European Commission

JRC TECHNICAL REPORTS

Life Cycle Data Network — Handbook for data developers and providers

How to develop, check and share ILCD Entry Level compliant data through the Life Cycle Data Network

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2016

Joint Research Centre

EUR 28251 EN

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JRC Science Hub
https://ec.europa.eu/jrc

JRC104371

EUR 28251 EN

PDF	ISBN 978-92-79-64014-8	ISSN 1831-9424	doi:10.2788/585488
Print	ISBN 978-92-79-64013-1	ISSN 1018-5593	doi:10.2788/553203

Luxembourg: Publications Office of the European Union, 2016

How to cite: Fazio, S., Kusche, O., Zampori, L., Pant, R.; *Life Cycle Data Network — Handbook for users and data developers*; EUR 28251 EN; doi:10.2788/585488

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Acknowledgements

This report has been partly developed in the framework of the administrative arrangement 'EFME 3' (No 070201/2015/704456/SER/ENV.A1 — Technical support for environmental footprinting and the Life Cycle Data Network) between the JRC and the Directorate-General for Environment (DG Environment) of the European Commission.

Abstract

After its debut in the European Commission's integrated product policy ([1]) (COM(2003)302) as the 'best framework for assessing the potential environmental impacts of products', life cycle thinking (LCT) and life cycle assessment (LCA) has become increasingly used in support of community policies and business. Focus has been primarily on establishing agreed methods, both within Europe and internationally. The European Commission's European platform on LCA (EPLCA) has continued to address the equally essential issue of data availability, coherence and quality assurance.

LCA has become an important approach to boost smart, sustainable and inclusive growth in the European Union (EU). As an example, in the context of the Europe 2020 flagship initiative, 'A resource-efficient Europe' ([2]),the 'Single market for green products communication' ([3]) and the related European Commission recommendation for the product environmental footprint and the organisation environmental footprint guides ([4]). These methodologies reflect a vital milestone in the aim to increase coherence and quality in the assessment of the environmental performance of products and organisations. Other prominent applications include, in support of the waste framework directive, the ecodesign directive, the EU ecolabel scheme, the EU green public procurement, the raw materials initiative and the bio economy strategy, as well as provide a more advanced basis for indicators and targets accounting for the burdens of EU imports and exports to help focus policies and research funding. LCT is essential in modern decision-making in business and policy. Commonly implemented through LCA, it is increasingly necessary to quantify the benefits and burdens associated with products, both goods and services, that occur in their supply chains during use as well as at end-of-life. This helps to avoid the shifting of burdens between different geographic regions, generations and impacts.

Within this framework the EPLCA, developed by the JRC together with DG Environment, represents the reference point for data and methods essential to implementing life cycle-based approaches. The EPLCA promotes the availability of data and information, with a focus on coherence and quality assurance.

Although methodology development is advancing fast, the availability of coherent, quality-assured life cycle data and studies still represents a major challenge to mainstream the use of LCA and associated environmental footprint methods in business and in policy.

To date, the EPLCA has facilitated the following notable developments.

— The Life Cycle Data Network (LCDN): launched in early 2014, it aims at providing a globally usable infrastructure for consistent and quality-assured life cycle data.

— The European Reference Life Cycle Database: comprises life cycle emissions and resource consumption inventory data from front-running, EU-level business associations and other sources for key materials, energy carriers, transport and waste management to be used as a source for secondary data.

— The Resource Directory: provides a structured repository for several types of life cycle-based documents and studies as well as a worldwide list of life cycle support software packages and databases from suppliers/developers and service providers.

([1]) COM(2003) 302.
([2]) COM(2011) 21.
([3]) COM(2013) 196.
([4]) Commission Recommendation 2013/179/EU.

— The Reviewer Registry: provides a list of potential reviewers for different LCA schemes and automatically assesses the eligibility of single reviewers and reviewers' teams according to different levels of compliance.

This guide provides comprehensive instructions on how to utilise the LCDN for publishing LCA data. It summarises how to orchestrate the various tools in order to guide the data developers through the entire process from generation of a dataset to publication on the LCDN. Further and more detailed documentation for the individual steps can be found in the annexes to this technical report.

In principle, the following steps are required in order to publish data on the LCDN and are therefore covered in this document:

(1) preparation of data (export from an LCA modelling tool);

(2) technical validation of the data;

(3) setting up of a node for participation in the LCDN;

(4) uploading of the data to the node;

(5) publication of the data on the LCDN.

Beyond that, a detailed guidance on how to document different International Reference Life Cycle Data System entry-level (ILCD-EL) aspects, in three commonly used LCA software in Europe (GaBi ([5]), OpenLCA ([6]) and SimaPro ([7])), is also provided. **This document provides some examples, taking into account some of the abovementioned LCA software because they are the most commonly used and widespread in Europe. However, this does not imply any recommendation or endorsement from the JRC or the European Commission.**

An exemplary dataset was used to provide an overview and an understanding of how to address some compliance issues in different software. Some general guiding principles that apply to all of the software are summarised, along with a short review of discrepancies found when exporting the dataset in ILCD format using the individual LCA software. The editable compliance elements are explained individually, showing some screenshots of different software tools.

Finally a set of slides, resuming the content of this guide, is provided in Annex II.

([5]) http://www.gabi-software.com/international/downloads/
([6]) http://www.openlca.org/
([7]) https://www.pre-sustainability.com/simapro

1. Introduction

This guide provides comprehensive instructions on how to utilise the LCDN for publishing LCA data. It summarises how to orchestrate the various tools in order to guide you through the entire process from generation of a dataset to publication on the LCDN. Further and more detailed documentation for the individual steps can be found in the annexes to this document.

The European Platform on LCA

The EPLCA is managed by the Commission's JRC Bioeconomy Unit (D1), working closely with the circular economy and green growth policies of DG Environment. This platform supports business and government needs for the availability, interoperability and quality of life cycle data, methods and studies.

LCA has been identified as the 'best framework for assessing the potential environmental impacts of products' in the European Commission's integrated product policy communication (COM(2003) 302). This communication highlighted the necessity for a platform on LCA and for an increase in the availability of quality-assured life cycle data. The European Commission, through its DG Environment and the JRC, responded to these needs by establishing the EPLCA.

The Life Cycle Data Network

The LCDN is a non-centralised web-based infrastructure that ensures life cycle data can be easily accessed via searches, filtering and sorting. Datasets in the network can be provided globally by any data developer/owner, e.g. industry, national LCA projects, research groups and consultants.

To participate in the network, interested parties can set up their own node where data can be hosted and shared on the network. While an individual node may be used to publish any data that is desired, only datasets that fulfil the requirements of the network (ILCD-EL requirements) can be registered and shared on the network. That means that only those datasets that are ILCD-EL compliant are visible through the LCDN, while all others can be accessed only from the individual nodes.

Steps for publishing data on the LCDN

The following steps are required in order to publish data on the LCDN and are therefore covered in this document:

(a) preparation of data (export from an LCA modelling tool);
(b) technical validation of the data;
(c) setting up of a node for participation in the LCDN;
(d) uploading of the data onto the node;
(e) publication of the data on the LCDN.

Figure 1.1 shows the flowchart of the abovementioned steps.

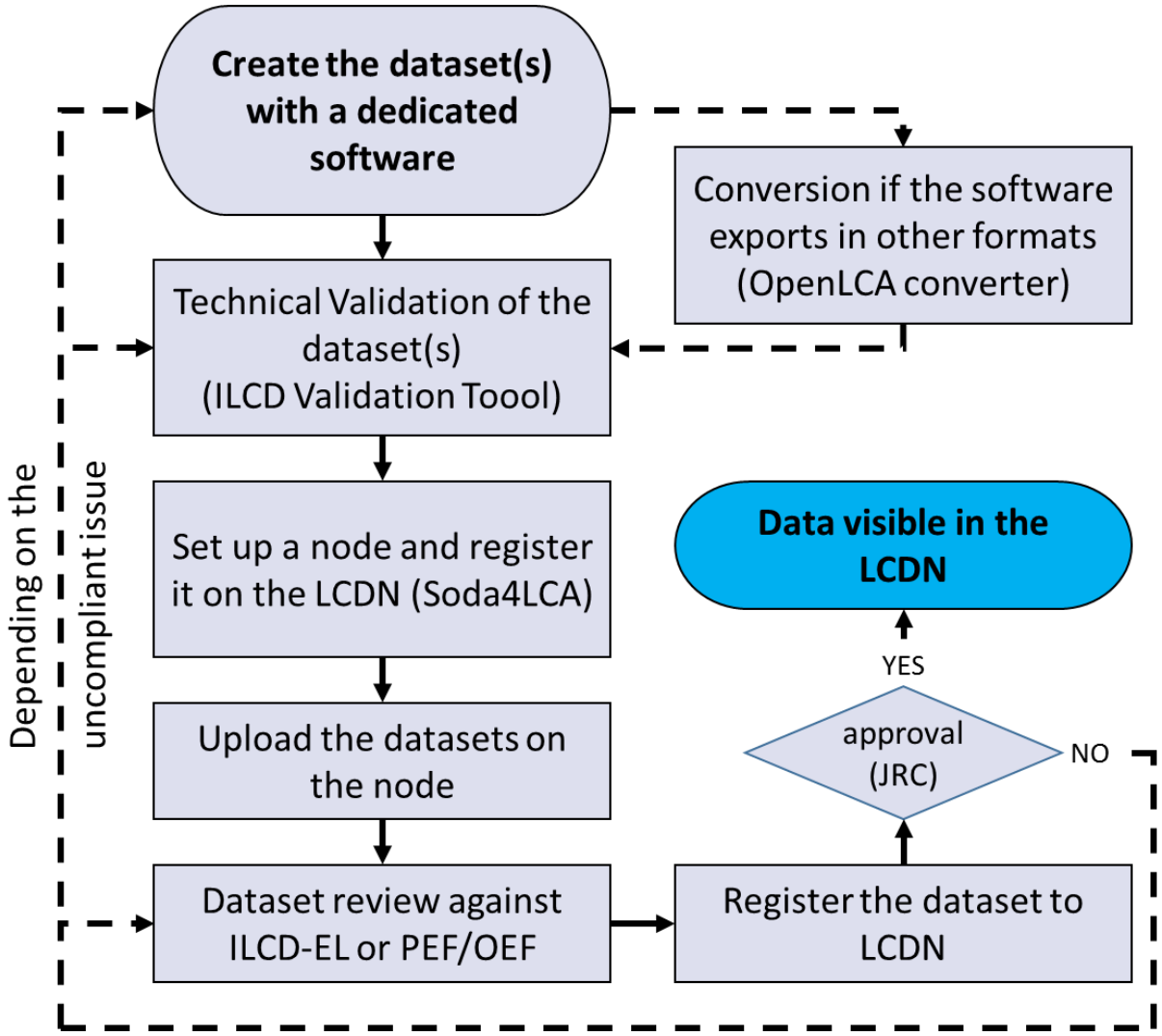


Figure 1.1. Steps for the creation of datasets and publication on the LCDN

List of software components

The following software components are used for the procedures described in this document, aside from an LCA modelling tool:

- ILCD validation tool
- OpenLCA converter
- soda4LCA

The following software components are necessary to set up an LCDN node:

- soda4LCA
- Java ™
- MySQL ™
- Apache Tomcat ™

2. Creating ILCD Entry Level compliant datasets

2.1. Requirements

In order to fulfil the ILCD-EL requirements ([8]), the following information needs to be documented in process datasets.

Table 2.1. Overview of ILCD-EL requirements

Compliance area	ILCD-EL requirements
Format	Use of ILCD format
Documentation	○ Minimum documentation extent specified ○ Based on ISO quality criteria
Nomenclature	○ ILCD nomenclature compliant documents (e.g. use of ILCD reference elementary flows) ○ Permission of certain aggregated elementary flows ○ ILCD terminology use not enforced
Data quality	*In general following ISO quality criteria* ○ No minimum data quality required ○ BUT documentation of data necessary, using ISO quality criteria ○ Technological, time and geographical representativeness to be documented
Method	○ ISO 14040 and 14044 compliant process-based LCA ○ Methodological ILCD compliance not enforced ○ Applied modelling frameworks and allocation/substitution approaches to be documented

Review*	○ Use of reviewers from registry not required
	○ 'Qualified reviewer' required (based on ISO 14025):
	  ○ knowledge of relevant sector;
	  ○ knowledge of represented process or product LCA method expertise and experience.
	○ Qualified independent external reviewer in line with ISO 14044 requirements BUT separate review report is NOT required OR
	○ Qualified independent internal reviewer in line with ISO 14044 requirements BUT separate review report IS required (with the ILCD template/minimum review documentation scope in addition to review documentation provided within dataset)
	○ Review on unit process level may not be required, depending on data quality claims

* The JRC is reviewing ILCD-EL requirements and particularly regarding the use of reviewers from the Reviewer Registry of the EPLCA, which may become mandatory, and the request for a separate review report, which may also become mandatory for external reviewers.

2.2. Export from LCA tools

In order to publish data on the LCDN, the dataset must be formatted in the ILCD data format. Data export directly to the ILCD data format is supported by major LCA software tools used in Europe. For all cases where this is not possible, a free converter tool ([9]), which has been developed in collaboration between GreenDelta and the JRC, is available to convert data from EcoSpold to ILCD (see Chapter 3, 'Using the EcoSpold-ILCD converter', for further details. See also Annex I for further information on how to create an ILCD-EL compliant dataset using the major software for LCA modelling).

([8]) http://eplca.jrc.ec.europa.eu/uploads/ILCD-Data-Network-Compliance-Entry-level-Version1.1-Jan2012.pdf
([9]) http://www.openlca.org/openlca-format-converter/

2.2.1. GaBi software

In GaBi, select the items you want to export and then choose 'Export' and 'ILCD …' from the 'File' menu.

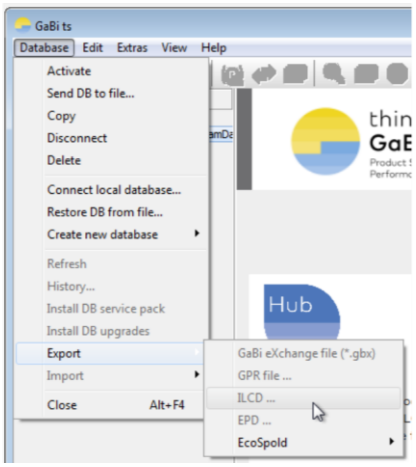


Figure 2.1. GaBi export

2.2.2. OpenLCA software

In OpenLCA, choose 'Export' from the 'File' menu, then the item 'Processes' under 'ILCD', as shown in Figure 2.2. In the next step of the export wizard, select the processes to be exported and confirm with 'Finish' (Figure 2.3). A file named 'ILCD.zip' will be created at the selected location.

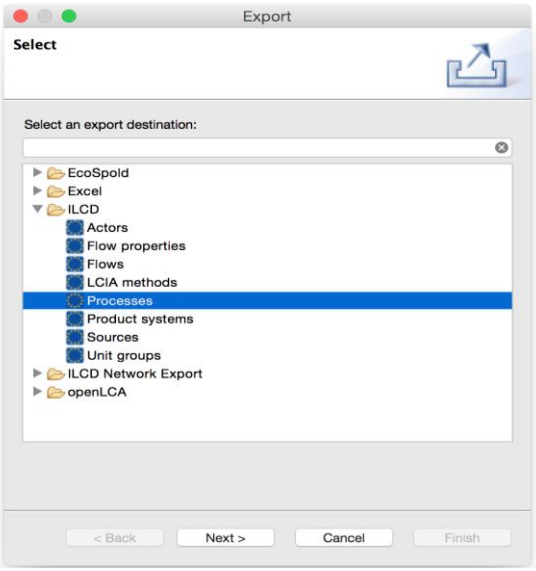


Figure 2.2. OpenLCA ILCD export

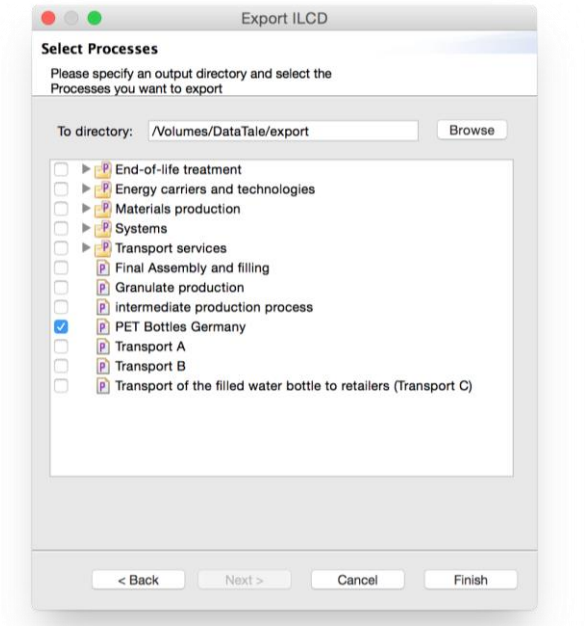


Figure 2.3. openLCA ILCD export

2.2.3.SimaPro software

In the most recent release, SimaPro offers native ILCD export. With previous versions of the software tool, generating ILCD datasets from SimaPro requires two steps: first exporting the data from SimaPro in EcoSpold, and then converting that data to ILCD using the OpenLCA converter tool.

Export from SimaPro software

Example: select the items you want to export and select 'Export' from the 'File' menu. In the following dialogue, choose 'ILCD database' as the data format, as shown in Figure 2.4. Then select 'Browse' under the 'Mapping file' section and navigate to the mapping file, which is located in the database directory under:

`C:\Users\Public\Documents\SimaPro\Database\SimaProToILCDMapping820.xlsx`

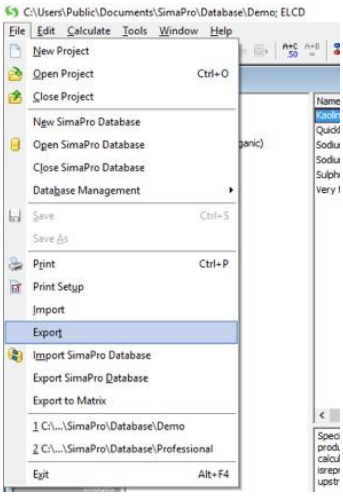


Figure 2.4. SimaPro export

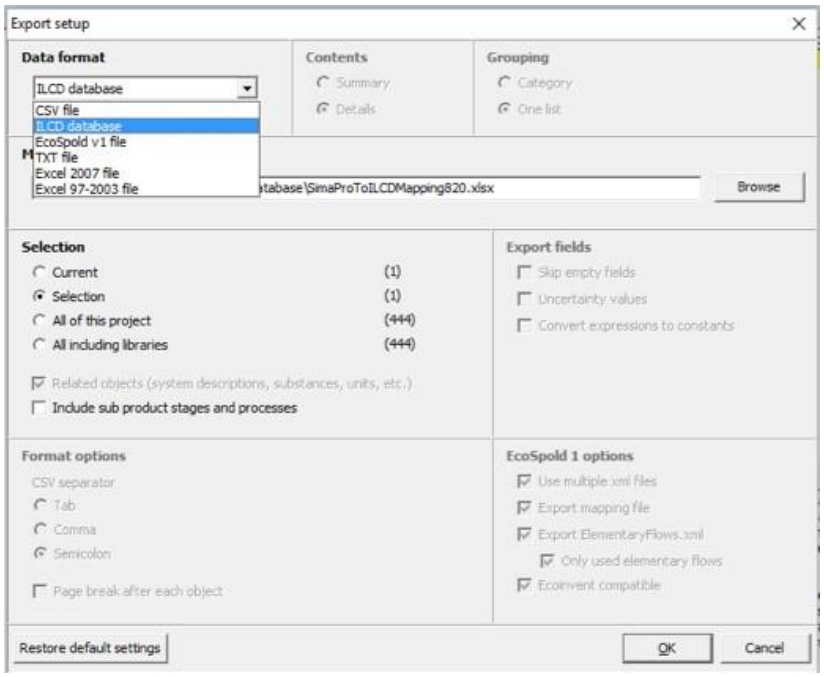


Figure 2.5. Select target format

After the mapping file has been selected, click on ‘OK’. A file dialogue will appear, prompting you to specify a target folder and a file name for the exported data. The result will be an ILCD ZIP file.

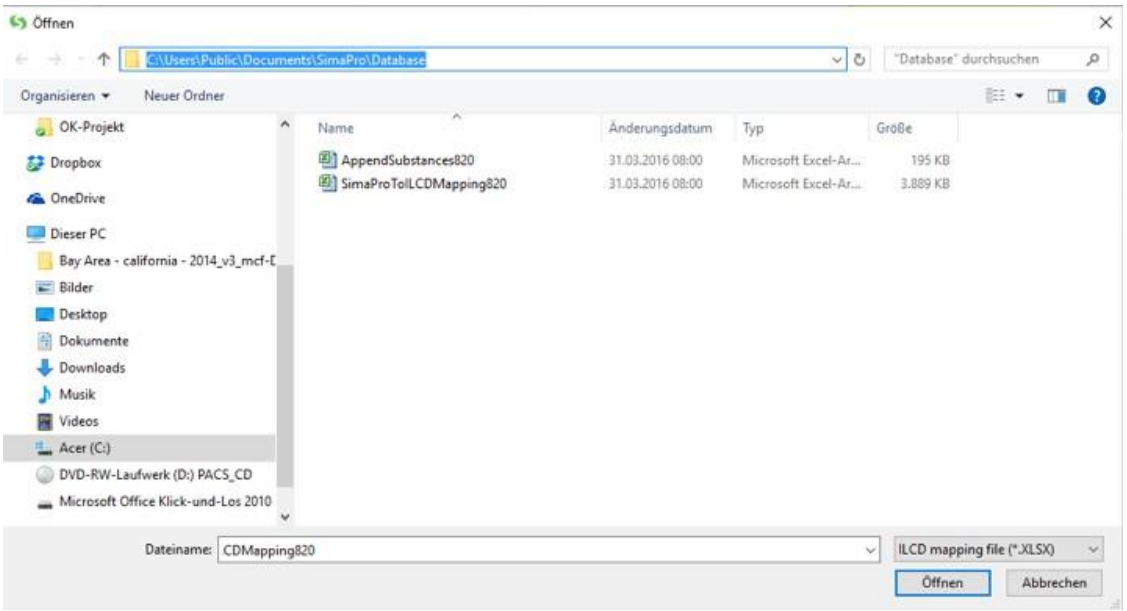


Figure 2.6. Select mapping file

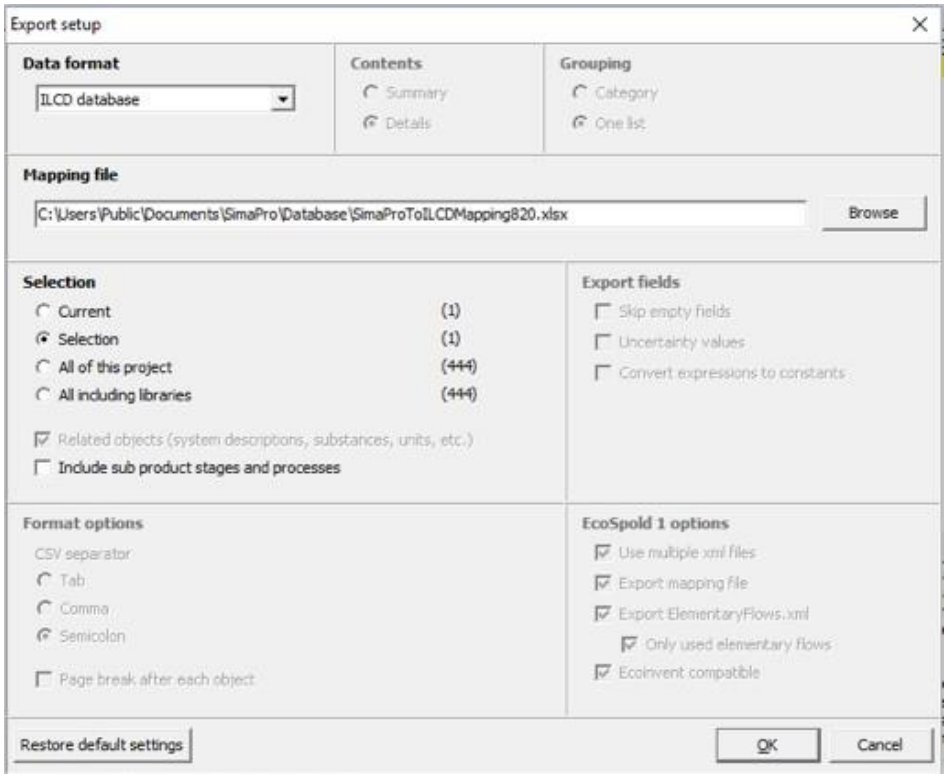


Figure 2.7. Select target folder and file name

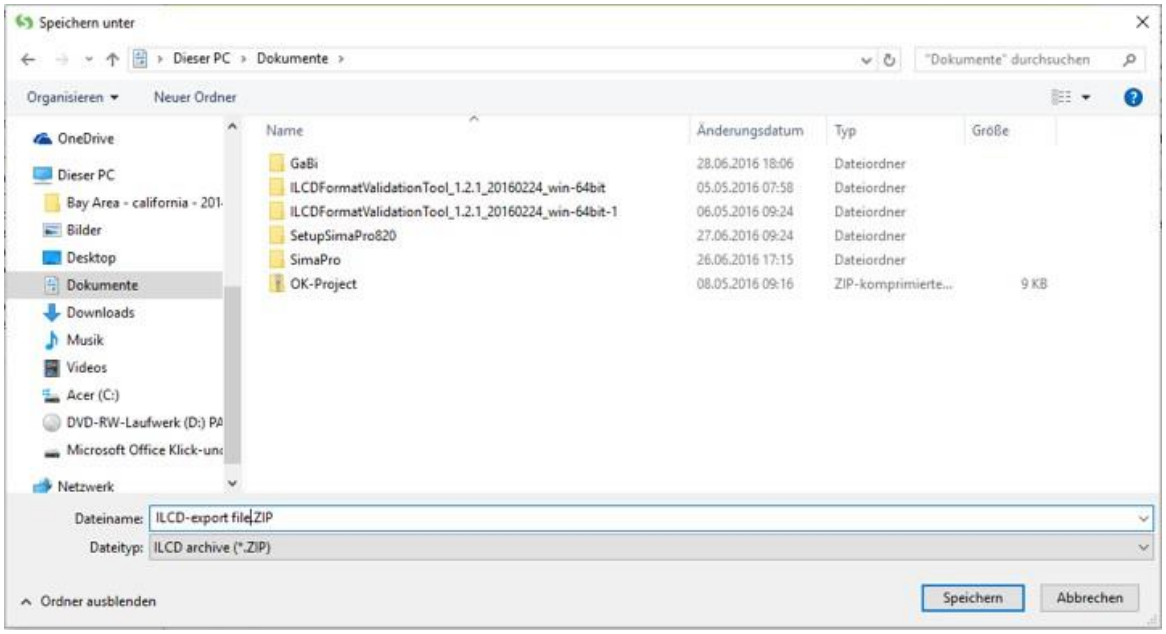


Figure 2.8. Ready for export

Optional: convert data to ILCD

In case you are using a previous version of SimaPro that does not yet support ILCD export, you may alternatively export the dataset as EcoSpold1 and subsequently use the OpenLCA converter to convert the data to ILCD format.

