue using a database without updating the content. For consistency it is however highly recommended to install these updates.

Such an update cannot be performed while the database is connected.

1. As an Administrator unlink the local database.
2. Opening the unlinked database a message will prompt you to perform the content update. Click "Yes".

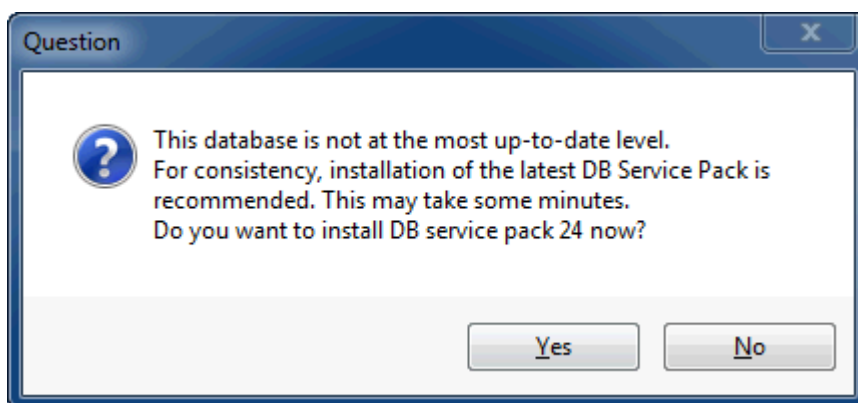


Figure: Content update available

3. You will receive a message indicating whether the update was successful.
4. Publish the database again.
5. Other users can download the database again. Alternatively the published database can also be copied to other users' computers. For more information on publishing, downloading and unlinking databases please click **here** (Section 12.3).

12.4.2 GaBi History with GaBi Server

When you update your database, the history of all updated objects will be deleted, indicating, that there are no

changes made to the objects after the last update of the database.

If you submit your changes to the server, the whole database history will be deleted. This means every time you submit changes sets the history back to a new starting point.

If you continue working in your local database the history will start to record all changes made after the last update/submit. If you look at the database history you can see all changes made in the local database. Those changes represent what is sent to the server when you submit your changes the next time.