

What's new in SimaPro 8



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Report version: 1

Date: October 2013

Language: English

Availability: PDF file

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What's new in SimaPro 8

PRé is proud to present the new release of the world's leading LCA software, SimaPro 8, equipped with an updated database. Important differences from the previous version include the introduction of regionalized water footprint methods and of ecoinvent 3. Implementing this new version of the ecoinvent database involved quite a few implications, as the ecoinvent centre redeveloped their database completely, using an innovative philosophy and methodology. To cope with the sharp increase of network sizes in ecoinvent 3, PRé has developed a new calculation engine in SimaPro 8, making the calculations several times faster than before. The release of SimaPro 8 also comes with a significant update of the impact assessment methods. Below is a summary of these new features and some of their implications for working with SimaPro 8.

ecoinvent 3

Compared to the previous versions, ecoinvent 3 is completely different. The main changes and the relevant aspects of its implementation in SimaPro 8 can be summarized as follows.

New modeling approaches The consequential modeling approach was introduced next to the widely used attributional modeling approach. For those less familiar with these concepts: in attributional modeling, upstream emissions and resource extractions are allocated wherever multi-output processes occur. Whereas in consequential modeling, the emissions and resource extractions of marginal products — products that could substitute the co-products — are subtracted from the product life cycle. The modeling approaches result in two data libraries, which are both supplied in two forms: 1) unit processes — fully transparent, including uncertainty data; and 2) system processes — aggregated datasets without uncertainty data. This means that there are four different ecoinvent 3 libraries to choose from in SimaPro 8: 1) attributional — unit; 2) attributional — system; 3) consequential — unit; and 4) consequential — system. The SimaPro library switch function enables the calculation of results with any of these libraries, while modeling your projects with links to only one.

Introduction of market processes In ecoinvent 3, processes are introduced that represent the national, regional, or global markets for products. These “market processes” include inputs from production in several countries as well as inputs of transport processes. When the specific supplier is not known, it is recommended to use the market process. The market processes can be found in SimaPro 8 in separate categories from the underlying transformation processes. Transformation processes contain all the inputs for making a product or service, except for transport, and all the associated emissions and resource extractions. In the network view, the market processes are marked to distinguish them from other processes. This will give the user a better overview of the extremely large networks in ecoinvent 3. In fact, about one third of all the ecoinvent 3 processes are market processes.

New allocation procedure A new approach to recycling products and allocation in case of multi-functional processes was implemented in the attributional version. The approach is much more comprehensive than previously, but is also more complex. For example, emissions and resource extractions that take place in processes for converting by-products into valuable products are partly allocated to the main product. Before, these were only attributed to the upgraded by-product. Also, the cut-off approach for recycling was abandoned by modeling the complete cycle including collection, processing, and use in new products.

New data Besides all technical innovations, new data were added to the database. An important addition is the new water use data in all datasets of ecoinvent 3, which include information on the extraction location. The water flows are specified in SimaPro 8 on country or regional level to enable regionalized water footprints. Furthermore, several new datasets were added to ecoinvent 3. For example, new types of transport, cement production, chemical production, horticultural, and other agricultural production processes were added. Other data improvements are the updated and improved electricity processes and the more sophisticated way that transport is modeled.

Data format To enable all the changes in ecoinvent 3, the ecoinvent organization introduced a new database format. It was decided to not adapt SimaPro's database structure, because implementing a smooth transition would need to be handled carefully, given the extreme complexity. Users can view the original data in detail on the easily accessible ecoinvent website. PRé's partner GreenDeltaTC developed a special tool for converting SimaPro data to the ecoinvent 3 format and vice versa. The tool also converts to and from the ILCD format and is available online.

Database update SimaPro 8 enables the transfer of links to ecoinvent 2.2 in user databases to ecoinvent 3 by choosing this option while importing the Update database. A more detailed description of this function can be found in the Update manual. Besides the new ecoinvent libraries, the SimaPro 8 database also includes updates of the impact assessment methods ReCiPe, CML-IA, Ecological scarcity 2006, EDIP 2003, EPD 2008, and USEtox.

Water footprint assessment now possible

Because regionalized water use data is now available through ecoinvent 3, several spatially differentiated water impact assessment methods were implemented in SimaPro 8. This means that all water flows from groundwater, rivers, lakes, and unspecified natural origin in the ecoinvent 3 libraries and the implemented water footprint methods are country or region specific. For example, the flow, "Water, river, CN," is used in the Chinese irrigation process and has an environmental impact factor in each implemented water footprint method. This way, the total impact of water use in the product life cycle can be calculated in SimaPro 8 while addressing the differences in impact per country/region.

The new methods category "Water footprint" was added, containing the following new regionalized methods:

- Boulay et al 2011 (Water Stress indicator),
- Hoekstra et al 2012 (Blue water scarcity)
- Pfister et al 2009 (Water Stress Index),
- Boulay et al 2011 (human health),
- Motoshita et al 2010 (human health),
- Pfister et al 2009 (human health, ecosystems quality, resources – based on Ecoindicator99),
- Pfister et al 2010 (human health, ecosystems quality, resources – based on ReCiPe).
- Ecological scarcity 2006 (water only)

Quicker calculation engine

The significant increase in life cycle inventory data in the ecoinvent libraries had some serious implications to SimaPro. PRé noticed that SimaPro's calculation engine, which was based on widely used and recognized concepts in LCA software (matrix inversion and solver algorithms), was not very efficient with large networks of 5000 processes and up. For example, calculating the network of a random ecoinvent 3 product with SimaPro 7.3 would take more than 5 minutes, or an "out of memory" error would show up. The calculation engine was therefore replaced by an accurate and much faster procedure that requires much less computer memory.

The new procedure is an "iterative algorithm," as it recalculates the results until a certain accuracy is reached. The actual calculation speed depends on many factors, such as local disk/network, computer processor speed, and Windows version. With the new calculation engine, calculation time is no longer exponentially related to network size. It should be noted, however, that although SimaPro 8 is faster than its previous version, the increased network size in ecoinvent 3 slows down most of the advantage. Nevertheless, there is improvement, which can be best noticed when using the Monte Carlo analysis function. With this change, SimaPro 8 is ready for even larger data libraries in the future.

More information?

If you have questions about the new ecoinvent data, please contact ecoinvent via support@ecoinvent.org or check the user forum on www.ecoinvent.org.

Please contact us or your local partner if you have questions on the ecoinvent implementation of ecoinvent 3 in SimaPro or any other questions related to the update.

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