Follow the instructions in the section on SimaPro in Chapter 3, 'Using the EcoSpold-ILCD converter', of this document in order to convert the data generated in the previous step to ILCD.

3. Using the Ecospold-ILCD converter

The OpenLCA converter is a tool to bridge the various data formats and nomenclature systems that currently exist, enabling users to convert data from EcoSpold 1 and 2 and SimaPro formats to the ILCD format in order to publish data on the LCDN. As regards the conversion of datasets from Ecospold to ILCD, the conversion of elementary flows is fully covered.

3.1. Obtaining and installing the OpenLCA converter

The tool can be downloaded from

http://sourceforge.net/projects/OpenLCA/files/OpenLCA_converter/.

Select the latest version and download the converter-3.x.x.jar file.

This file is an executable JAR file, which requires Java to be installed on the local machine in order to run it. The converter runs by simply double-clicking on the executable file. If a message is displayed claiming that the file cannot be opened, then an updated version of Java is required, which is downloadable from http://java.com/download/.

3.2. Using the converter

Once started, the converter tool displays its main window as shown in Figure 3.1. To convert an EcoSpold dataset to ILCD, users must simply select the originating dataset in the 'Source' field as well as an (empty) target folder in the 'Target' field, as shown in Figure 3.2.

NB: It is necessary that for each conversion a new empty folder is chosen as target.

The resulting files will be written into the specified folder as can be seen in Figure 3.4. If during the conversion any issues have occurred, this is indicated in the converter's log window. In addition, the converter tool offers to perform a validation on the generated files.

3.3. Converting data generated with SimaPro

To convert data generated with SimaPro to the ILCD format, additional mapping files are required, which can be downloaded at http://www.pre-sustainability.com/data-conversion-tool-ilcd-format, along with instructions on how to set up the converter tool accordingly. See 'converting SimaPro to ILCD format' guidance ([10]).

([10]) https://simapro.com/wp-content/uploads/2015/07/Converting-SimaPro-to-ILCD-format.pdf

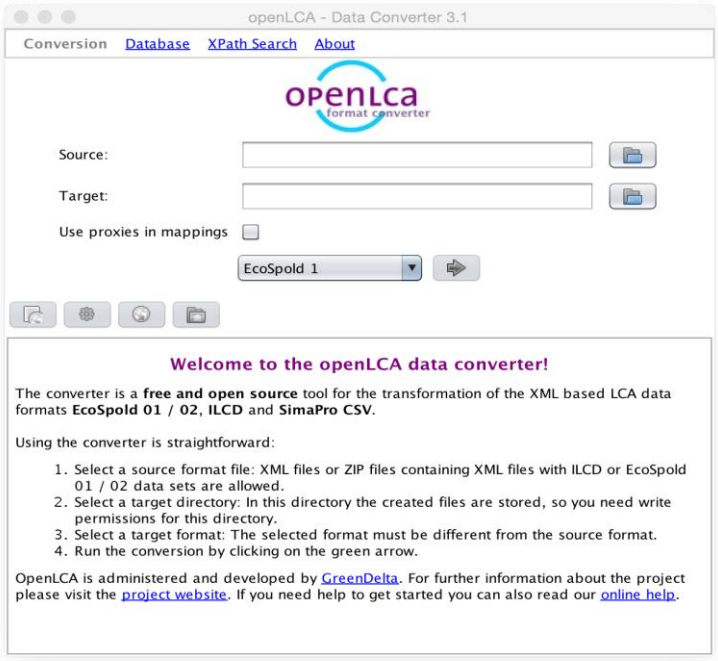


Figure 3.1. OpenLCA converter main window

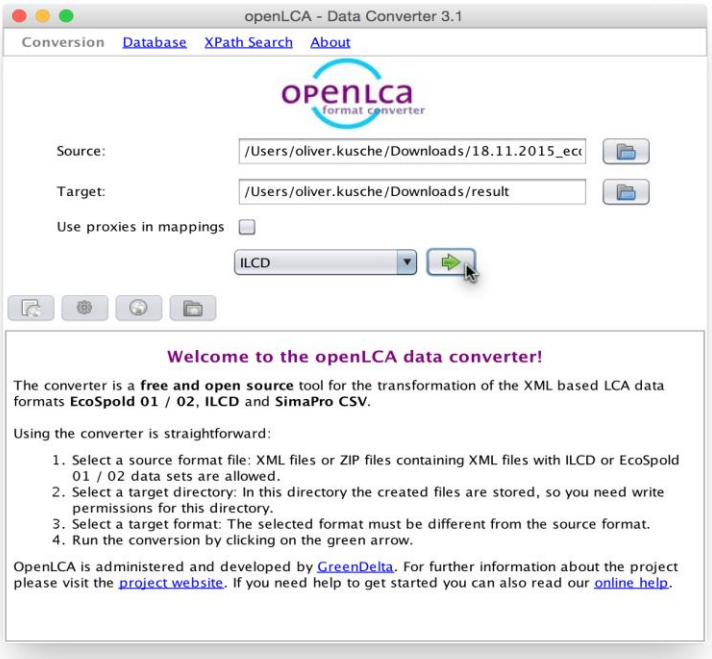


Figure 3.2. Converting EcoSpold 2 to ILCD

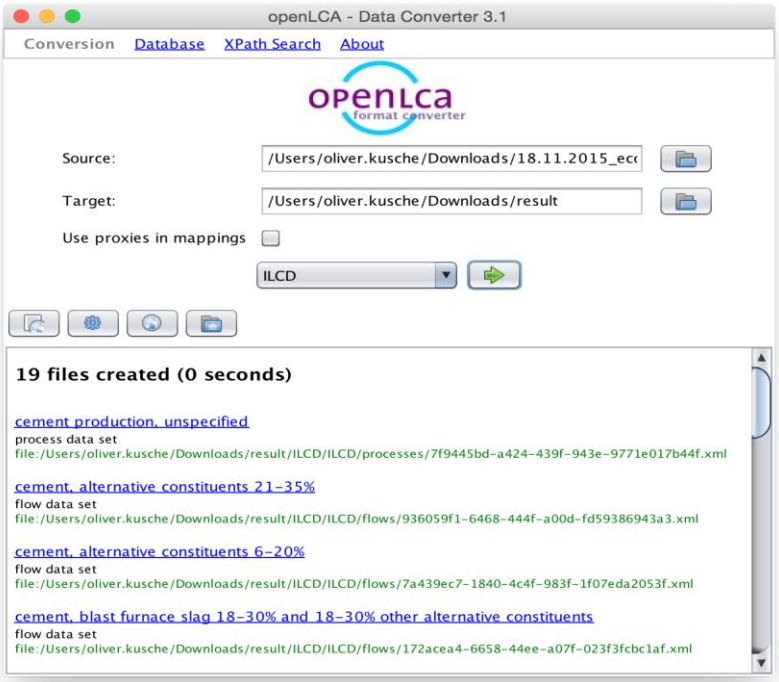


Figure 3.3. Conversion finished

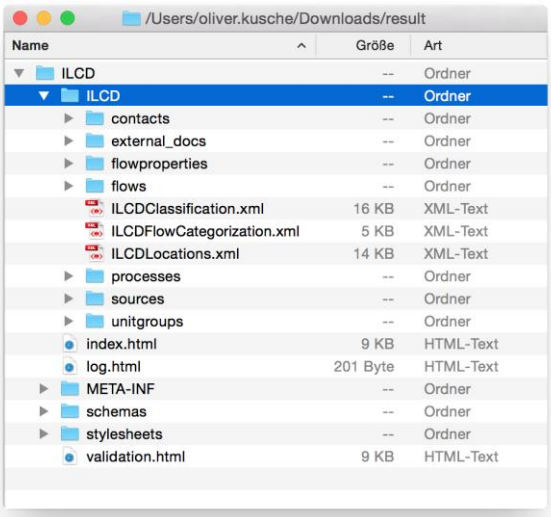


Figure 3.4. Resulting files

4. Data validation

For the (technical) validation of datasets, a free software tool is available. It can be used to check syntax, categories, nomenclature, references between datasets and other technical aspects.

By default, the tool will check against the ILCD format syntax only. Other aspects can be selected if desired.

4.1. Obtaining and running the ILCD validation tool

The validation tool (developed by Oliver Kusche in collaboration with the JRC) is available for all major operating systems and can be downloaded at

https://bitbucket.org/okusche/ilcdvalidationtool/downloads

The programme runs simply by unzipping the downloaded package launching the application. On Mac OS X, Java is required and can be obtained at

http://java.com/download/

4.2. Validation aspects

The tool offers to perform validations of the following aspects:

(1) dataset level:

- ILCD format syntax: the dataset conforms to the ILCD format specification,
- advanced ILCD format syntax: the dataset conforms to more specific rules,
- compliance to a reference nomenclature: the dataset references only elementary flows (and optionally flow properties and unit groups) that are defined by a reference nomenclature (such as the ILCD scheme);

(2) on a set of datasets:

- links: all local references (links) between datasets can be resolved,
- orphaned datasets: in a set of datasets, there are no extra datasets present that are not referenced from any other local dataset;

(3) on an archive:

- archive structure: the ZIP archive complies with the ILCD format specification regarding its internal folder structure and optional manifest file.

The aspects to validate against can be selected using the check boxes in the 'Validation aspects' component as shown in Figure 4.1.

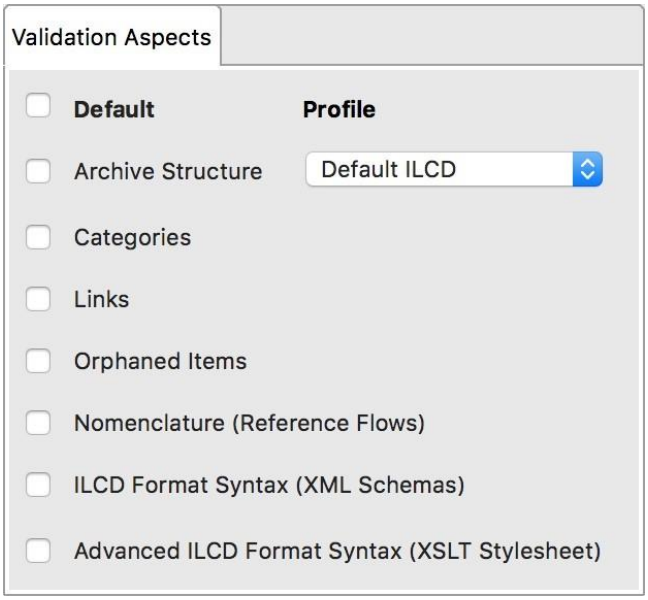


Figure 4.1. Validation aspects selection

4.3. Validation profiles

The tool allows for checking against different sets of rules, which are called profiles. In addition to the default ILCD profile, distinct profiles are available to check against EL and environmental footprint requirements.
As profiles are sometimes updated, they carry a version number where the latest version number is always the highest one.

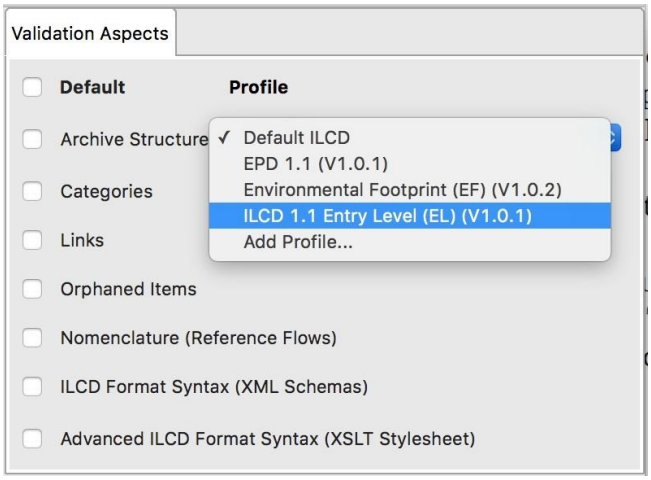


Figure 4.2. Profile selection

New profiles can be added (or existing ones updated) using the 'Add profile …' menu entry in the profile selector, as shown in Figure 4.3.

4.4. Using the validation tool

The datasets can be opened in the validation tool by simply dragging and dropping the ZIP file or folder generated from the LCA modelling tool (or the OpenLCA converter) to the area labelled 'Drop files or folders here' (see Figure 4.4). Then the desired validation aspects must be selected on the left-hand side, as shown in Figure 4.1. Optionally, a profile can also be chosen, then the validation can be launched by selecting the green 'Play' button.

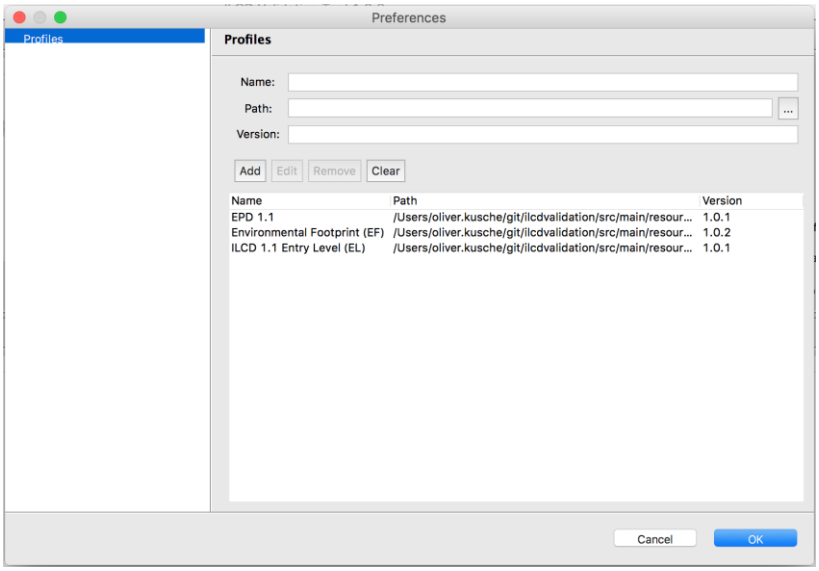


Figure 4.3. Adding new profile

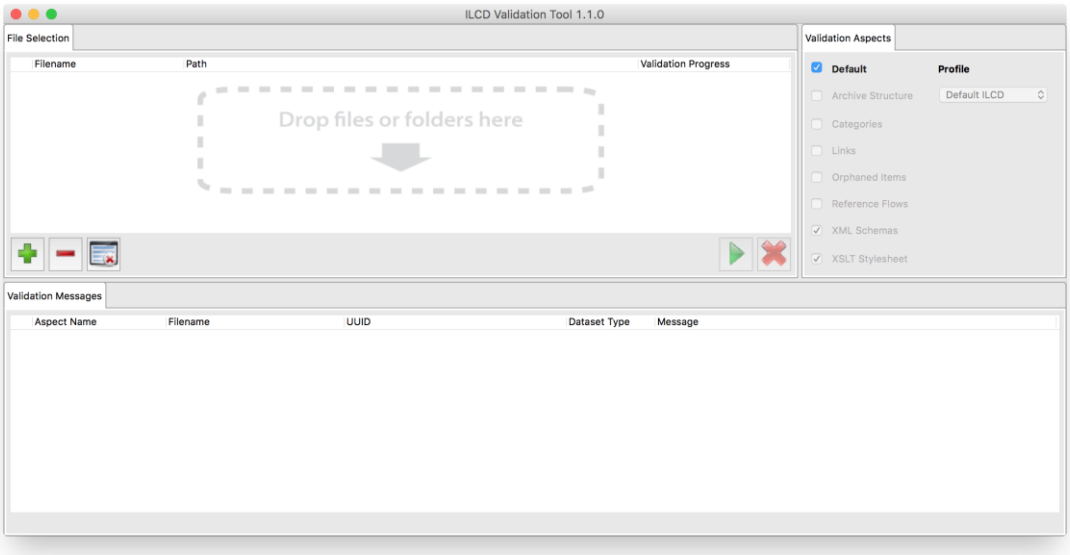


Figure 4.4. ILCD validation tool

Validation messages are issued on the bottom section of the application window with details for the respective dataset.
When validating a folder, right clicking on an individual message reveals the dataset file on the file system (see Figure 4.5). This does not work for a ZIP file, however, as this can be extracted in advance before the folder can be validated.

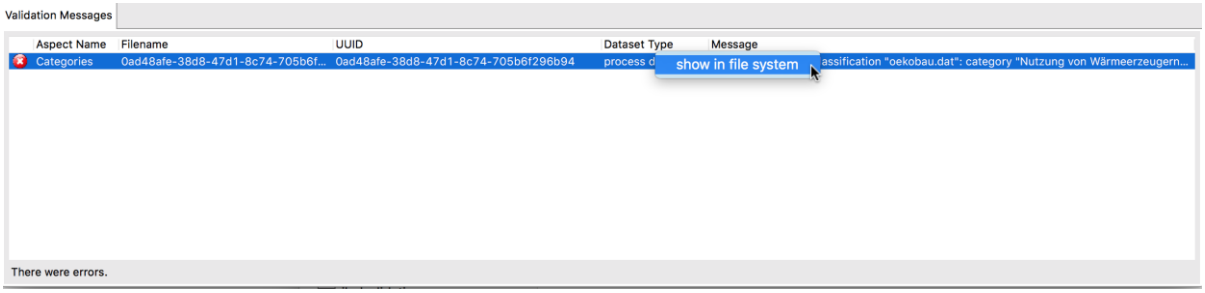


Figure 4.5. Show in file system

4.4.1. Validation messages

The entire log or single entries can be copied to the system clipboard using the entries in the context menu (see Figure 4.6).

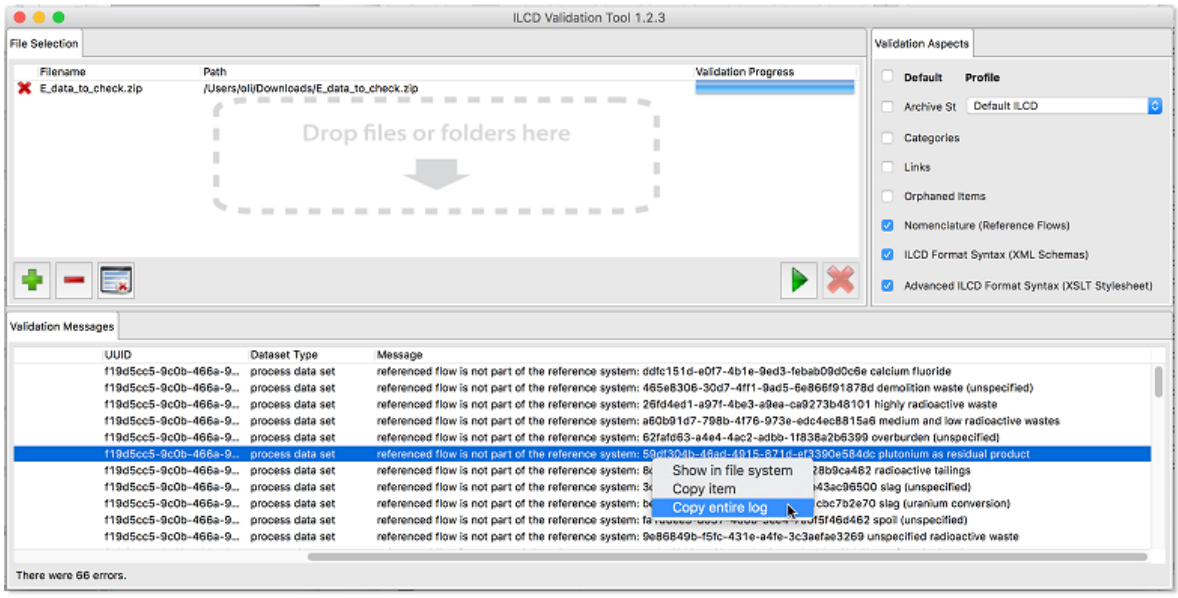


Figure 4.3 Copy log to clipboard

These logs can be further processed by, for instance, inserting them into a spreadsheet application like Microsoft Excel (see Figure 4.4.4).

4.4.2. Validating against ILCD-EL requirements

When validating data against ILCD EL requirements, the EL profile must be selected from the profile selector. The 'Nomenclature', 'ILCD format syntax' and 'Advanced ILCD format syntax' aspects should be checked.

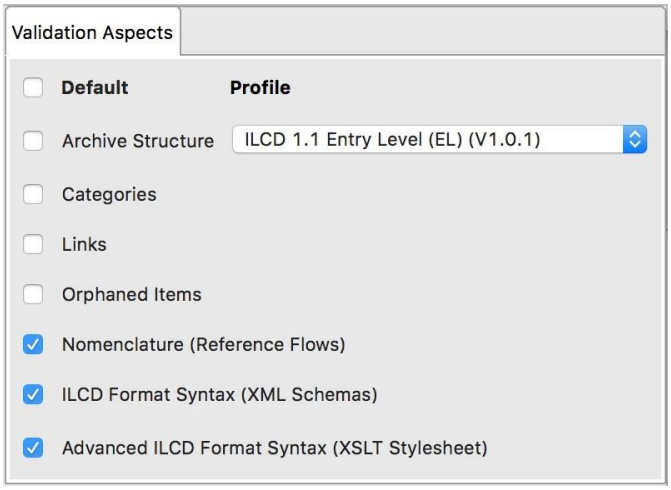


Figure 4.4. Validation for EL requirements

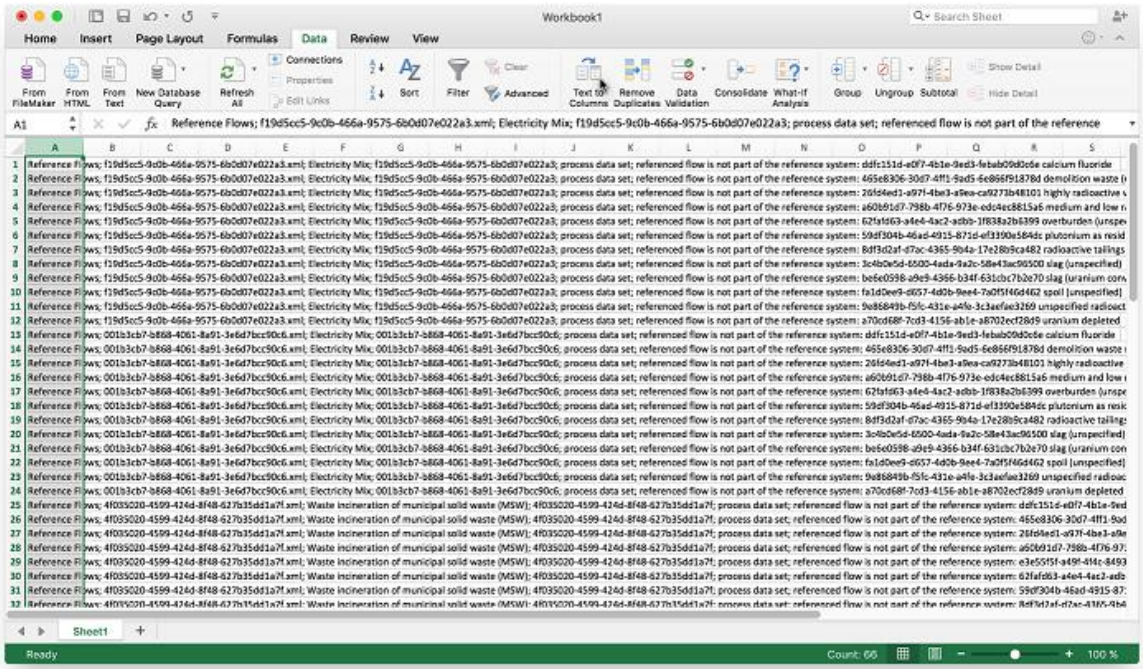


Figure 4. 8. Validation log: paste into Excel

4.4.3. Post-processing validation logs

If there are a large number of validation messages, it may be desirable to further process them and, for instance, provide them to other parties in a structured way. As the copied entries are in plain CSV format, they can be post-processed in spreadsheet applications like Microsoft Excel. This process is described below.First, the entire validation log must be copied into the clipboard using the menu entry. Then in the spreadsheet application and pasting the clipboard contents into the A column of line 1, the 'Text to columns' option must be chosen, as shown in Figure 4.8.
A wizard will appear, where the option 'Delimited' must be chosen before the user can press the 'Next' button, as shown in Figure 4.9.

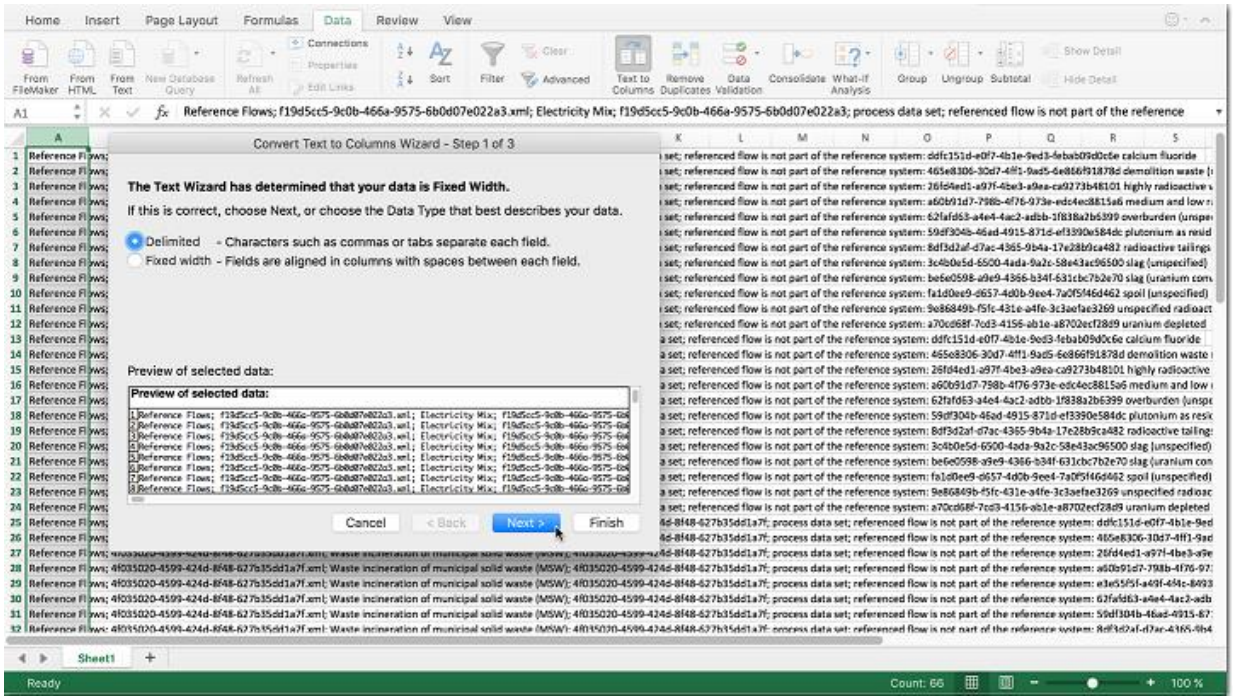


Figure 4.9. Validation log: choose 'Delimited'

In the following step, the user must select 'Semicolon' as the delimiter, as shown in Figure 4.10).

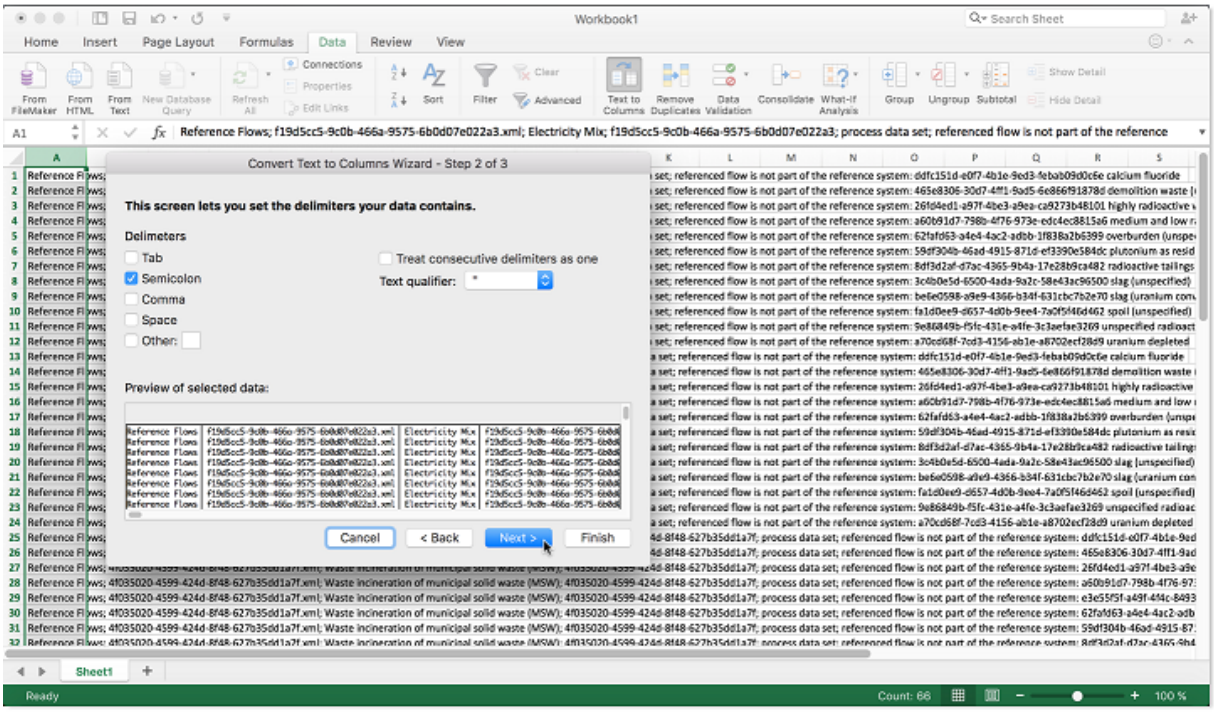


Figure 4.5. Validation log: choose semicolon delimiter

In the next step, the user must select a data format for each column, which is 'General' by default (Figure 4.11). Then the user can select the 'Finish' button.

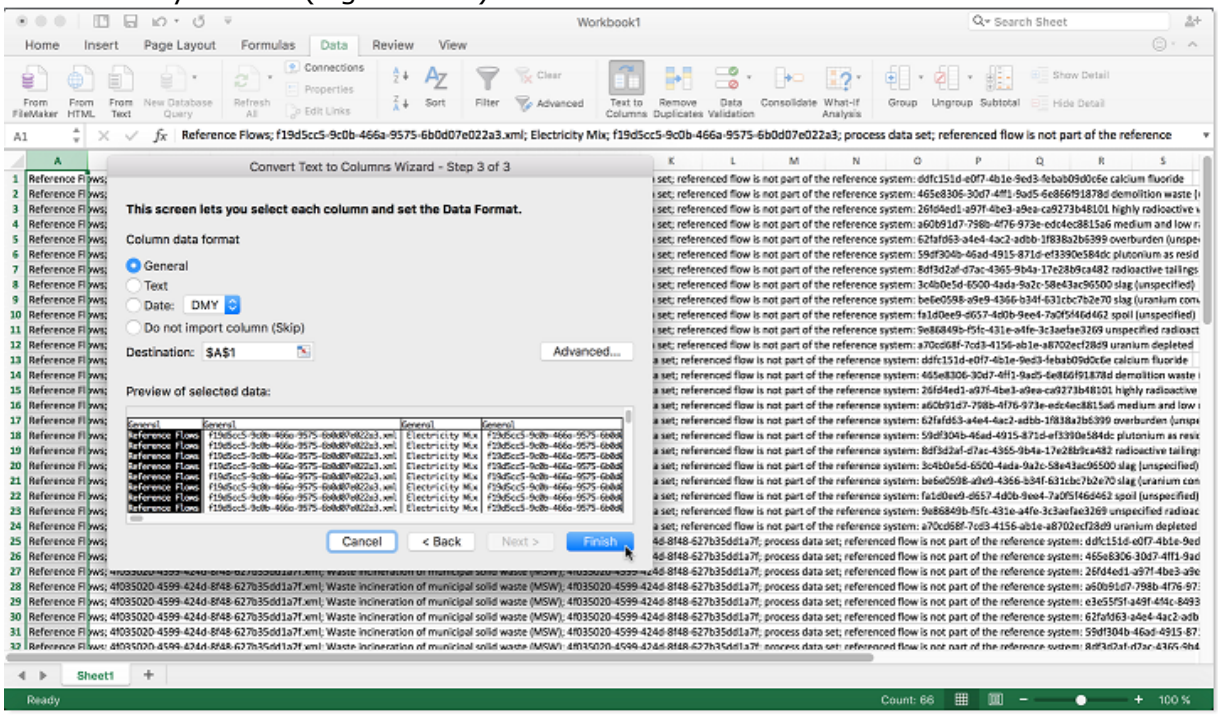


Figure 4. 11. Validation log: finish the wizard

Now there is an extra column for each part of the log message. In order to have each column as wide as its contents, the user must select all cells and then choose 'AutoFit selection' from the 'Format'/'Column' menu, as shown in Figure 4.12.

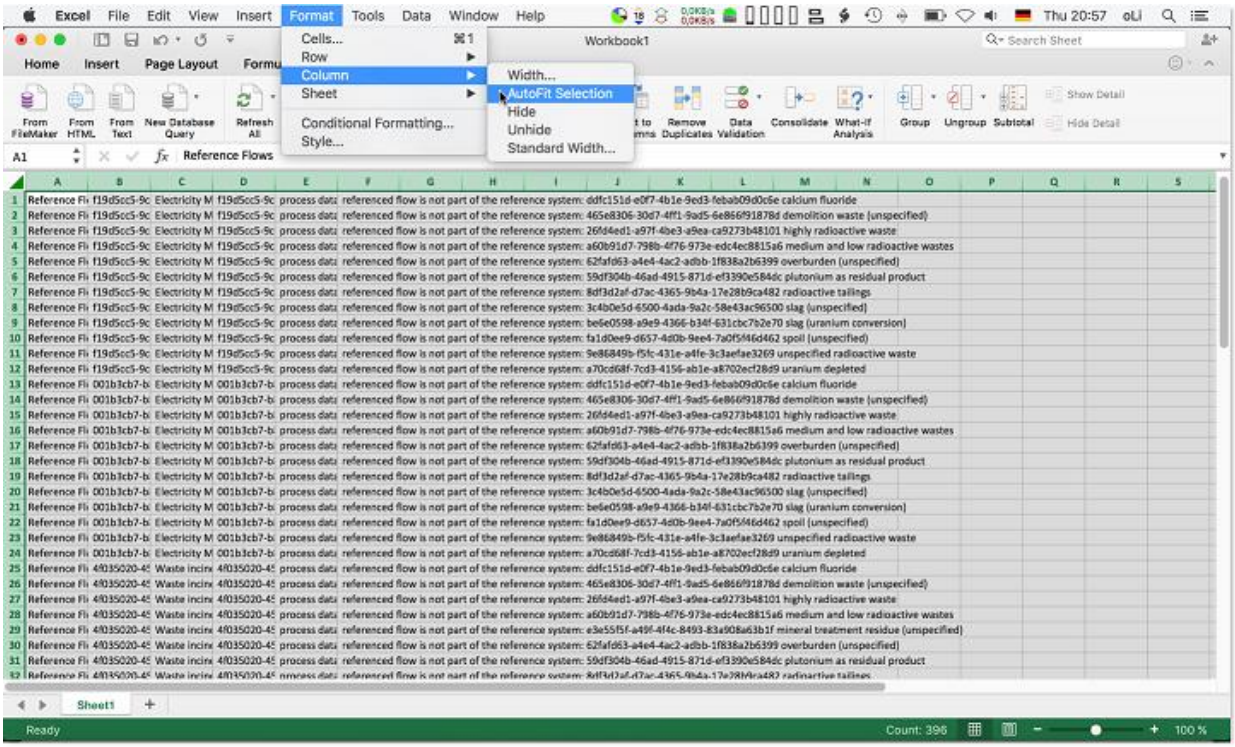


Figure 4.6 Validation log: auto-fit the columns

If there are any log messages of the type 'Reference flows' and the user wants to further separate the wrong flow of UUIDs and names in separate columns, then the following steps have to be followed.
First, the entire F column should be selected before the user chooses 'Text to columns' again, as shown in Figures 4.13 and 4.14.

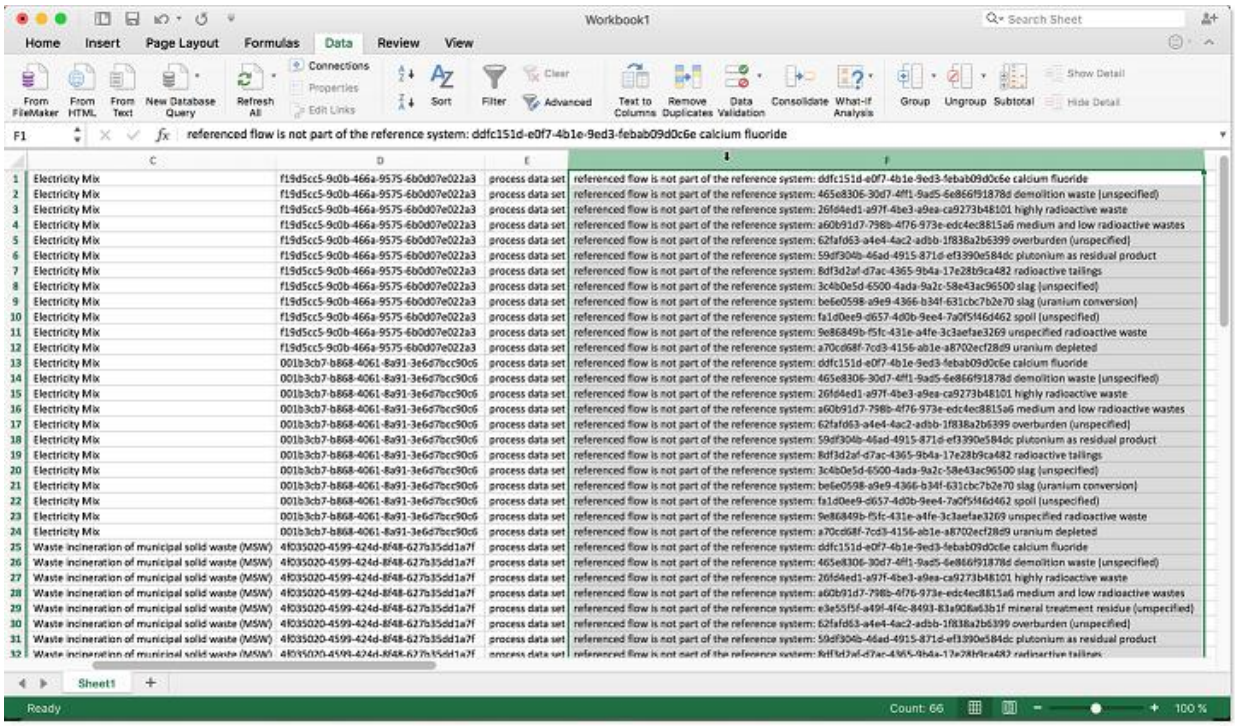


Figure 4.7. Validation log: select column F (flow UUIDs and names)

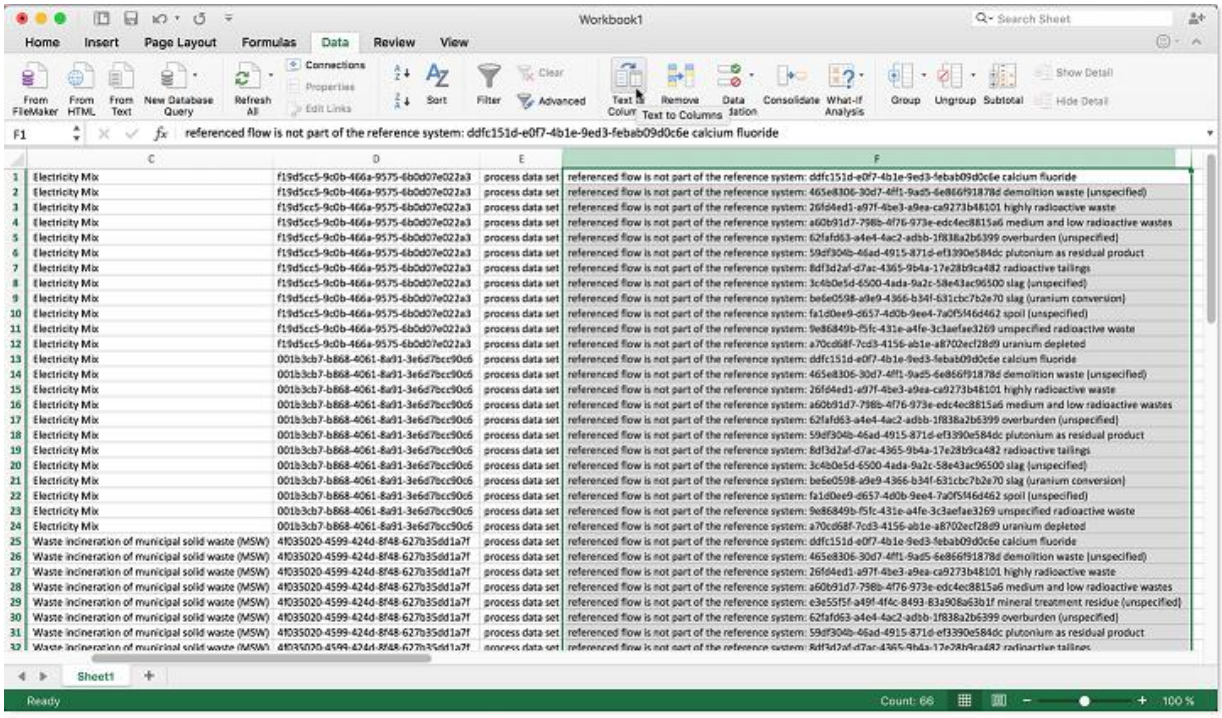


Figure 4.8. Validation log: choose 'Text to columns'

In the following wizard, the options 'Fixed width' and 'Next' have to be selected, as shown in Figure 4.15.

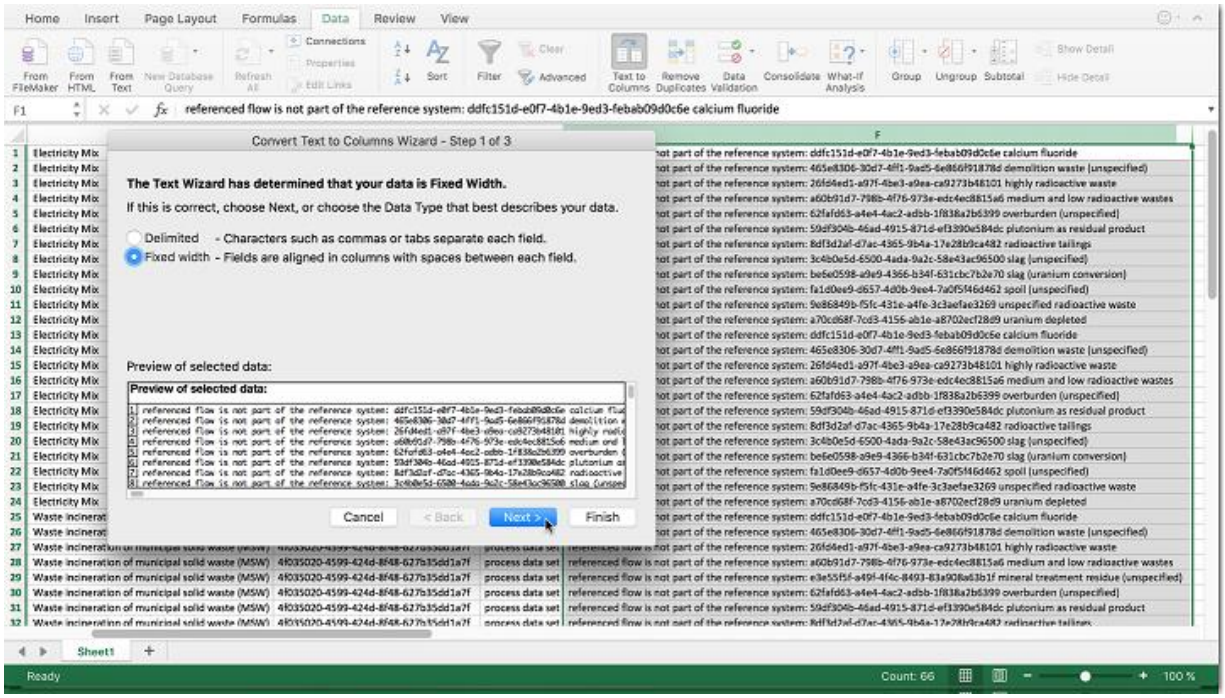


Figure 4.9. Validation log: select 'Fixed width'

In the next step of the wizard, the user has to create two vertical break lines that separate the text blocks by clicking on the respective positions and removing all other possibly existing break lines by double-clicking on them, as shown in Figure 4.16.

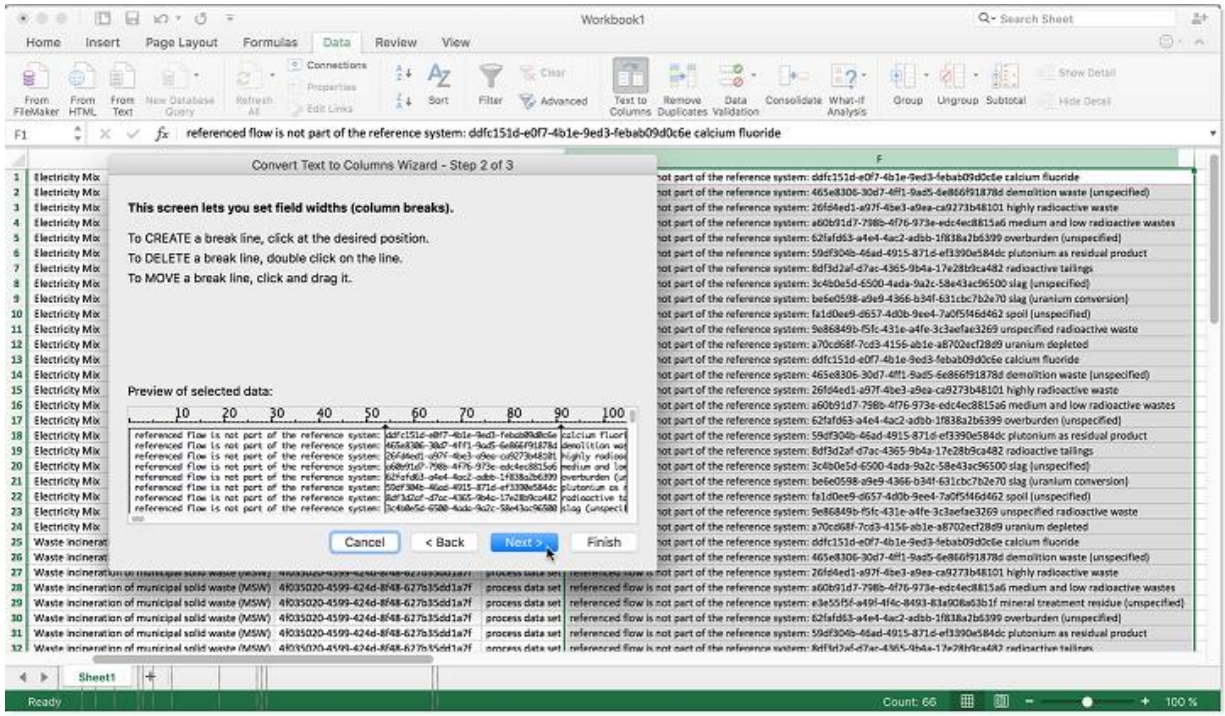


Figure 4.10. Validation log: set the break line to finish the wizard

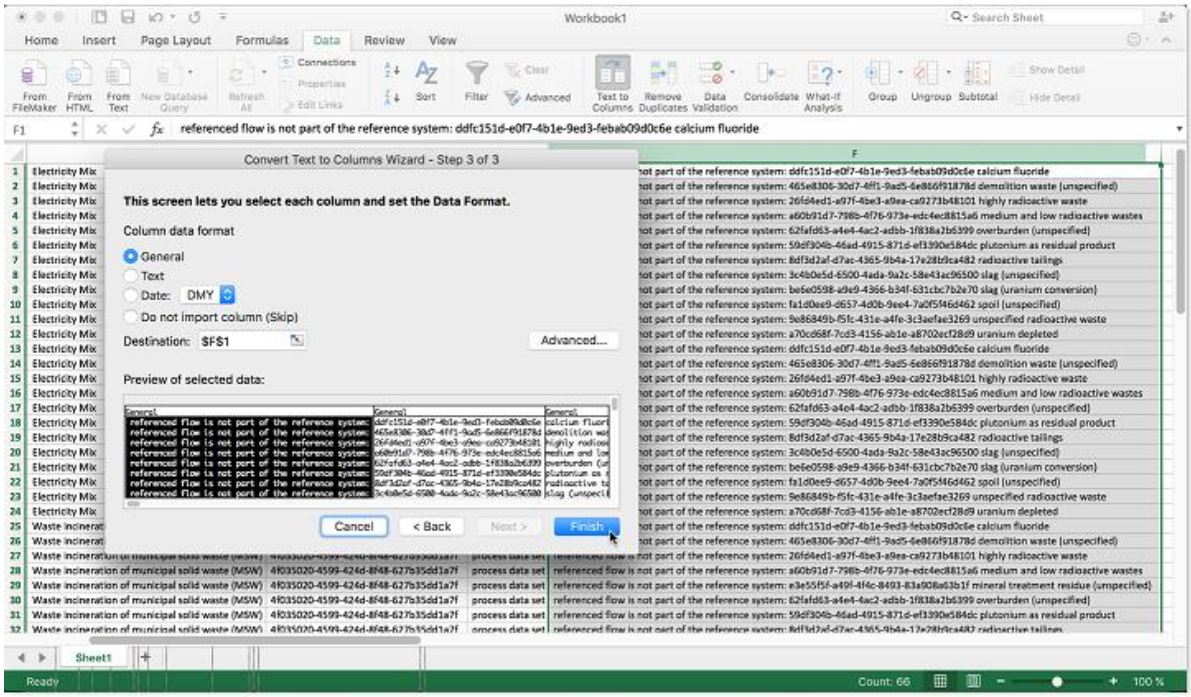


Figure 4.11. Validation log: finish the wizard

The result will be a spreadsheet table where every part of the validation message (dataset name, UUID, error message, etc.) will be in an extra column, as shown in Figure 4.18.

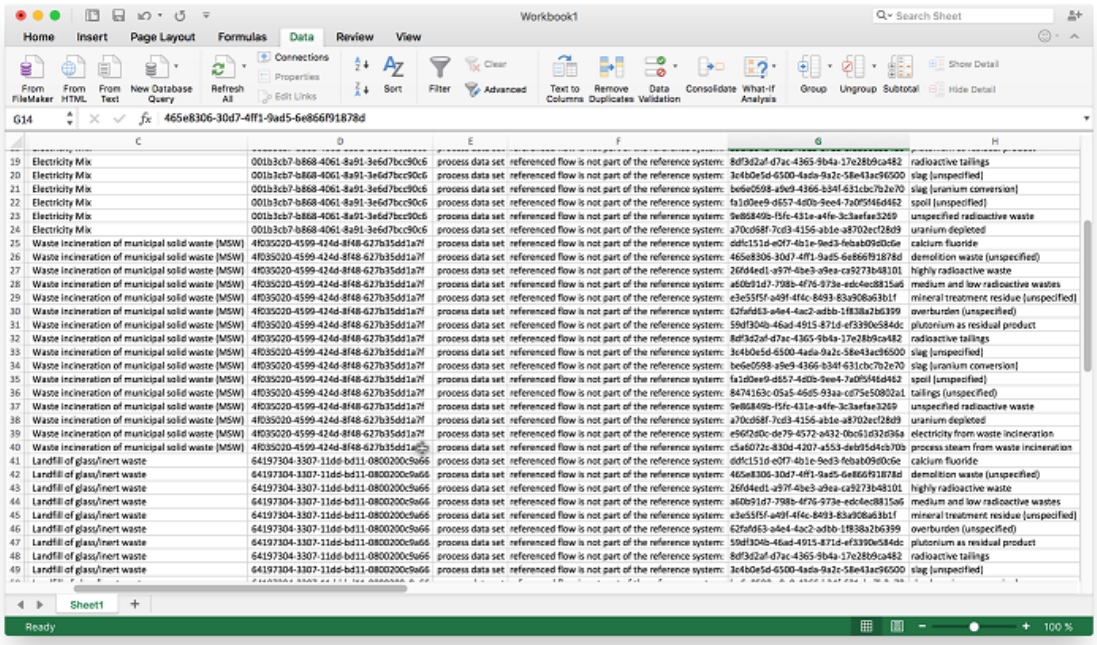


Figure 4.12. Validation log: ready to process in Microsoft Excel

4.5. Correcting errors

The following examples demonstrate how to fix issues in datasets detected during validation.

4.5.1. Syntax

Example validation message:

```
e5255c06-4b2b-451e-a14f-bc64d99c57cf - source data set - 15,93 cvc-attribute.3: The valu……
```

This means that there is an illegal character in the URI of an external file that is referenced from the source dataset (e.g. the % sign). This can be fixed with the following steps:

1. go back to your modelling tool and identify the source dataset with the UUID that is displayed by the validation tool;
2. rename the file, e.g. 'Metal_production_32 %.JPG' to 'Metal_production_32_percent.JPG', removing the illegal character;
3. correct the reference from the source dataset to the JPG file so that the 'external file' property of the source dataset points to the renamed file;
4. re-export the datasets from the modelling tool.

4.5.2. Nomenclature (ref. elementary flows)

Example validation message:

```
0cbf76cc-0192-4617-acd3-0fdb3cecf6c7 - process data set - referenced flow with UUID ddfc
```

This means that one of the elementary flows in your model does not comply with the ILCD reference system. This can be fixed with the following steps:

1. go back to your model and identify the input or output flow with the UUID that is not part of the reference system;
2. substitute the flow with one that is listed in the list of ILCD reference flows.

4.6. Minimum requirements for LCDN acceptance

For datasets to be accepted in the LCDN, the following checks need to be passed without any errors: ILCD format syntax and advanced ILCD format syntax, categories and links.

5. Creating a new node

This section explains how to technically set up a new node within a self-managed IT infrastructure. The set-up process should be carried out by experienced IT personnel only. As an alternative to operating a node within a self-managed infrastructure, commercial turn-key hosting solutions are also available, where the set-up and operation services are provided for a fee. In the latter case, please skip Sections 5.1 to 5.3.

5.1. Node set-up

This section summarises how a new node is set up. A comprehensive installation guide can be found in the annexes of this document.
The software used to run LCDN nodes is called soda4LCA, which stands for 'Service-oriented database application for LCA'. It is available free of charge under the open source GNU AGPL license. It is recommended to always use the latest available stable release.

5.1.1. System prerequisites

It is strongly recommended to run the node on a system with a GNU/Linux ([11])- or *nix ([12])-based operating system. The following components need to be installed on the target system:

- Java JDK3 ([13]) 1.7 or newer,
- J2EE servlet container ([14]) (recommended: Apache Tomcat 8.0 ([15])),
- MySQL ([16]) 5.x database.

In general it is recommended to use the latest available releases.

5.1.2. Obtaining soda4LCA

The latest soda4LCA release can be downloaded at:
https://bitbucket.org/okusche/soda4lca/downloads

The package has to be unzipped, and within the package there's a 'doc' folder which contains the documentation (which is also available online at https://bitbucket.org/okusche/soda4lca/).

5.1.3. Database and application set-up

The instructions for this step are contained in Chapter 4, 'Installing the application', of the installation guide in the 'doc' folder of the software package or online.

In principle, this would involve the following steps:

([11]) http://www.linux.org/
([12]) https://en.wikipedia.org/wiki/Unix-like
([13]) http://www.oracle.com/technetwork/java/javase/downloads/
([14]) https://en.wikipedia.org/wiki/Web_container
([15]) https://tomcat.apache.org/
([16]) http://dev.mysql.com/downloads/

- create a database schema;
- obtain and install the MySQL driver;
- add the database to the Tomcat configuration;
- create and adjust the soda4LCA configuration file;
- install the WAR file late.

5.2. Node set-up

Managing the soda4LCA.properties file described in the installation guide the options described in the following sections of the installation guide have to be customised:

- host name and port,
- node information,
- administrative contact,
- data and temporary directories.

5.3. Running the node

After installation and configuration is complete, the application server can be started (usually this will be Apache Tomcat) and checked.

Important: the default administrator password has to be changed immediately by logging onto the application as administrator, using the default credentials as described in the installation guide. A new password for the 'admin' account can be defined in the 'Change password' field at the bottom of the screen.

If necessary, additional settings for the appearance (logo, title, theme, etc.) can be selected as described in the installation guide.
For example, the title that will be displayed in the header section can be changed by setting the title property in the soda4LCA.properties file:

```
title = ACME Database
```

To change the theme of the integrated web user interface, any of the standard themes shown at http://jqueryui.com/themeroller/ in the gallery section can be specified, for example:

```
theme = Cupertino
```

To have, for example, the soda4LCA logo included in the header of the page, use the following line:

```
logo = templates/default/images/soda4LCA_logo.png
```

As a path to the logo, you can also provide an absolute URL to an image (e.g. http://www.acme.org/files/logo.png)

5.4. Registering the node in the LCDN

After the node has been set up and is running, the node has to be registered with the network registry which is operated by the JRC in order to join the LCDN. The following instructions are also documented in the 'Registering with a registry' section of the soda4LCA administration guide ([17]).
Before the registration process can start, the registry has to be added to the application's list of known registries. Only users with administrator privileges are allowed to perform this operation. In order to add a new registry, the user must follow these steps:

1. navigate to Network -> Registries;
2. press the 'Add registry' button;
3. the form as shown in Figure 5.1 will be displayed;
4. fill in all mandatory fields as follows and then press 'Save':
   a) registry name: Life Cycle Data Network,
   b) UUID: (to be added),
   c) base URL: http://ilcd.jrc.ec.europa.eu/ILCDRegistry.

It is important to insert the exact values, especially the UUID and base URL. In case the network does not work as expected, the value of the UUID has to be re-checked. The procedure to send a registration request for the node to the LCDN registry is described in these steps, which the user must follow.

1. Navigate to Network -> Registries.
2. Select 'Registry' and click on 'Register' in the 'Action' column, when the registration page will appear.
3. Complete the 'Access account' and 'Access password' fields. NB: these fields are not the user's credentials for the node application, but will be used to authenticate the deregistration action, so the user must keep this information for later. Node ID and base URL are entered by default by the system, but it is possible to change the values. The user must be careful with the URL — in case of an incorrect value, the registration will be not processed.
4. After successfully sending the node registration request, the status of this node on the registry is 'Pending registration'.
5. Send an email to eplca@jrc.ec.europa.eu asking to register the new node.
6. When the registry administrator approves your request, the status will be changed to 'Registered'. You will be also informed about the approval by email. NB: a node can be registered in multiple networks.

The node is now part of the LCDN. In case of problems, the JRC can be contacted via email at: eplca@jrc.ec.europa.eu.

([17]) https://bitbucket.org/okusche/soda4lca/

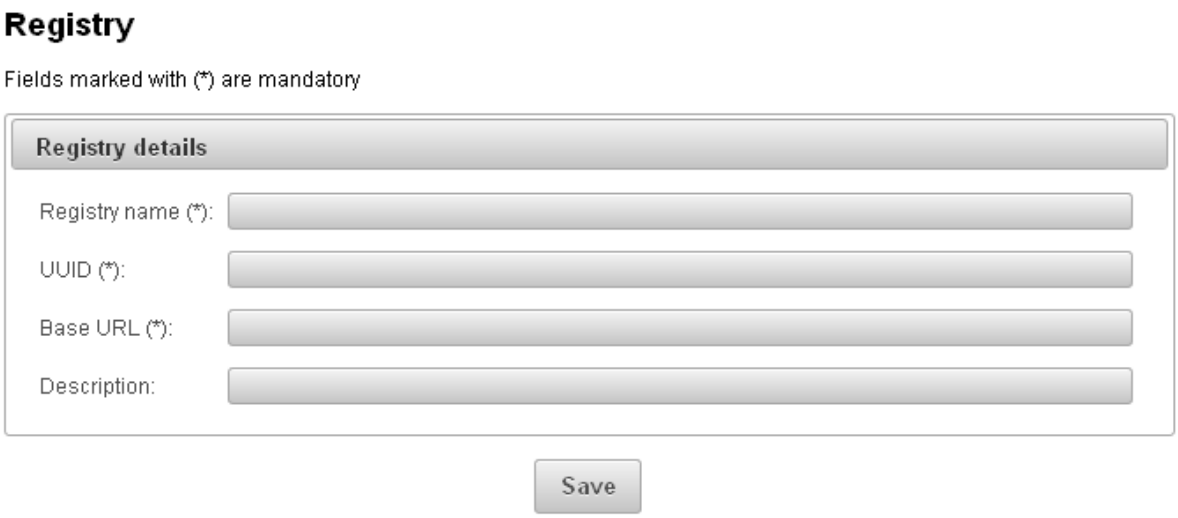


Figure 5.1. Add registry

5.5. Summary and procedure in case of node disconnection

The node should now be set up and registered with the LCDN. In case it gets disconnected from the network (e.g. due to maintenance of the central registry or changes in the remote node), the procedure described in Chapter 5.4 has to be repeated.

6. Managing and publishing data

The soda4LCA application merely stores datasets; it does not alter the data that is stored in any way.

6.1. Administration area

soda4LCA has a special administration area for data management, accessible by logging in with the 'admin' user account.

6.2. Uploading data

In order to import datasets into the node, the user must be logged in as administrator. Data can be imported using the 'Import datasets' button or the 'Import' menu entry into the administrator section (Figure 6.1).
NB: soda4LCA accepts datasets in ILCD format only. You may upload single datasets as extensible markup language files as well as one or more ZIP files containing multiple datasets.

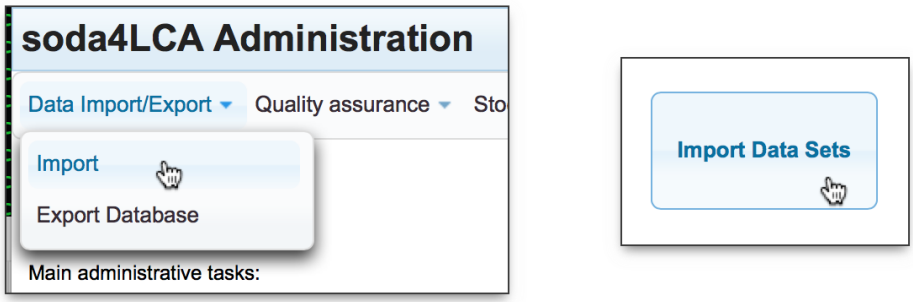


Figure 6.1. Data import in soda4LCA

6.3. Organising data in the node

For organising data within the node, datasets can be grouped in so-called data stocks. There are two types of data stocks: so-called root data stocks and logical (non-root) data stocks. Both may contain an arbitrary number of datasets. During import, every dataset is assigned to one (and only one) root data stock. This assignment cannot be changed later and a dataset can only be part of one single root data stock. A logical data stock, however, is different in that a dataset can be assigned to an arbitrary number of logical data stocks. After installation, one single root data stock exists, which is the default one.

Advanced data management options such as organising data in data stocks and managing permissions are covered in the soda4LCA administration guide ([18]) in the chapters 'Managing access' and 'Managing datasets'.
The next section gives a brief example of how data can be organised, differentiating between publicly visible and private datasets.

6.3.1. Private and public data

By default, all data imported into the default root data stock is publicly visible. Different data stocks can be used in order to differentiate between private and public data. This could be desirable in a scenario where datasets are imported into the node but are still waiting for final approval to be published or if part of the data is provided for a fee or only for registered users via a user account with proper permissions to access the data.

The following example explains a configuration where single datasets from a private root data stock can be assigned to a public data stock in order to be publicly available. It assumes that the administrator has already imported some datasets into the default root data stock.

- Log into the administrative interface with the 'admin' account.
- In the administration area, select 'Manage (root) stocks'.
- Select 'New stock' to create a new logical, non-root data stock.
- Enter a name and title as shown in Figure 6.2.

In the administration area, the following steps have to be followed.

- Select 'Manage (root) stocks' -> 'New stock' to create a new logical, non-root data stock.
- Enter a name and title as shown in Figure 6.2.

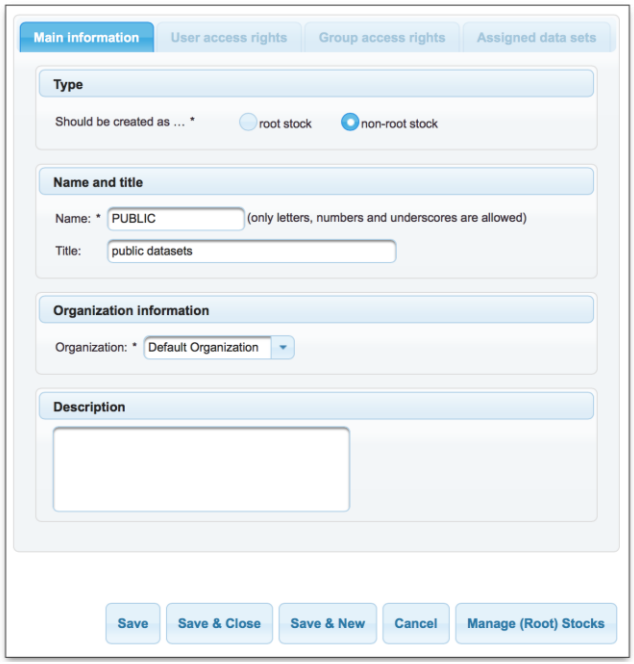


Figure 6.2. Create new data stock

([18]) https://bitbucket.org/okusche/soda4lca/

- Select ‘Save and close’ — the new data stock will appear in the list of data stocks as shown in Figure 6.3.

Figure 6.3. List of data stocks

- Select the button in the column ‘User access rights’ of the default data stock and remove the read permissions for anonymous users by unchecking the check boxes, as shown in Figure 6.4. Confirm with ‘Save and close’.

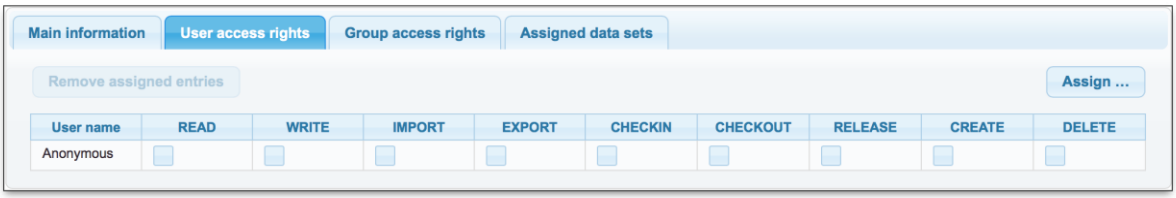


Figure 6.4. Remove anonymous permissions for default root data stock

- Edit the permissions for the ‘Public’ data stock, granting READ and EXPORT to anonymous users (see Figure 6.5). Select ‘Save’.

The READ permission controls whether a dataset is visible to a certain user or not. Without the EXPORT permission in addition, only the (process) dataset’s metadata will be visible. Adding the EXPORT permission means that also the input/output section of a process dataset will be visible.

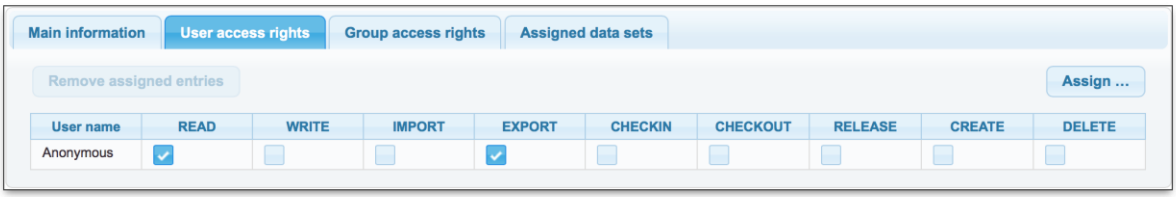


Figure 6.5. Grant anonymous read permissions for public data stock

- Still in the edit view for the ‘Public’ data stock, navigate to the tab ‘Assigned datasets’ and select ‘Assign’ as shown in Figure 6.6.
- A dialog box listing all available datasets appears. Data can be filtered by their root data stock using the drop-down box in the upper right-hand corner.
- Select some datasets for publication by checking the check box in the first column for every dataset before selecting ‘Assign selected entries’ (Figure 6.7).
- The newly assigned datasets are now listed in the edit stock view for the ‘Public’ data stock (Figure 6.8).

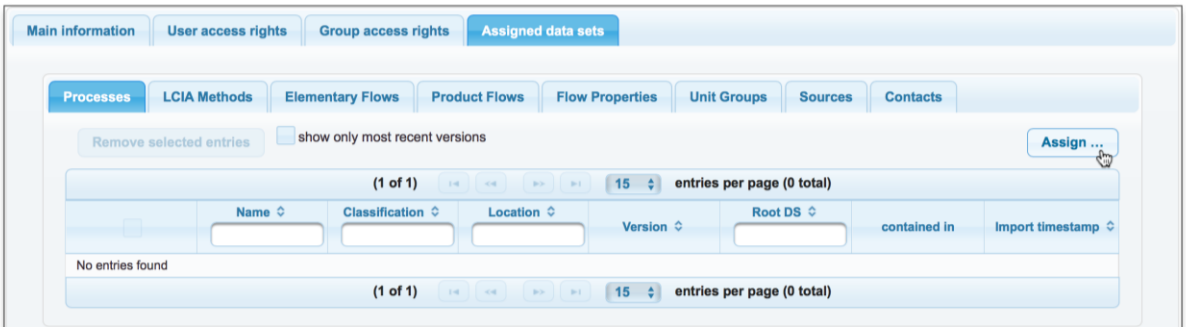


Figure 6.6. No datasets assigned yet to public data stock

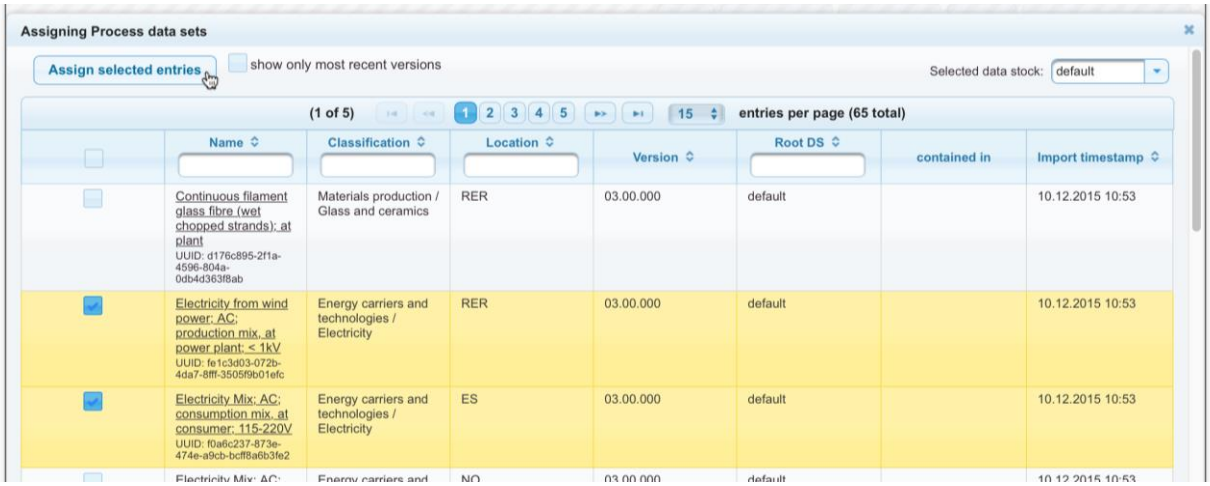


Figure 6.7. Assign datasets

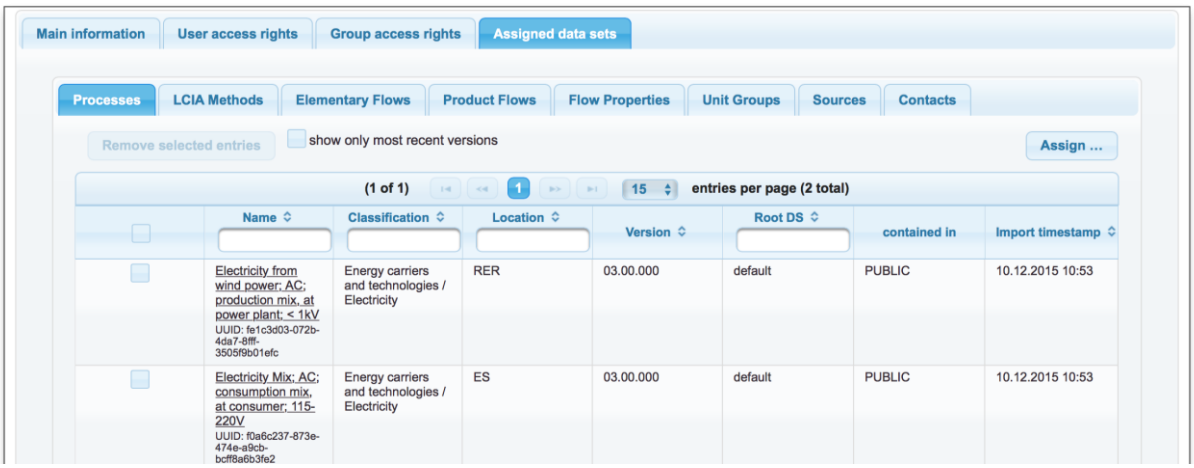


Figure 6.8. Datasets assigned to public data stock

- After logging out of the admin account, only the datasets assigned to the 'Public' data stock are publicly visible (see Figure 6.9).

NB: this assignment procedure has to be done separately for all dataset types (process, flow, etc.) and for every dataset that needs to be publicly visible.

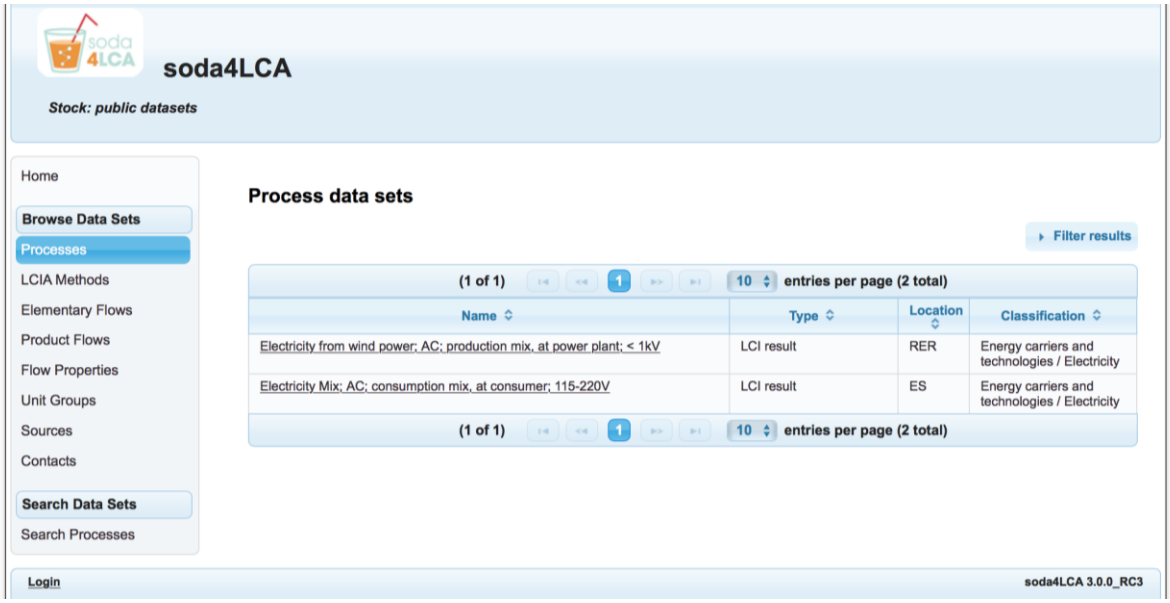


Figure 6.9. Publicly visible datasets

6.4. Publishing and restoring data in the LCDN

The dataset that has to be published (or restored, in case of problems within the server) on the LCDN needs to be accessible from the local soda4LCA node. Every dataset needs to be registered with the registry and approved by the registry administrator.
In order to register a dataset, the detailed procedure is described in the 'Node user guide' available in the soda4LCA zip package ([19]).
Once your datasets have been individually registered and subsequently approved by the network administrator at the JRC, they are publicly visible and available on the LCDN.

Here is a summary of the steps to be followed for the publication:

- Go to 'Manage datasets' and select 'Manage processes' (Figure 6.10)
- Select datasets you want to register and click on the 'Register selected' button.
- The registration datasets page appears. The user should select the network (Registry) where they want to send the registration request (the registry list contains only registries in which nodes are registered) and then click on the 'Register' button — a datasets registration summary appears (Figure 6.11).
- In the datasets registration summary you can consult the number of datasets that have been approved and rejected (because of validation rules) by registry (Figure 6.12).

In case of rejection, datasets for each rejection reason is depicted. Possible reasons are that:

- compliance systems are not valid;
- the sent dataset is already registered on a selected registry (exactly the same dataset — all data has to match).

([19]) https://bitbucket.org/okusche/soda4lca/

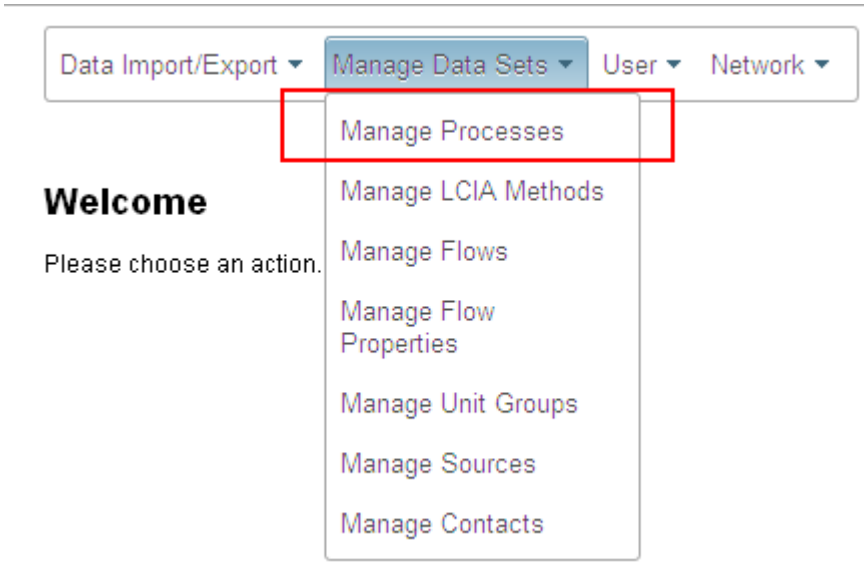


Figure 6.10. Select 'Manage processes' from the drop-down menu

Figure 6.11. Selection of the registry (e.g. LCDN)

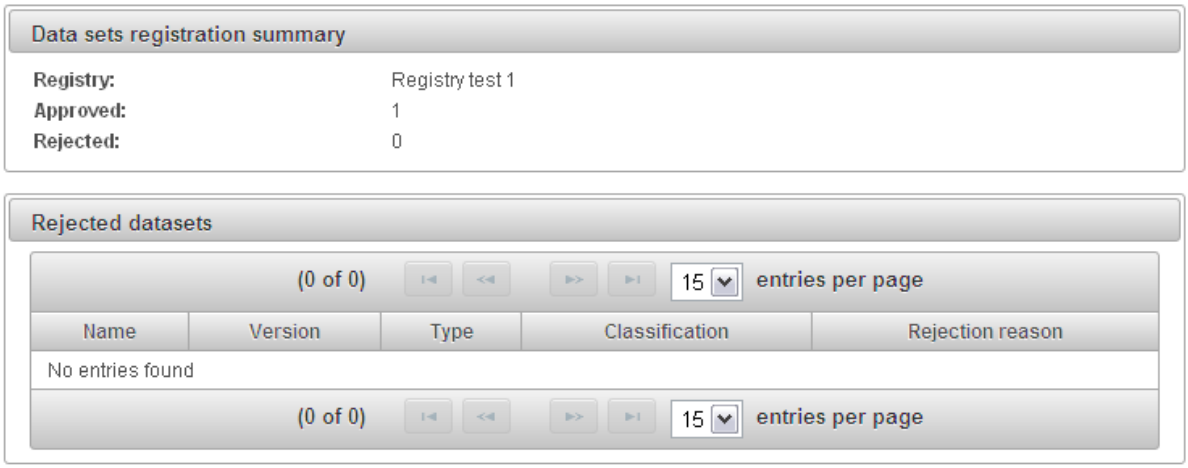


Figure 6.12. Dataset registration summary

Annex I — How to document data quality, method and review aspects in different LCA software

This annex is providing some examples, taking into account some of the most commonly used and widespread LCA software in Europe. This does <u>not</u> imply any recommendation or endorsement from the JRC or the European Commission.
Moreover, the examples are based on the most updated versions of the software, when this report was edited (September 2016). Future changes in software user interface and functionalities can lead to differences in the approaches described below.
This annex does <u>not</u> represent an exhaustive guidance, considering all the variables and specific cases. It takes just an exemplary case study into account, proposing an overview of how to address some ILCD-EL-related issues in different software.

An exemplary dataset is used to provide an overview and understanding of how to provide ILCD-EL compliant datasets using some of the common LCA software tools used in Europe:

- GaBi
- OpenLCA
- SimaPro.

In the following, a brief description of the dataset, used to showcase the creation of an ILCD-EL compliant dataset, is provided. Some general guiding principles that apply for all of the quality aspects are summarised, along with a short review of discrepancies found when exporting the dataset in ILCD format using the individual LCA tools. The guide provides guidance on where the information should be entered in GaBi, OpenLCA and SimaPro.
SimaPro poses a somewhat special case, as the software does not provide any specific field where information on the individual compliance elements can be entered; consequently, this information cannot be displayed in the ILCD format correctly. Therefore, a different approach is used for SimaPro, where all the relevant information to reach ILCD-EL compliance is simply written into the general text box. In order to prevent repetitive information, ILCD-EL compliance documentation suggestions for LCA datasets created in SimaPro are provided separately.

For quick and easy reference, we employ the following color codes.

GaBi

OpenLCA

SimaPro

Dataset description

The dataset is taken from the OpenLCA case study 'Beer containers: aluminium can vs PET bottle' ([20]). Figure 0.1 illustrates the model and system boundaries of the dataset.
Please note that the provided dataset and its related information are created for instructional purposes of how to create ILCD-EL compliant datasets. Thus, the provided detailed information on the ILCD-EL elements does not necessarily provide accurate information on aluminium can production, as it is meant for instructional purposes only.

System boundary
The system boundaries of the production of an average aluminium can in the United States are described in Figure 0.1. The guide will use the unit process of aluminium can production as an example to illustrate how to provide an ILCD-EL compliant dataset.

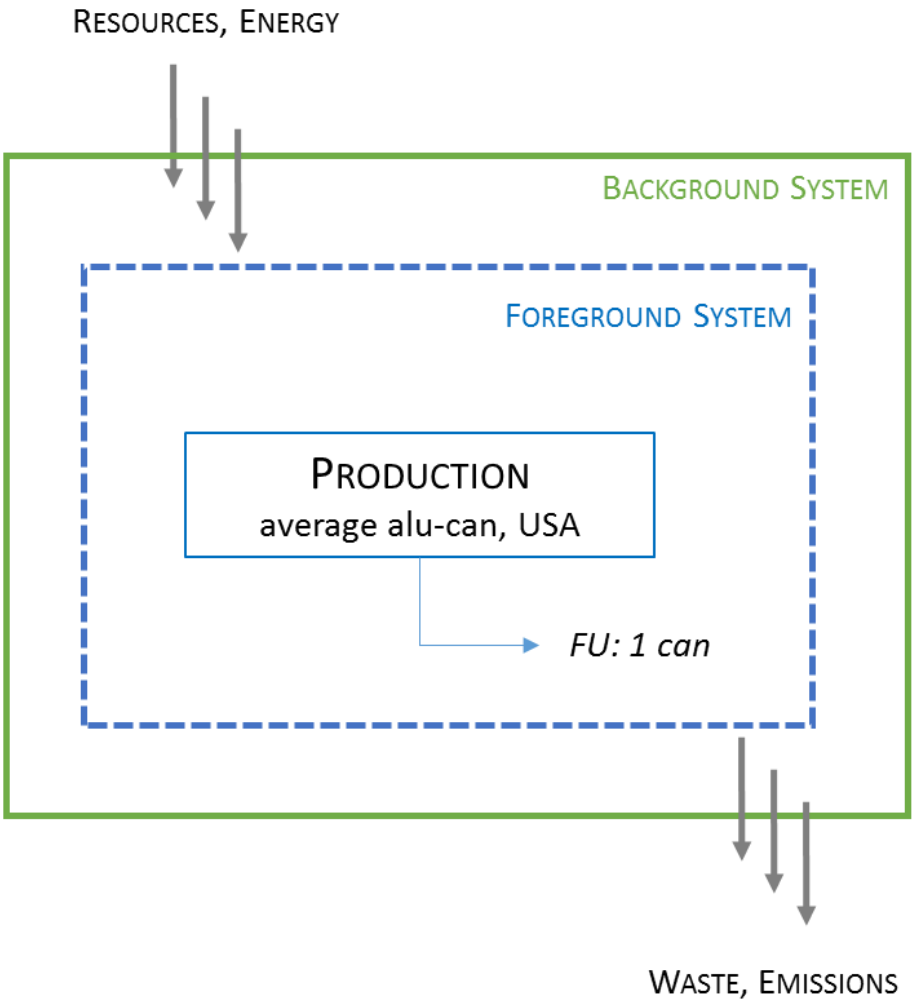


Figure 0.1. Model and system boundaries for the 'aluminium can' case study dataset

([20]) openLCA nexus. openLCA case study of a beer bottle: aluminium can vs PET bottle, 2013, Version 1.1.

General guiding principles

This example largely draws upon information provided in the ILCD handbook ([21]), DIN EN ISO 14040/14044 ([22]) ([23]) and other guidelines found in the handbook ([24]) ([25]). For more detailed information on ILCD-EL requirements the reader is thus directed to these sources; more up-to-date information can be found on the webpage http://eplca.jrc.ec.europa.eu/?page_id=134 or through the LCDN page at http://eplca.jrc.ec.europa.eu/LCDN/howto.xhtml.
In the following paragraphs, some general guidelines and additional information regarding ILCD-EL compliant dataset generation in the individual software evaluated will be provided.

General notation suggestion

Some information and handling thereof is of repetitive nature and will be provided within this section to avoid repetition.
As the different LCA software provides different documentation possibilities, notation suggestions for information provision on the dataset in general terms are provided in blue boxes. Information that may be selected from specific drop-down lists or within specified text boxes in the individual software should be entered in the adequate fields. Further information that cannot be entered into specified fields should be added into description boxes or comment fields.

Compatibility of required information in evaluated software and structure of documentation in ILCD format

GaBi and OpenLCA both provide specific entry fields to provide the required information for achievement of the ILCD-EL compliance level. However, one should note that some discrepancies are introduced when the datasets are loaded into the LCDN in the ILCD data format, as outlined in the following. No discrepancies were found in datasets exported from GaBi.

([21]) European Commission, Joint Research Centre and Institute for Environment and Sustainability, *ILCD handbook — Framework and requirements for life cycle impact assessment models and indicators*, Publications Office of the European Union, Luxembourg, 2010.
([22]) International Organisation for Standardisation, DIN EN ISO 14040, 2006.
([23]) International Organisation for Standardisation, DIN EN ISO 14044, 2006.
([24]) European Commission, Joint Research Centre and Institute for Environment and Sustainability, International Reference Life Cycle Data System (ILCD) Data Network — *Compliance rules and entry-level requirements*, Publications Office of the European Union, Luxembourg, 2012.
([25]) European Commission, Joint Research Centre and Institute for Environment and Sustainability, *International Reference Life Cycle Data System (ILCD) — Documentation of LCA datasets*, Publications Office of the European Union, Luxembourg, 2011.

OpenLCA — Documentation discrepancies

OpenLCA provides an entry field for life cycle inventory (LCI) method, 'LCI method' (Figure 0.2), which should be used to fulfill the ILCD-EL requirement 'method'. However, in the ILCD format this information is not displayed in the field 'principal LCI method', but instead in the field 'deviation from principal LCI method' (Figure 0.3). Thus, there is no entry possibility for information provision of actual deviations from the principal LCI method employed in OpenLCA.

Further fields within the ILCD structure that are not addressed by entry possibilities in OpenLCA include 'completeness of the product system', 'deviation from data selection and combination principles' and 'data collection and interpretation principles'.

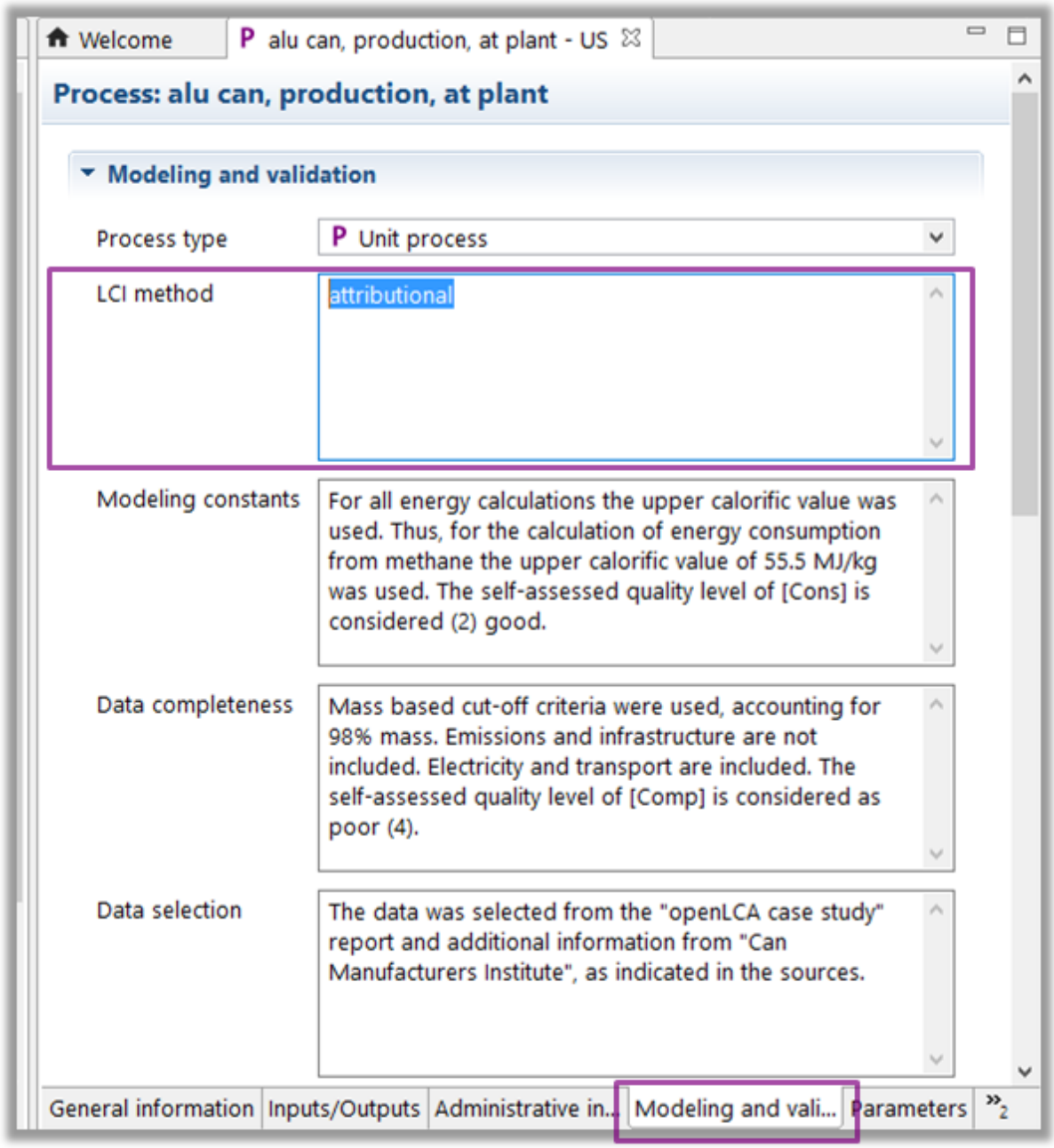
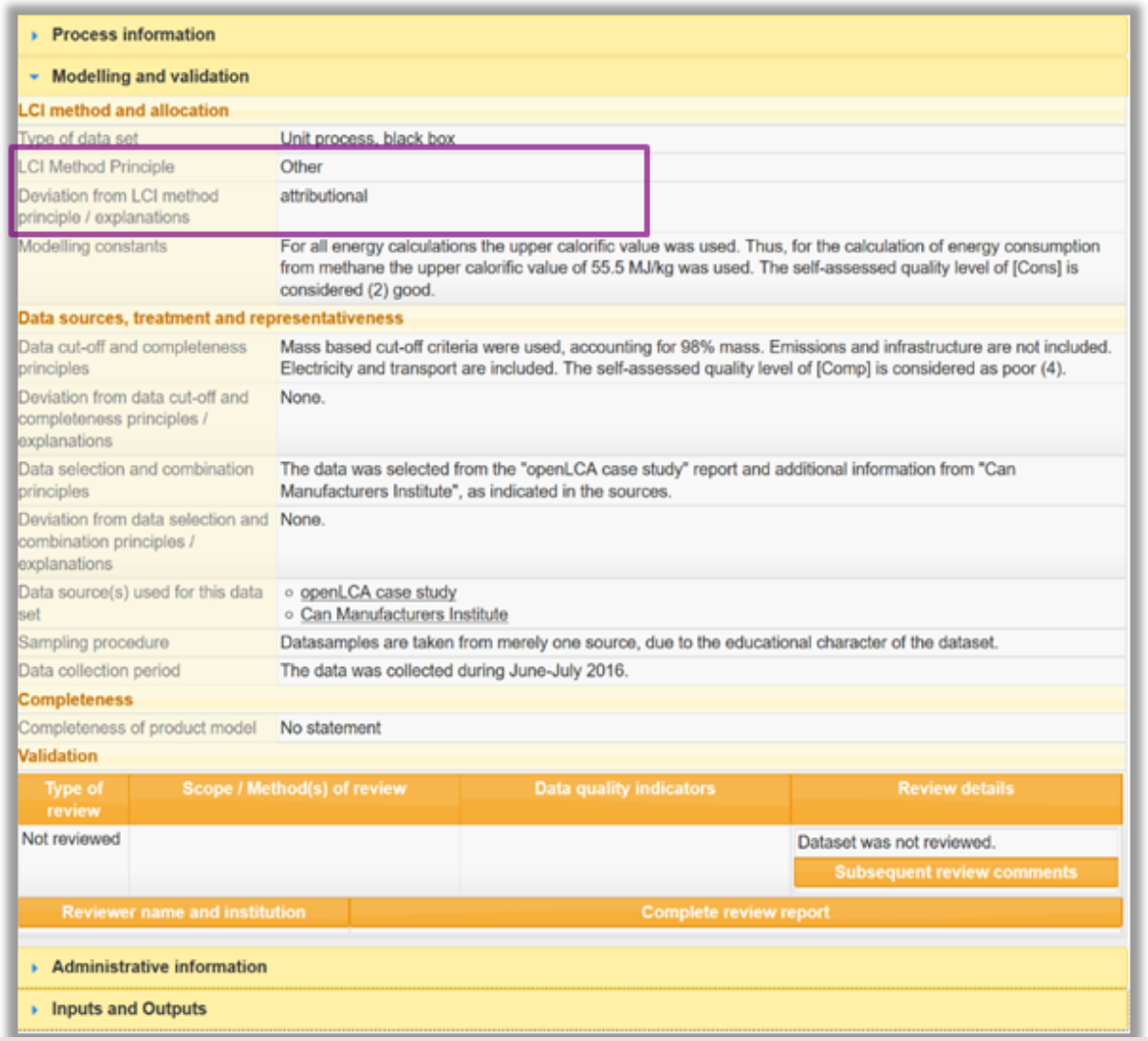


Figure 0.2. Information provision of LCI method in OpenLCA



Process information

Modelling and validation

LCI method and allocation

Type of data set	Unit process, black box
LCI Method Principle	Other
Deviation from LCI method principle / explanations	attributional
Modelling constants	For all energy calculations the upper calorific value was used. Thus, for the calculation of energy consumption from methane the upper calorific value of 55.5 MJ/kg was used. The self-assessed quality level of [Cons] is considered (2) good.

Data sources, treatment and representativeness

Data cut-off and completeness principles	Mass based cut-off criteria were used, accounting for 98% mass. Emissions and infrastructure are not included. Electricity and transport are included. The self-assessed quality level of [Comp] is considered as poor (4).
Deviation from data cut-off and completeness principles / explanations	None.
Data selection and combination principles	The data was selected from the "openLCA case study" report and additional information from "Can Manufacturers Institute", as indicated in the sources.
Deviation from data selection and combination principles / explanations	None.
Data source(s) used for this data set	○ openLCA case study ○ Can Manufacturers Institute
Sampling procedure	Datasamples are taken from merely one source, due to the educational character of the dataset.
Data collection period	The data was collected during June-July 2016.

Completeness

Completeness of product model	No statement

Validation

Type of review	Scope / Method(s) of review	Data quality indicators	Review details
Not reviewed			Dataset was not reviewed. Subsequent review comments

Reviewer name and institution	Complete review report

Administrative information

Inputs and Outputs

Figure 0.3. Information provision on LCI method in the ILCD data format. The displayed dataset was exported from OpenLCA in ILCD format

SimaPro — Documentation discrepancies

SimaPro offers information provision options for some of the ILCD-EL compliance elements, such as selecting a time period, geography and qualitative evaluation of other compliance elements.

As SimaPro does not provide specific entry fields for the individual compliance elements all necessary information is found in the general comment section within the European Reference Life Cycle Database data sheet, as depicted in Figure 0.5.

Furthermore, there seems to be a transmission error, as all input flows of the modeled process are with a specific United States or North American location and 'North America' was selected from the drop-down menu in geography (see Figure 0.4), the geographical representativeness as documented in the ILCD format is set to GLO (global).

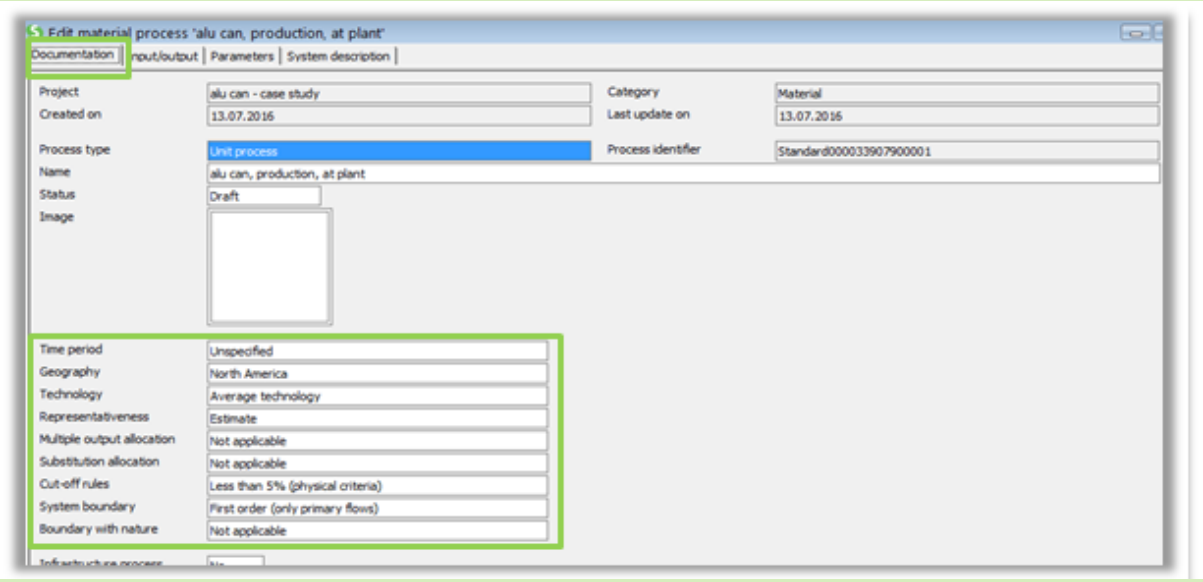


Figure 0.4. Information provision options of some ILCD-EL elements in SimaPro

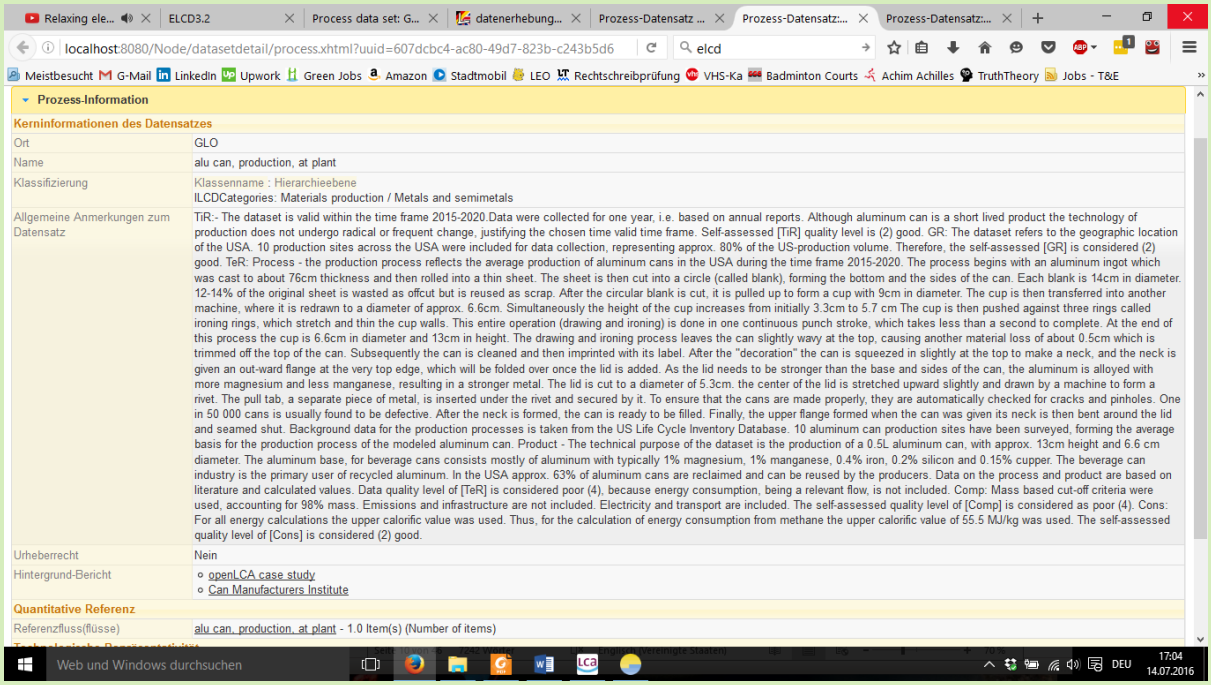


Figure 0.5. Information provision on all ILCD-EL elements as exported from SimaPro

Documentation of ILCD-EL requirements

The ILCD-EL compliance requirements are summarised in Table 0.1, where the items that can be validated automatically using a software tool (available at http://eplca.jrc.ec.europa.eu/?p=1406) are marked with **A** and items that need to be checked manually by the reviewer are marked with **M**. As format and nomenclature are checked automatically by the ILCD validation tool (available at https://bitbucket.org/okusche/ilcdvalidationtool/downloads), the following section merely provides a detailed explanation of the points to be manually checked. Some screenshots for each reviewed software tool are given to indicate where the information should be provided within the dataset.

Table 0.1. Overview of ILCD-EL requirements. In the table A stands for automated validation using the ILCD validation tool, while M depicts requirements that need manual, i.e. user, validation

Compliance element	Check	ILCD-EL requirements
Format	**A**	Use of ILCD format
Documentation	**A** **M**	○ Minimum documentation extent specified ○ Based on ISO quality criteria
Nomenclature	**A**	○ ILCD nomenclature compliant documents (e.g. use of ILCD reference elementary flows) ○ Permission of certain aggregated elementary flows ○ Terminology use not enforced
Data quality	**M**	*In general following ISO quality criteria* ○ No minimum data quality required ○ BUT documentation of data necessary, using ISO quality criteria ○ [TeR], [TiR], [GR] to be documented
Method	**M**	○ ISO 14040 and 14044 compliant process-based LCA ○ Methodological ILCD compliance not enforced ○ Applied modelling frameworks and allocation/substitution approaches to be documented
Review	**M**	○ Use of reviewers from registry not required ○ 'Qualified reviewer' required (based on ISO 14025) ○ Qualified independent external reviewer in line with ISO 14044 requirements BUT separate review report is NOT required OR ○ Qualified independent internal reviewer in line with ISO 14044 requirements, BUT separate review report IS required (with the ILCD template/minimum review documentation scope in addition to review documentation provided within the dataset) ○ Review on the unit process level may not be required, depending on data quality claims

[TiR] Time representativeness

GaBi

Documentation of the time representativeness can be found under 'process information', where the reference, i.e. starting year of the dataset and the number of years it is valid can be selected. Additionally, a field is provided where the quality of [TiR] can be described.

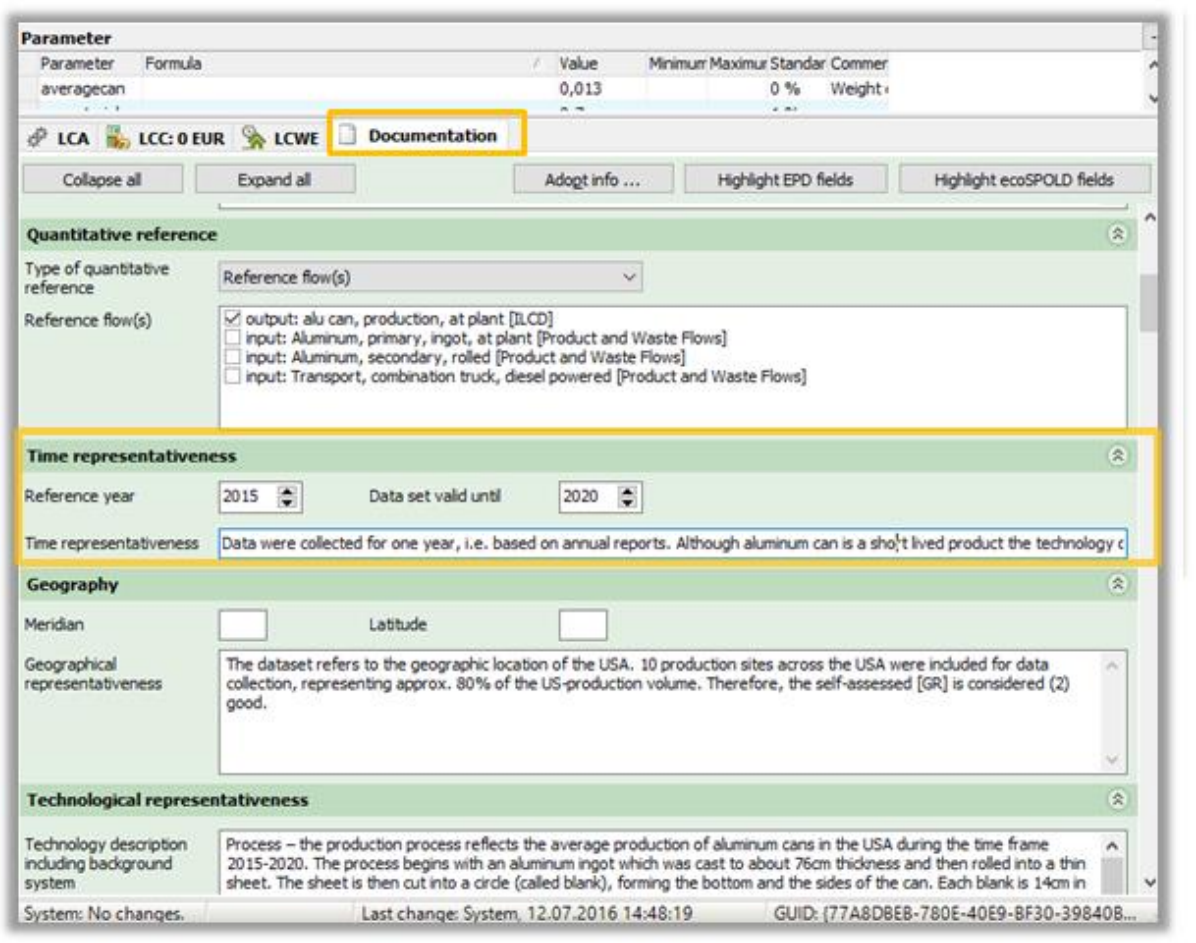


Figure 0.6. Example of [TiR] information provision in GaBi

OpenLCA

In OpenLCA, [TiR] can be provided by typing in the start and end date, as depicted below, or using the calendar view. Additionally, a description may be added, as shown below. Please note that the exact day and month are not crucial information; the start and end year of the validity time horizon is the most important piece of information.

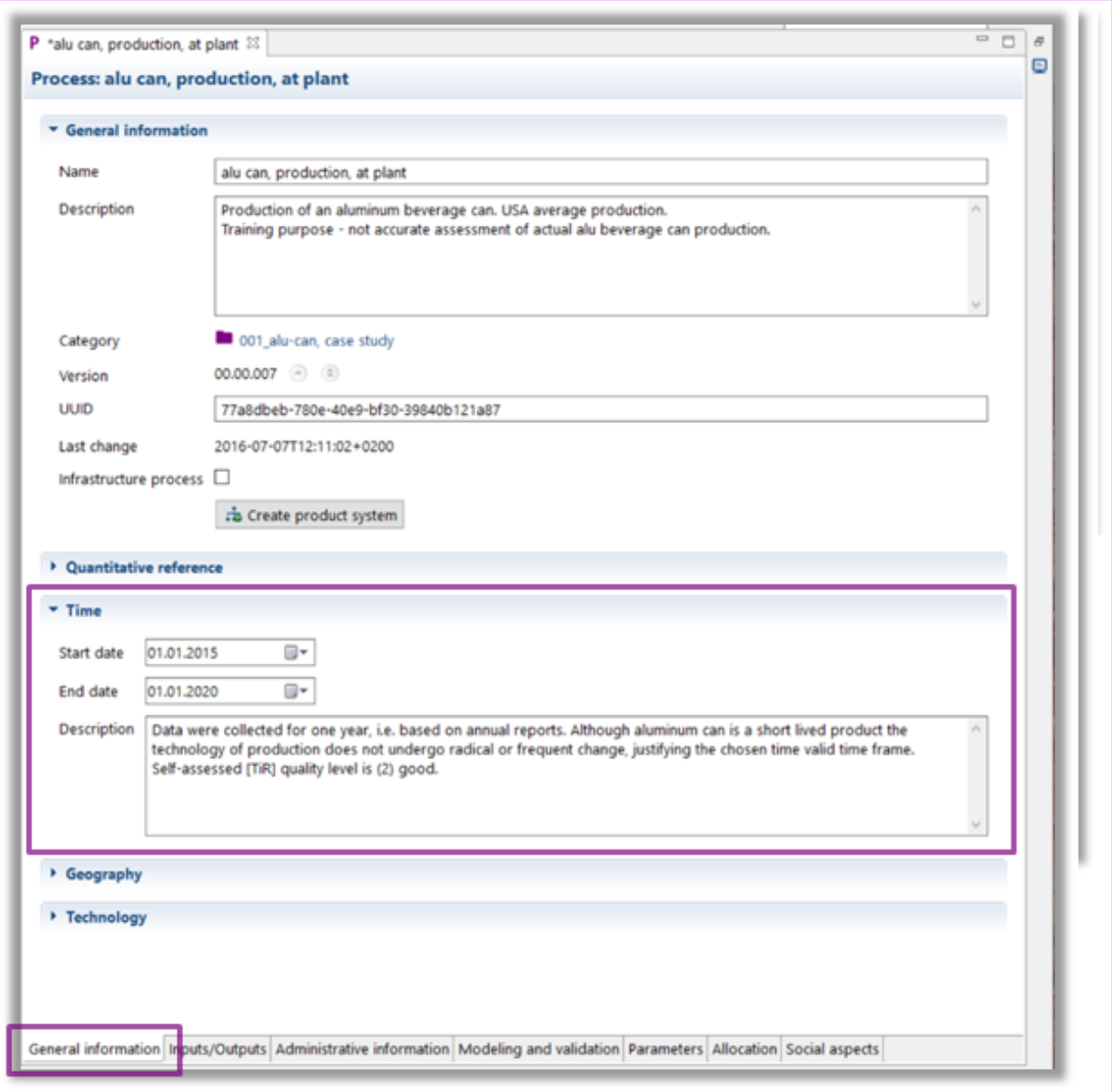


Figure 0.7. Example of [TiR] information provision in OpenLCA

[GR] Geographical representativeness

GaBi

Documentation of the geographical representativeness can be found under 'process information'. Specific fields are provided to stipulate geographic coordinates in meridian and latitude. Additionally, a field is provided where the quality and other information regarding [GR] can be stipulated. As one point's coordinates may not reflect the real geographical representativeness very well, we suggest including the applicable geographical location, region or political entity, the quality level of the [GR] and a short description, as stipulated in the notation suggestion box.

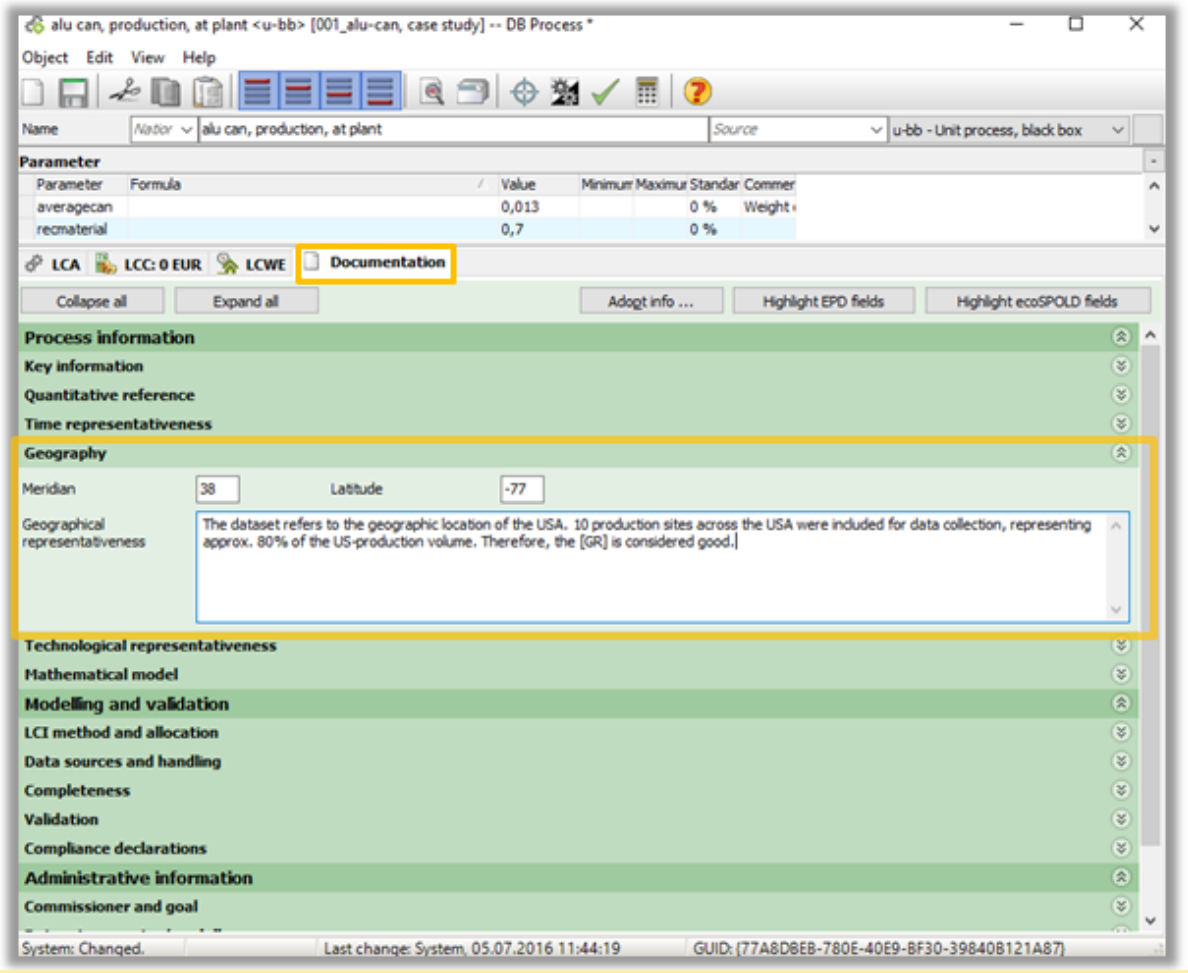


Figure 0.8. Example of [GR] information provision in GaBi

OpenLCA

Select the correct country, region or political entity that the dataset reflects from the provided drop-down menu, as shown below. OpenLCA also provides a map, where locations can be additionally included as points or polygons. Furthermore, we suggest providing additional information in the description box.

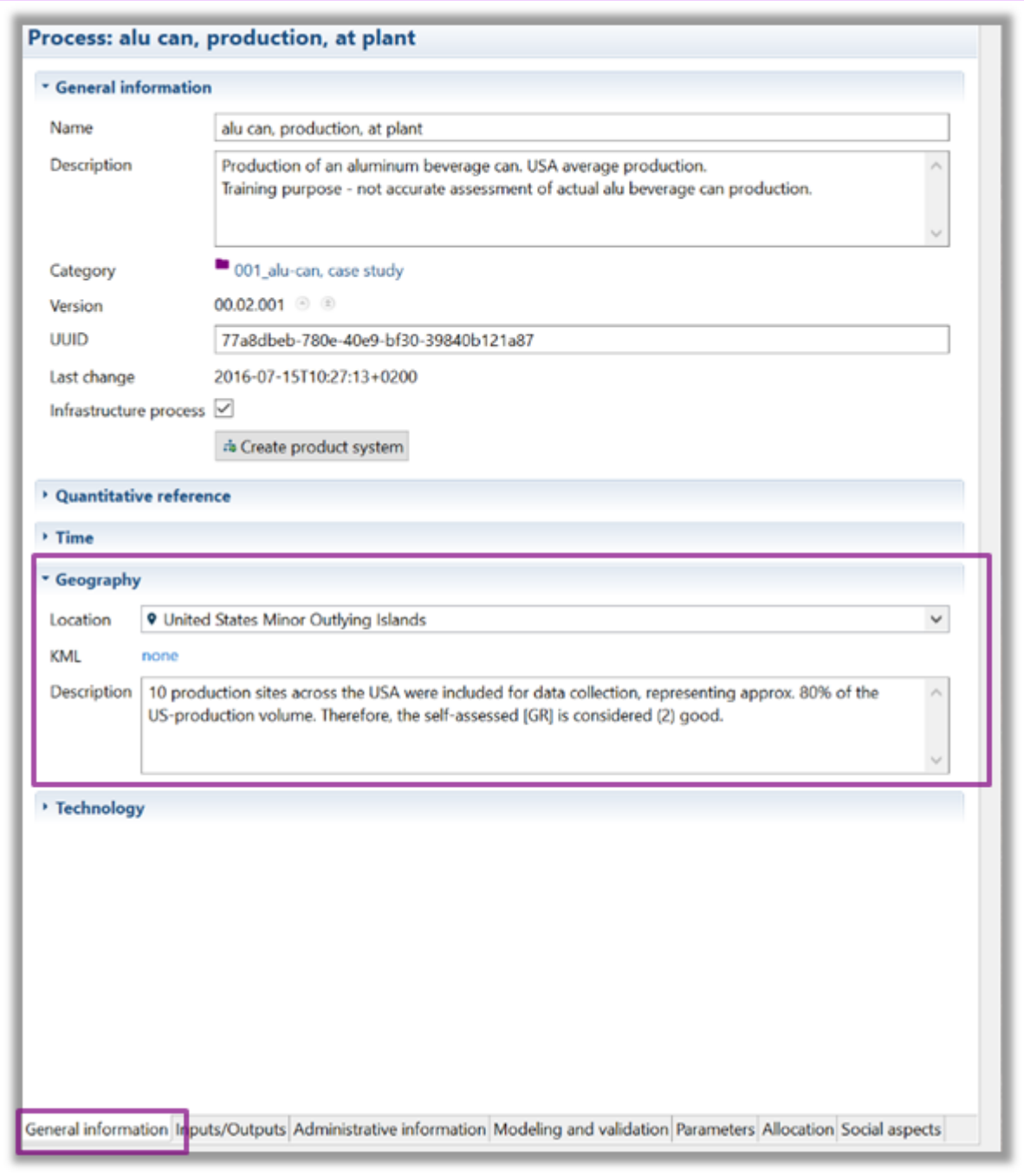


Figure 0.9. Example of [GR] information provision in OpenLCA

[TeR] Technological representativeness

GaBi

Documentation of the technological representativeness can be found under 'process information'. It provides the opportunity to describe the technology including its background system, to include related datasets and to state the technical purpose of the process or product. Thus, the suggested notation is divided among the available entry fields, as shown below.

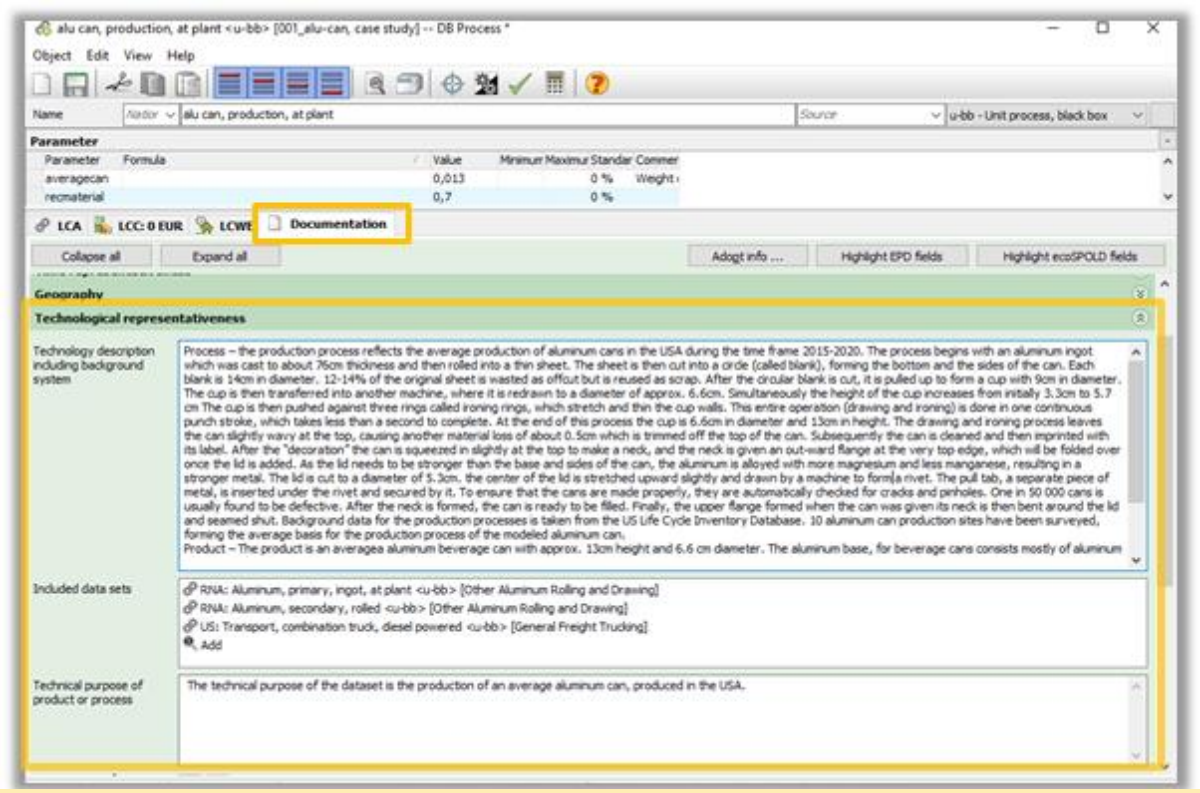


Figure 0.10. Example of [TeR] information provision in GaBi

OpenLCA

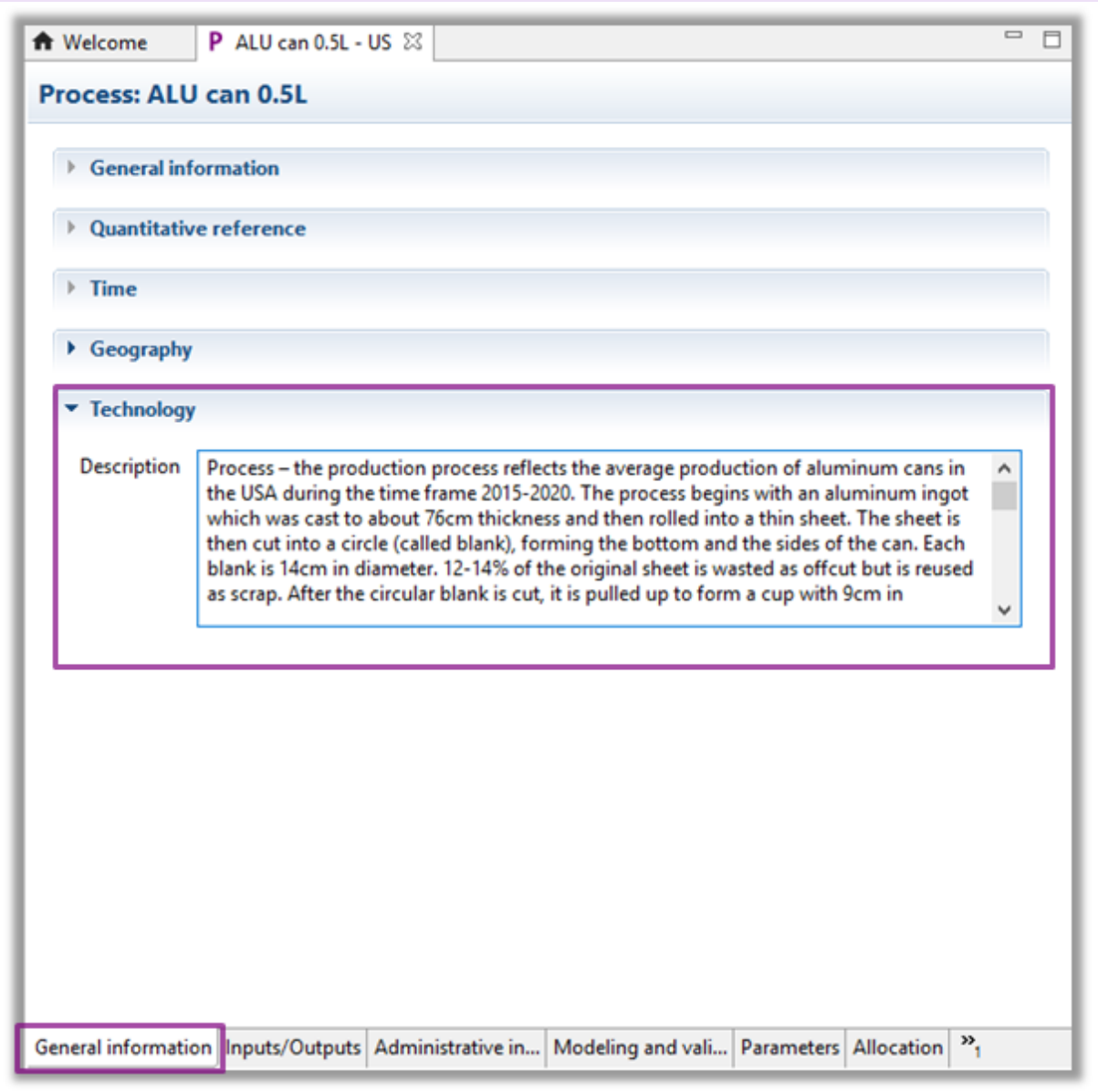


Figure 0.11. Example of [TeR] information provision in OpenLCA

[Repre] Representativeness (overall)

Representativeness refers to a qualitative assessment of the degree to which the dataset reflects the true population of interest, i.e. geographical, time-related and technological representativeness. Thus, representativeness [Repre], as intended in ISO standards, is merely a qualitative description of the previously assessed [GR], [TiR] and [TeR] and how well these fit the studied system at hand and the goal and scope definition of the study. Thus, by providing the time-related, technological and geographical representatives ([GR], [TiR], [TeR]), the overall dataset representativeness is already covered.

[P] Precision and [U] Uncertainty

GaBi

The standard deviation can be provided for each individual flow within a modeled process, as depicted below.

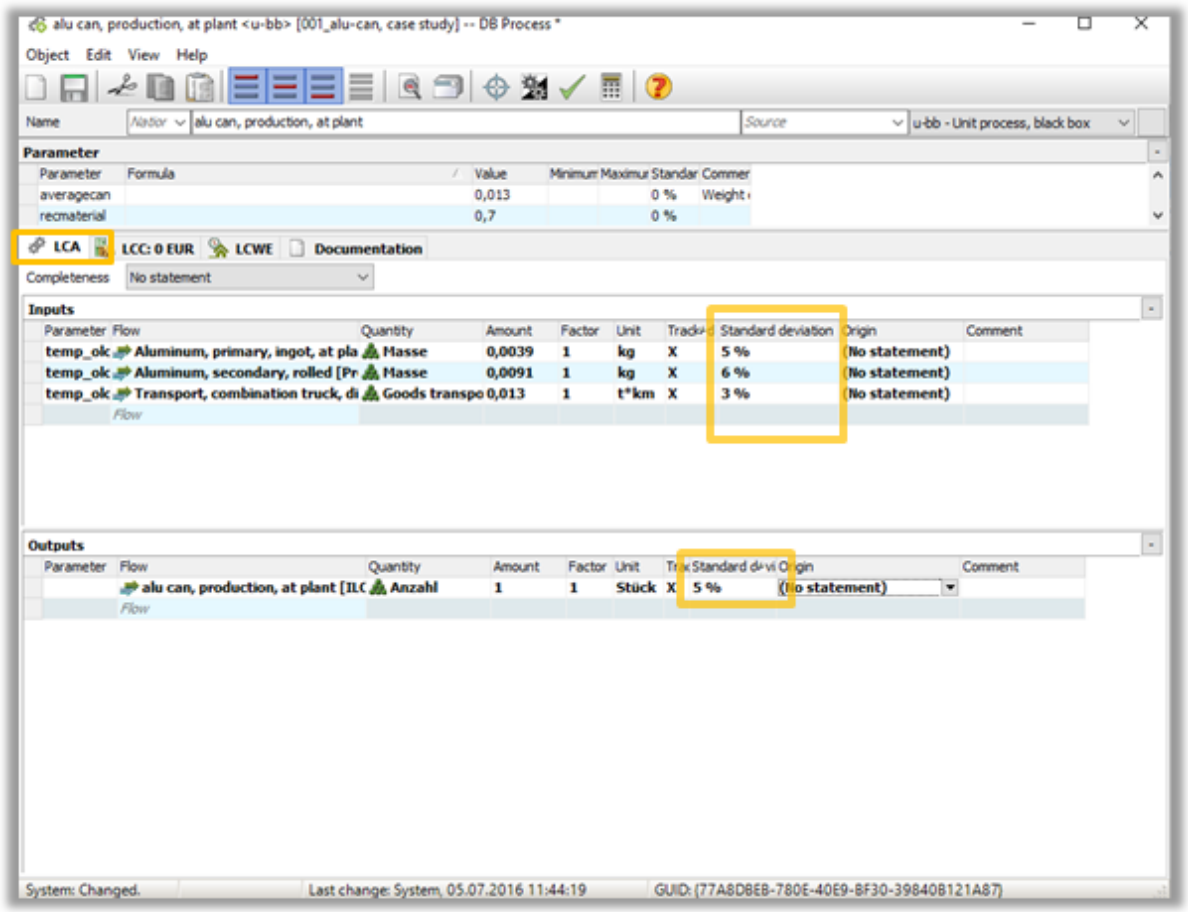


Figure 0.12. Example of [P] information provision in GaBi

OpenLCA

Data uncertainty can be provided for each input and output flow, as well as all parametres used (global, input and dependent parametres) in OpenLCA, as illustrated below.

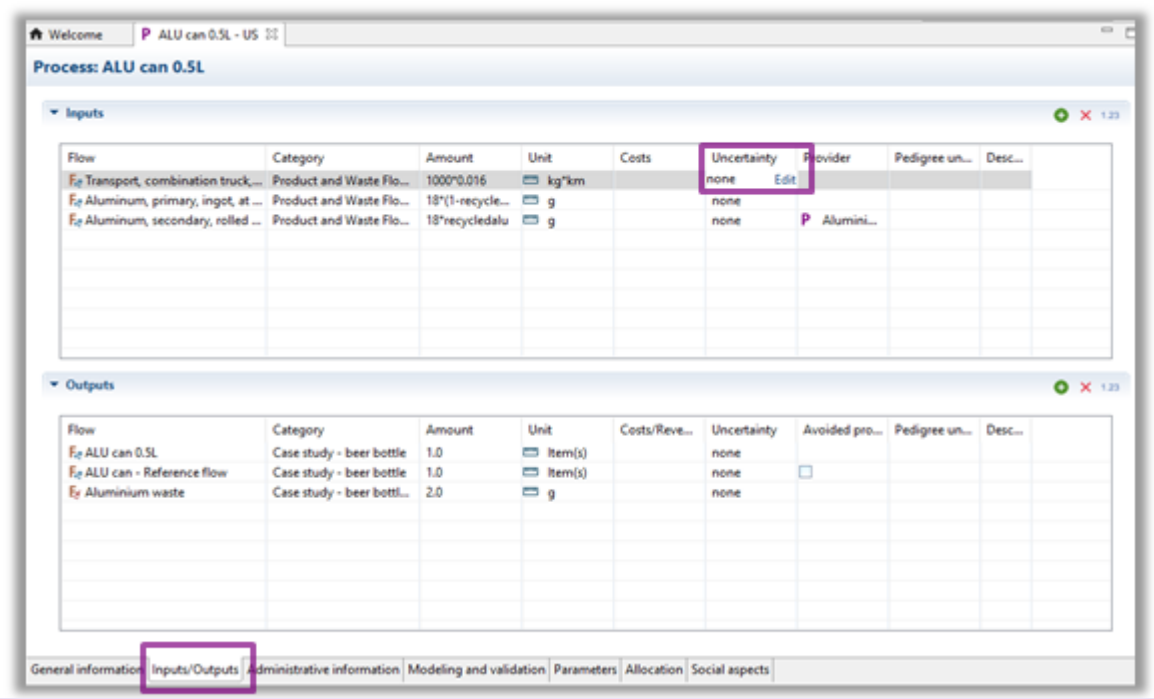


Figure 0.13. Example of [P] information provision in OpenLCA. Edit uncertainty for each of the input and output processes and parametres of the dataset

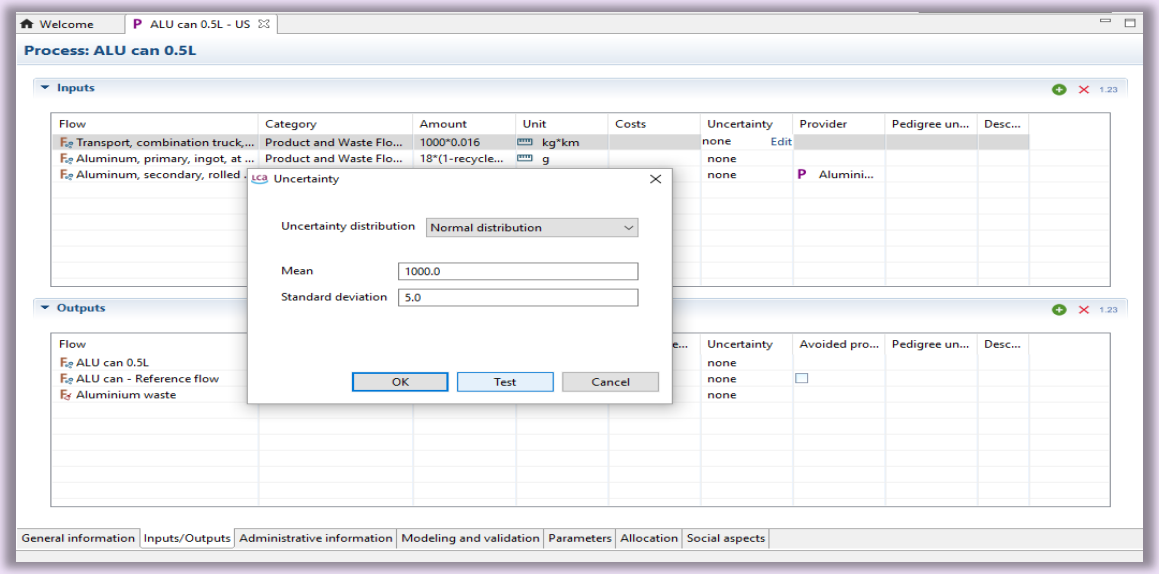


Figure 0.14. A pop-up window opens, where an uncertainty distribution may be chosen from the drop-down menu and according parametres may be chosen. Subsequently, a test can be run on the distribution

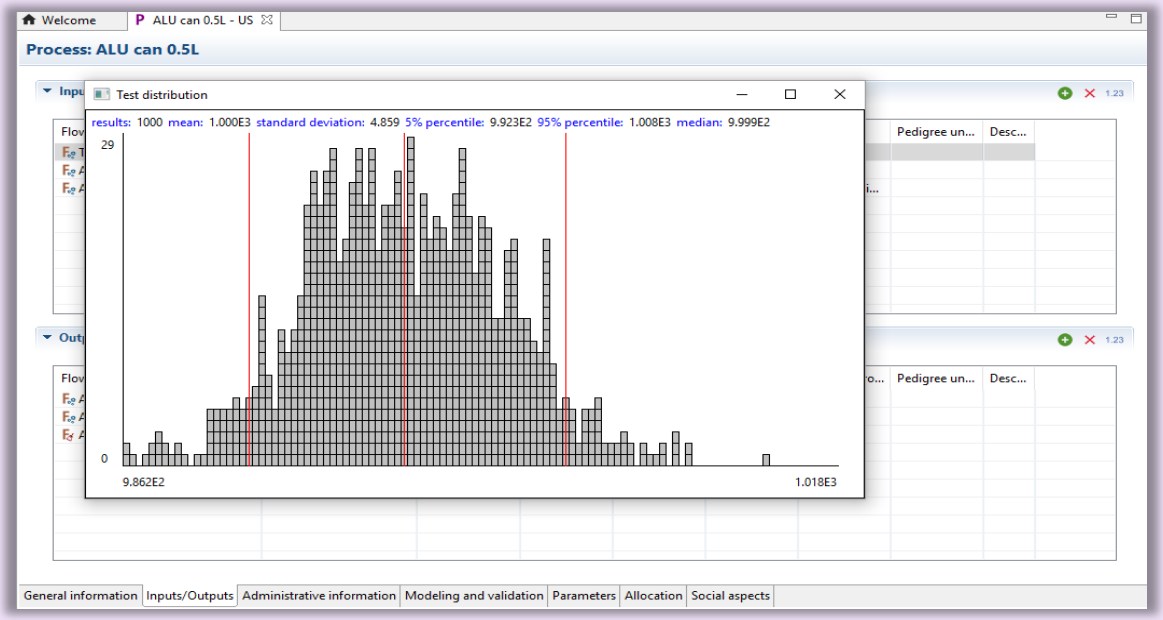


Figure 0.15. The test run of the distribution provides the above result

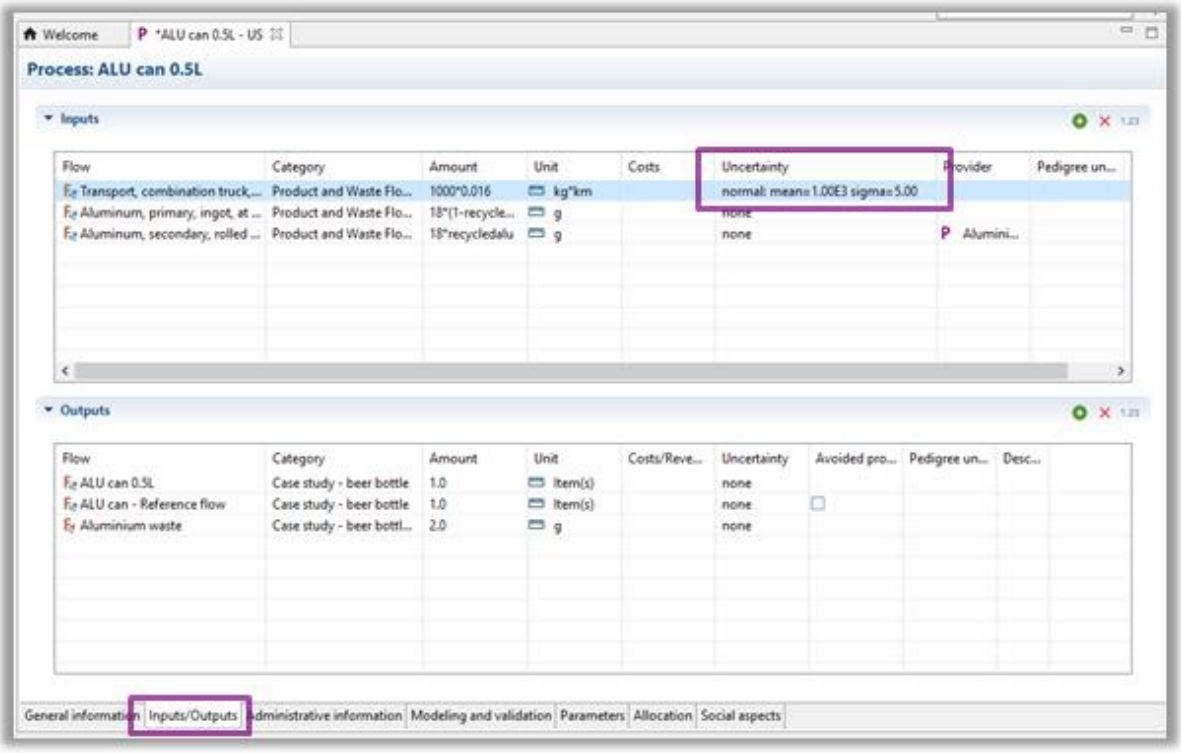


Figure 0.16. Values of [P] displayed in OpenLCA

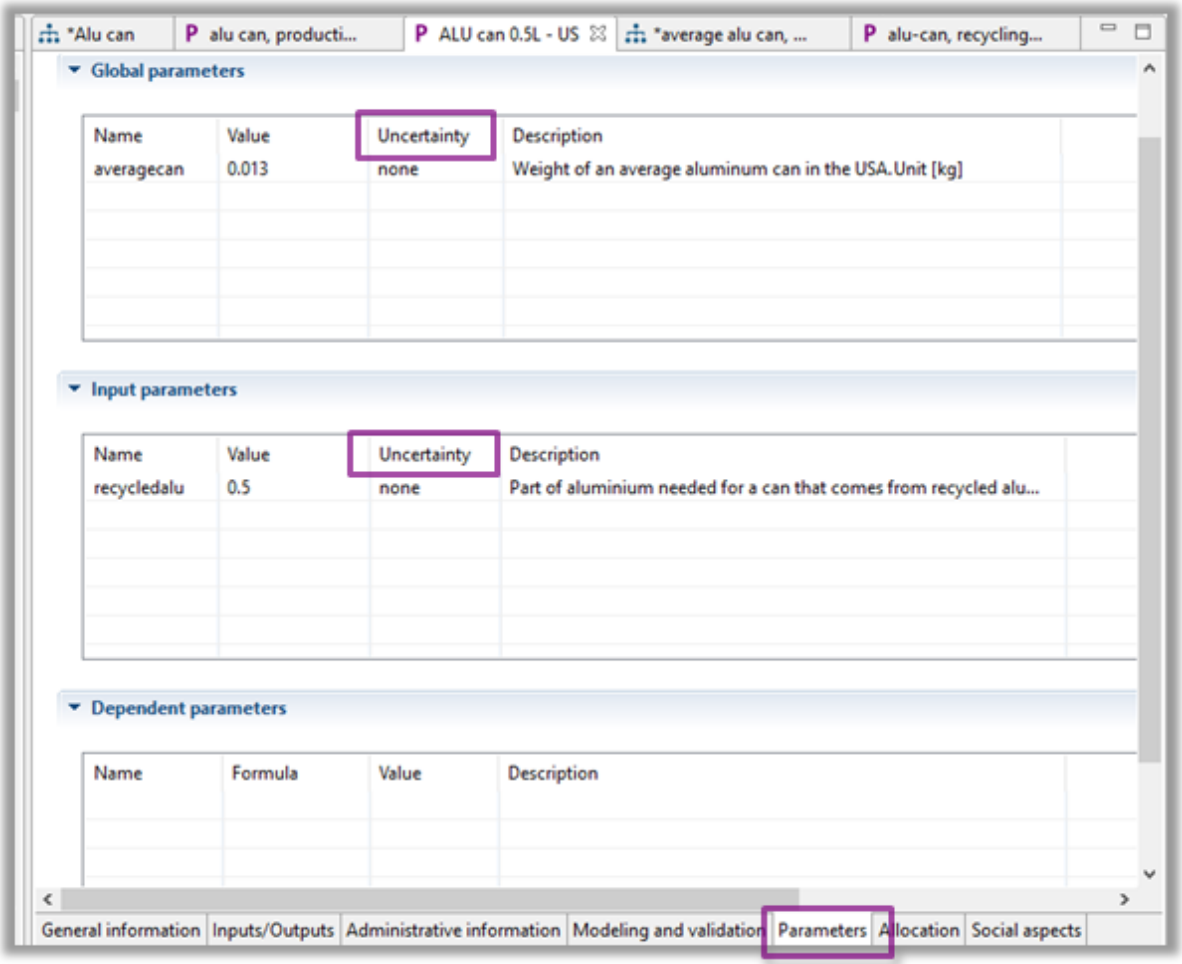


Figure 0.17. The same procedure as illustrated in Figures 4.9-4.12 should be done for all parametres within the dataset

[Compl] Completeness

GaBi

Information on completeness may be provided under the 'data sources and handling' tab in GaBi (not under 'completeness'). The tab provides a number of additional fields where data collection and handling may be further described in more detail.

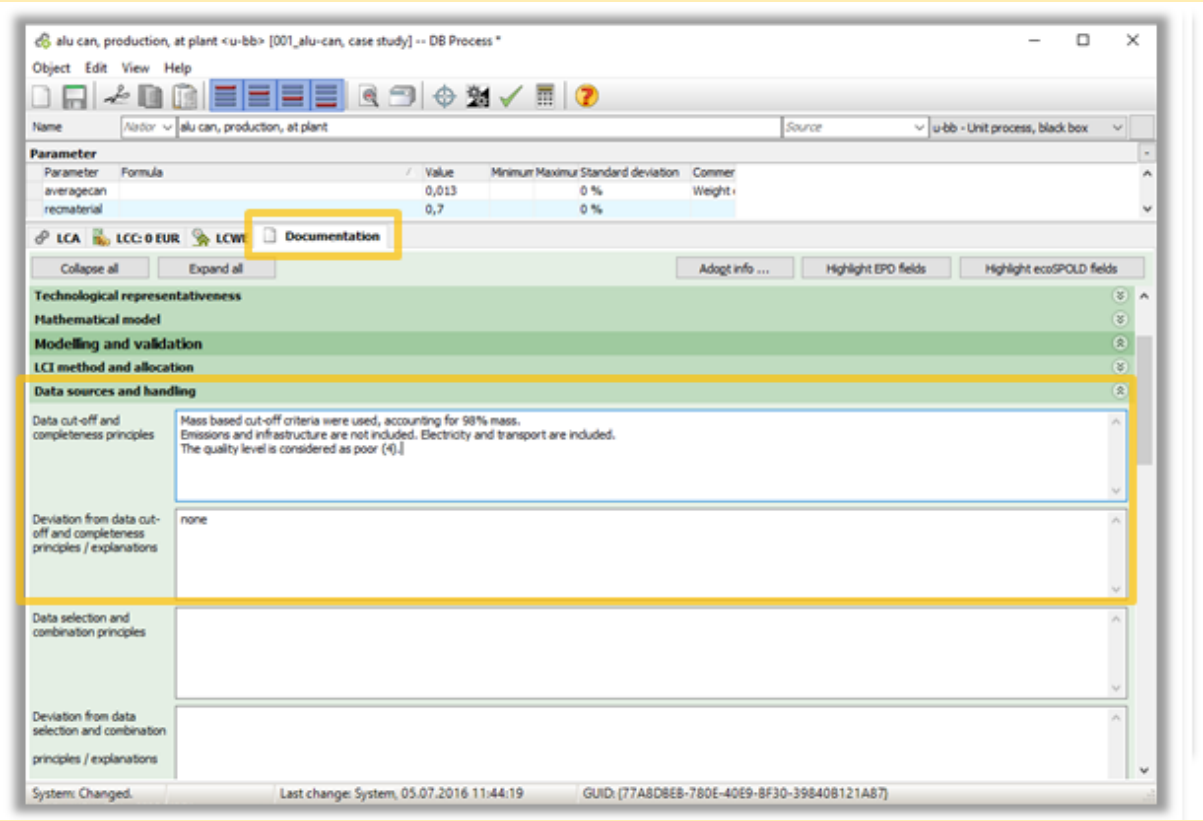


Figure 0.18. Example of [Comp] provision in GaBi

OpenLCA

Information on the completeness level of a process dataset can be provided in the 'Modelling and validation' tab under the corresponding menu point, as depicted below.

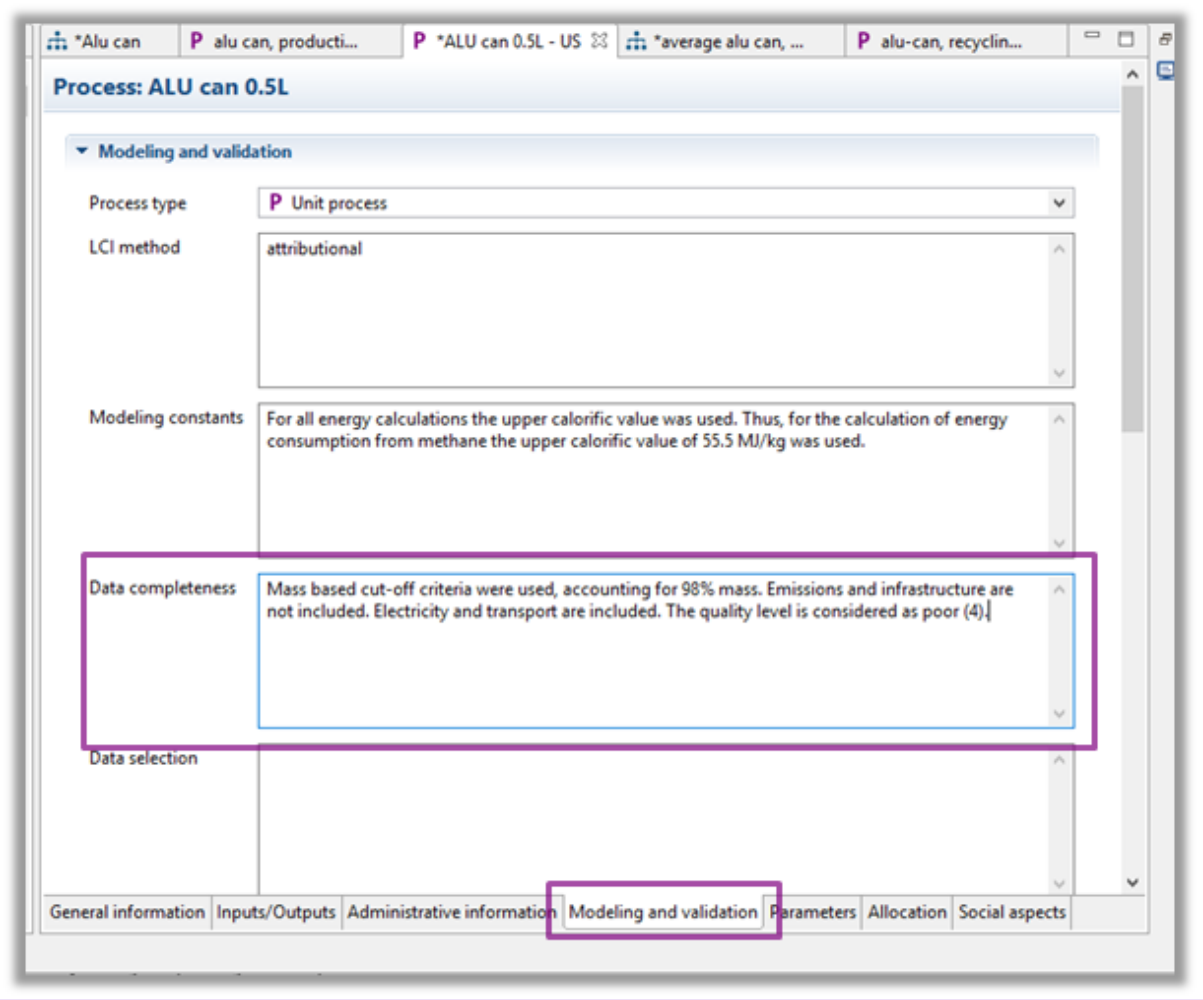


Figure 0.19. Example of [Comp] provision in OpenLCA

[Cons] Consistency

GaBi

The entry provided here on modelling constants, as part of the ILCD-EL element [Cons], is purely for illustrative purposes and is not actually included in the provided dataset.

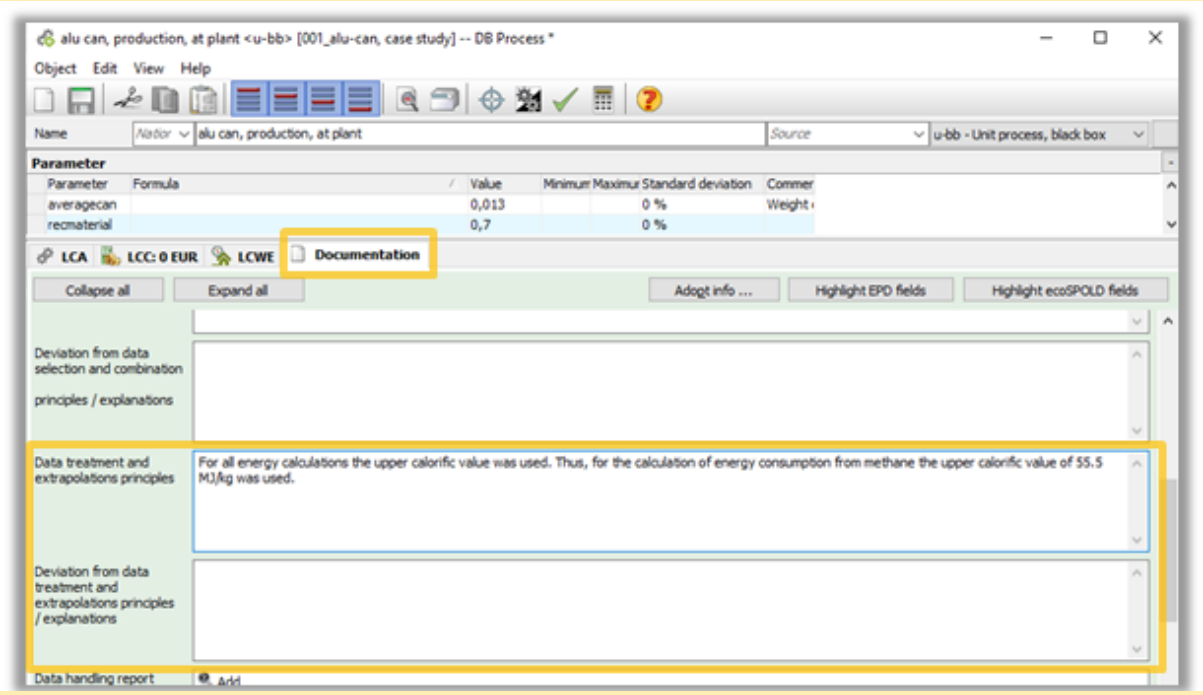


Figure 0.20. Example of [Cons] provision in GaBi

OpenLCA

The entry provided here on modelling constants, as part of the ILCD-EL element [Cons], is purely for illustrative purposes and is not actually included in the provided dataset.

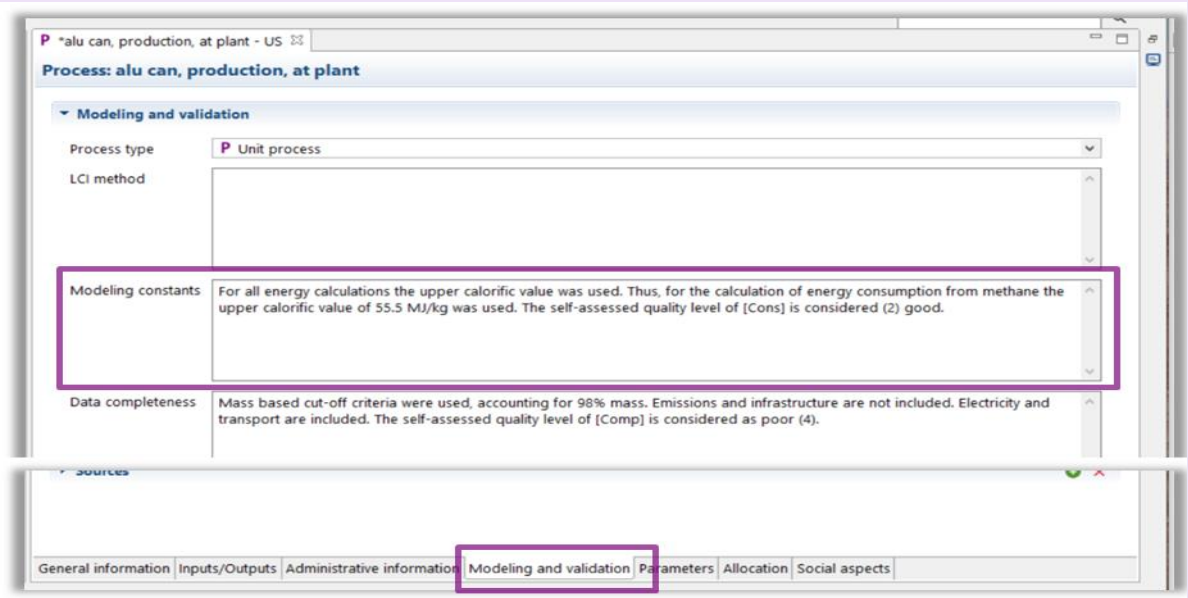


Figure 0.21. Example of [Cons] provision in OpenLCA

[S] Source of data

GaBi

Data sources can be entered from a library. In order to include references that are not yet part of the provided library, new sources can be added, as illustrated below.

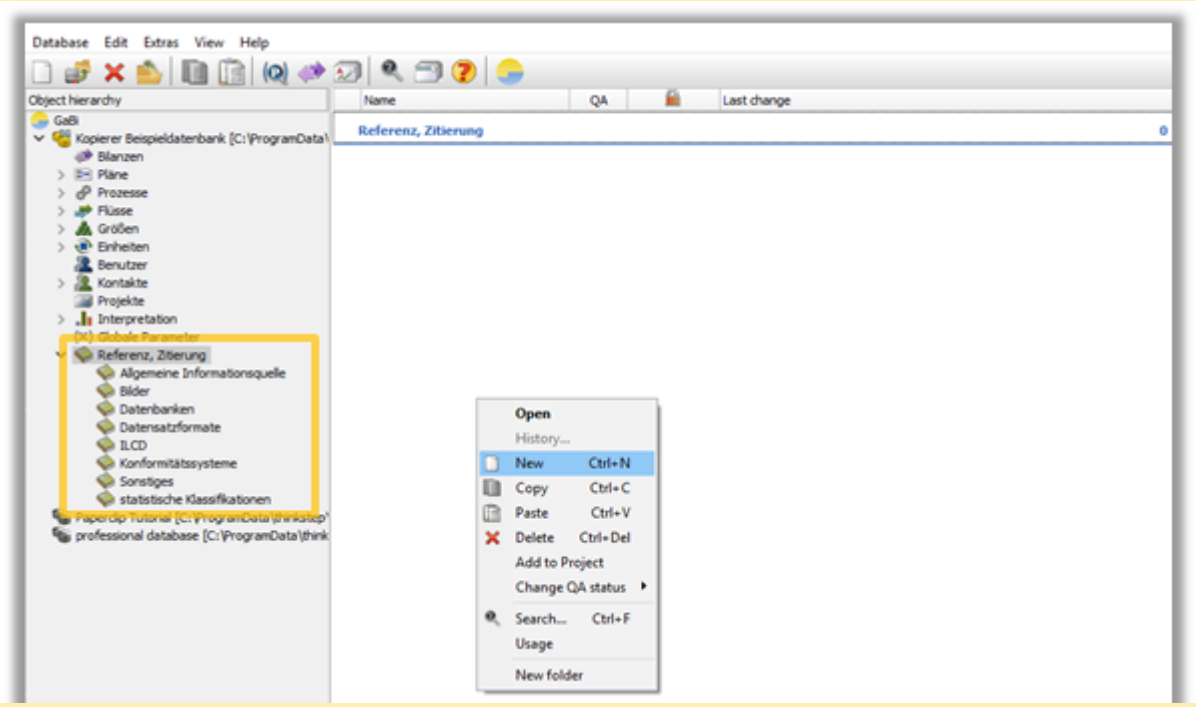


Figure 0.22. Example of [S] provision in GaBi

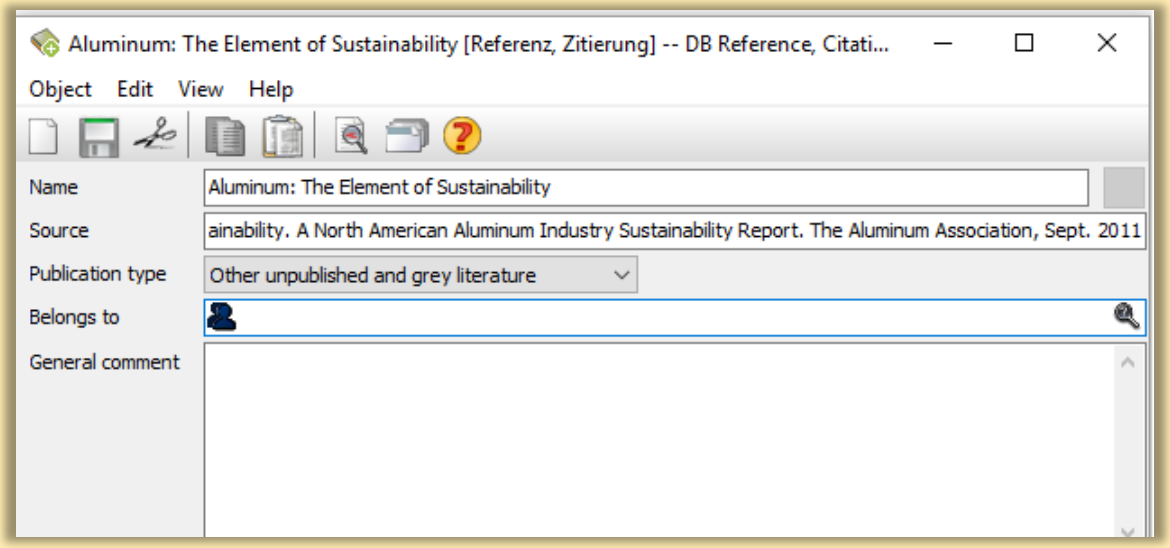


Figure 0.23. Creation of a new data source library entry in GaBi

OpenLCA

Data sources can be entered from a library, which includes all known sources from the current database used. In order to include references that are not yet part of the provided sources database, new sources may be created, as illustrated below. Subsequently, the created sources can be selected to provide information on the data sources.

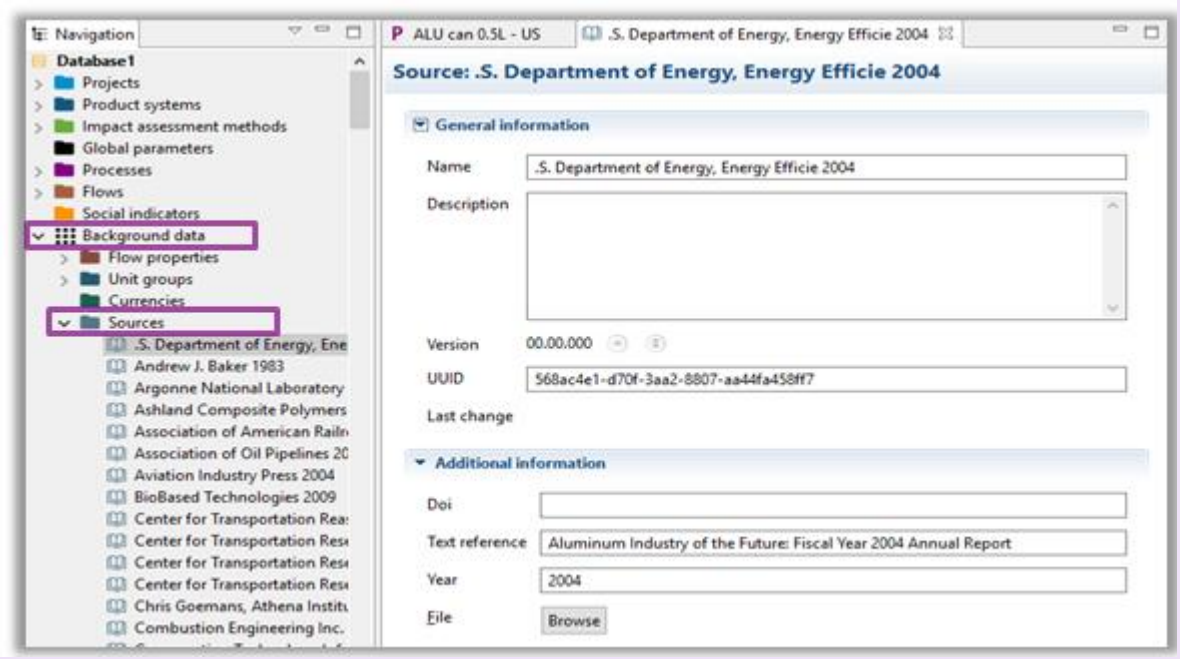


Figure 0.24. Example of [S] provision in OpenLCA. Library of sources and creation of a new actor for source reference within the dataset

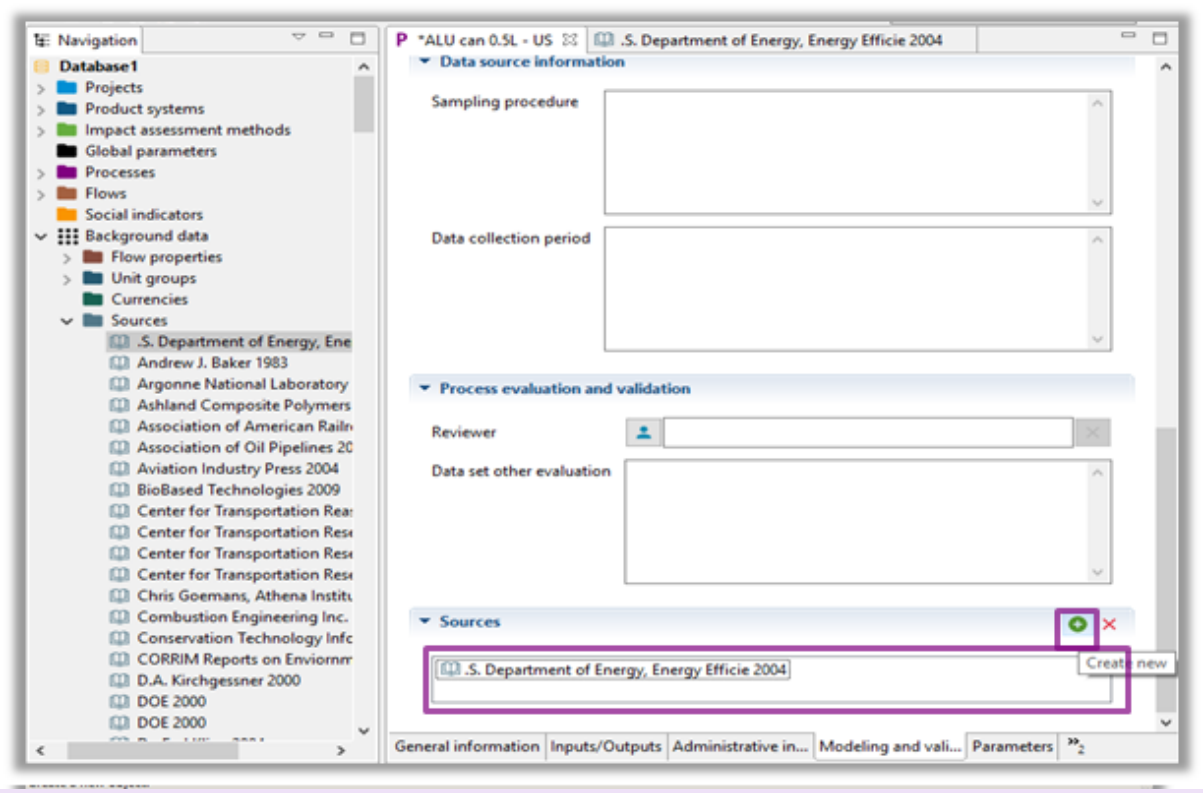


Figure 0.25. Sources can be selected from the source library after pressing the + button

SimaPro

In SimaPro data sources are found under 'Literature references' on the left, as depicted below. With a right-hand click the user can create a new entry. The sources can then be directly added into the process description, as shown below.

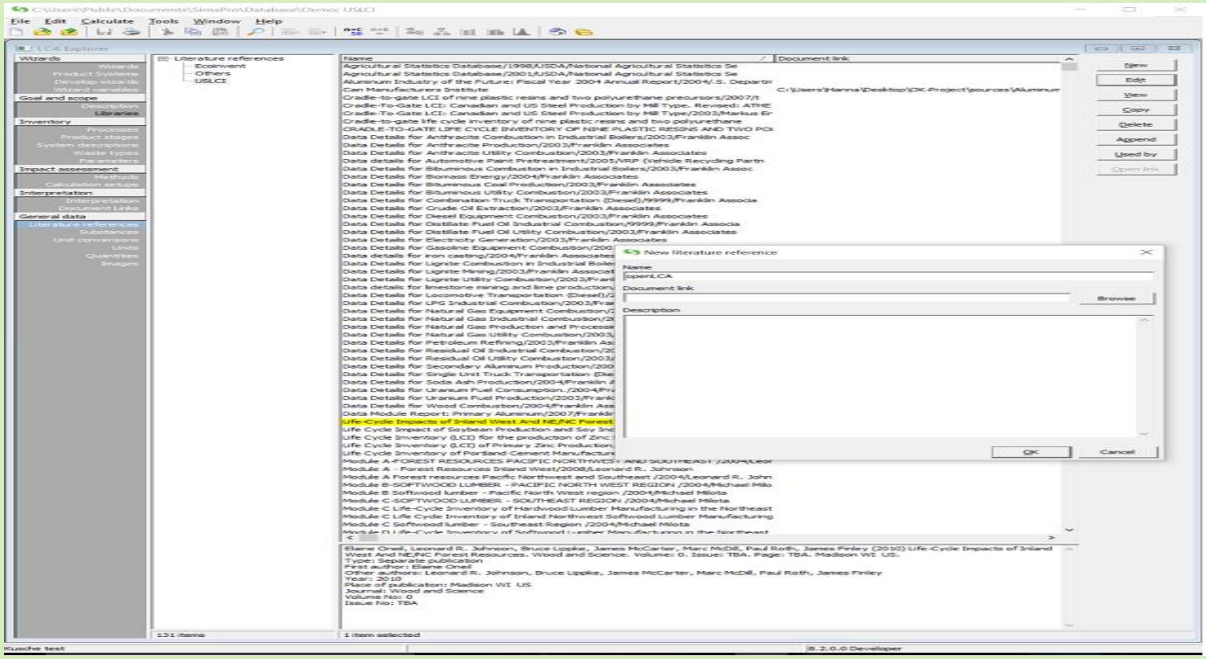


Figure 0.26. Creating new entries under 'Literature references' in SimaPro

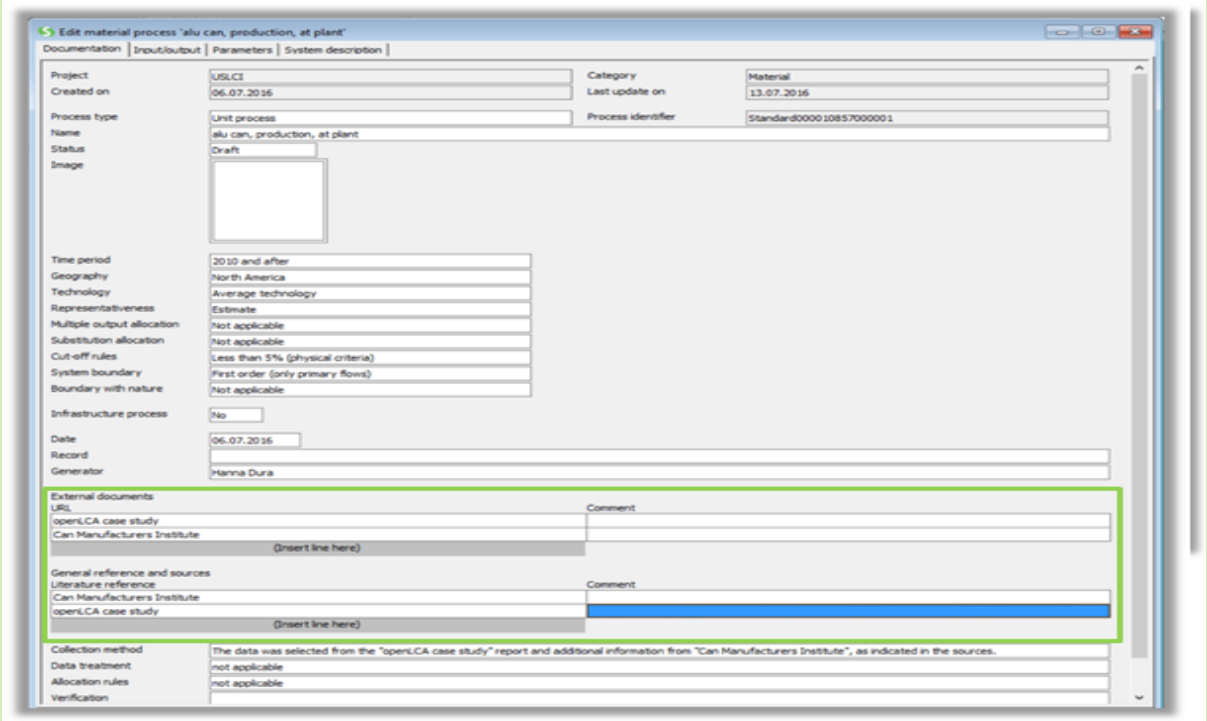


Figure 0.27. Providing sources in a process dataset in SimaPro

Method

GaBi

Information on the general LCI method and allocation procedures and possible deviations may be provided in the 'Modelling and validation' tab within the documentation in GaBi, as shown below.

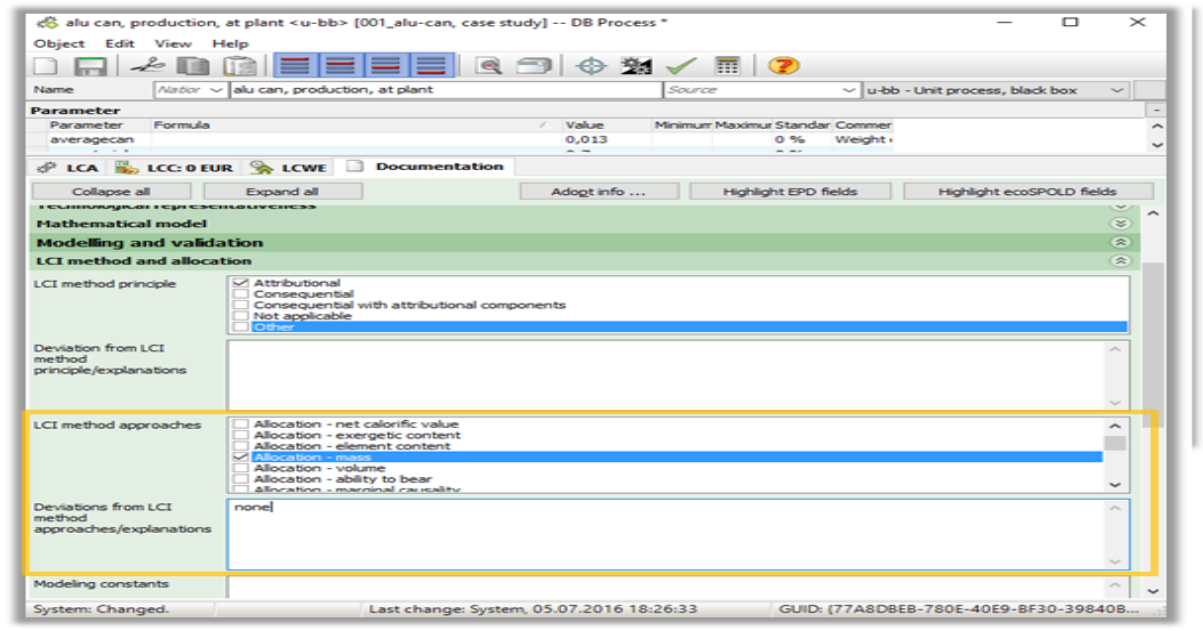


Figure 0.28. Information provision on methodology, particularly principal LCI method chosen, and allocation procedures when dealing with multifunctionality in GaBi

OpenLCA

Information on the general LCI method employed can be provided within the 'Modelling and validation' tab in OpenLCA, as shown below. Information on allocation procedures are directly provided in the allocation tab in OpenLCA. The user may choose between all available allocation procedures and can provide the appropriate values, as shown below.

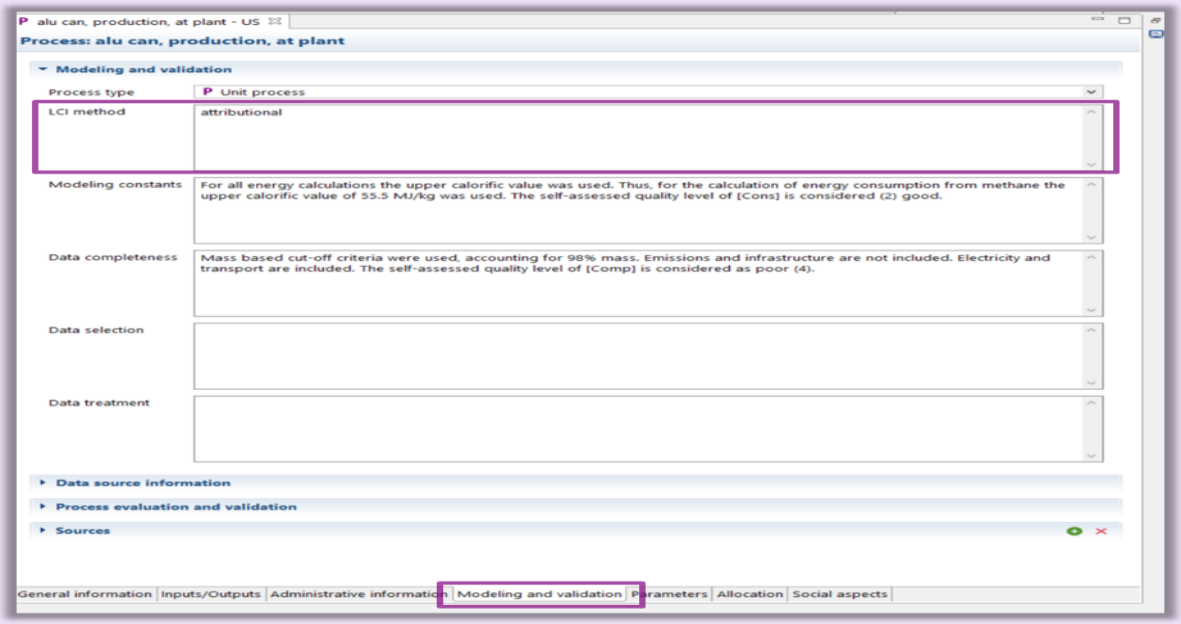


Figure 0.29. Example of information provision on methodological considerations, specifically the general LCI method

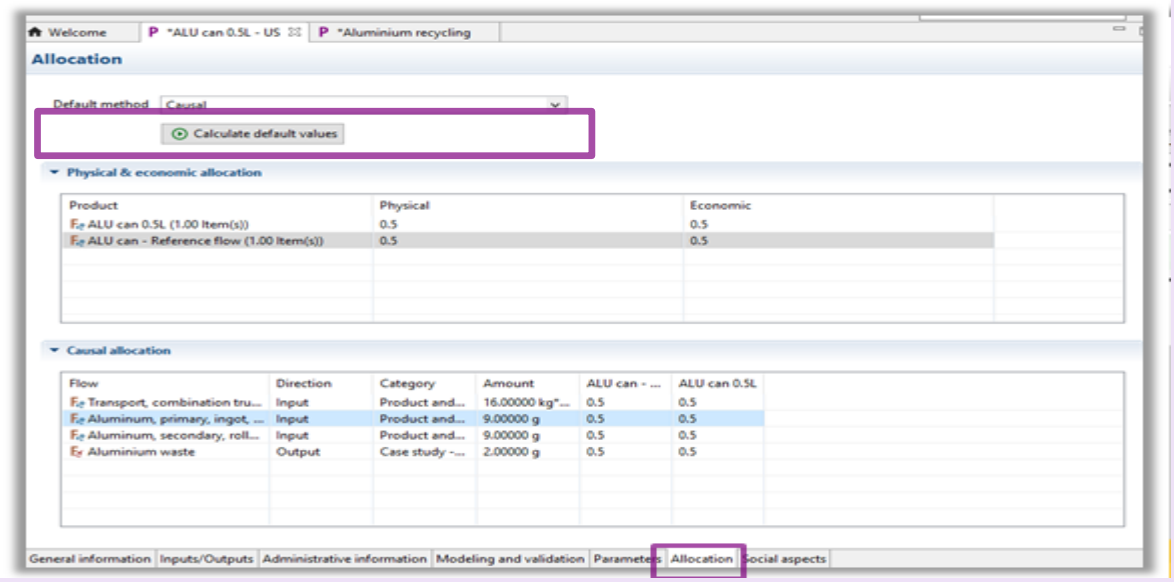


Figure 0.30. Information provision on allocation procedures when dealing with multifunctionality in OpenLCA

Review

OpenLCA

OpenLCA provides some entry fields to document the results of a review process.

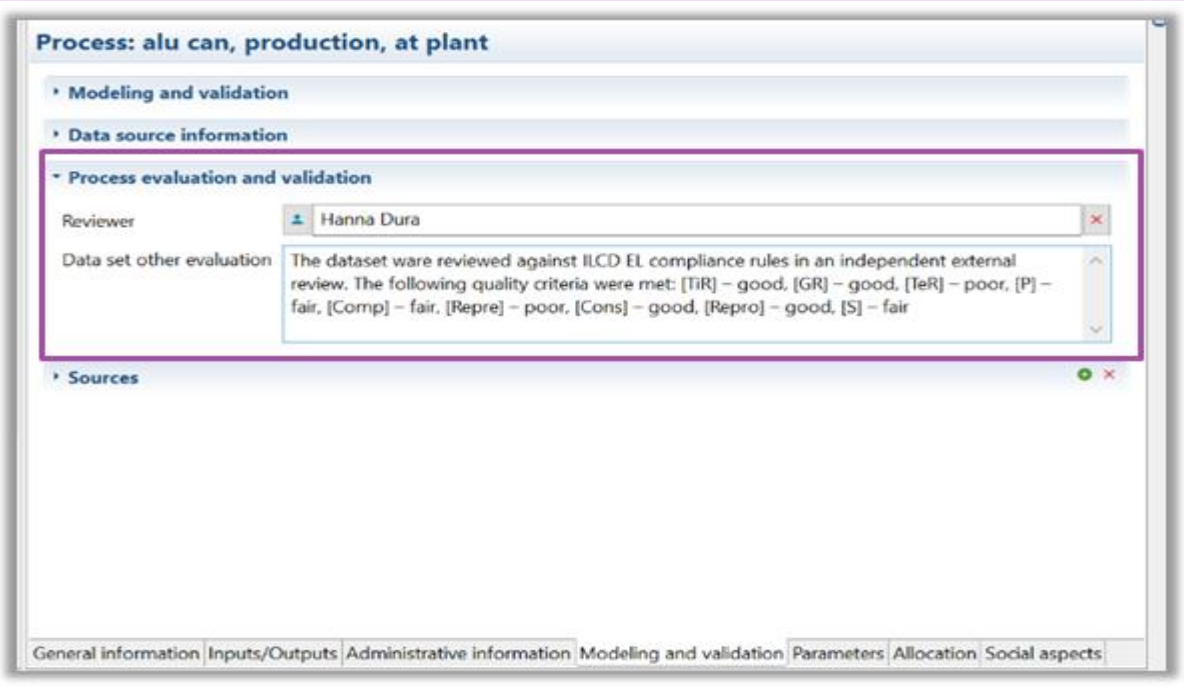


Figure 0.31. Result documentation of a dataset review in OpenLCA

GaBi

GaBi provides entry fields for the validation results of a review process. The type of review as well as scope may be selected from drop-down lists. So far no specific 'ILCD-EL compliance' review type is available. However, the reviewer may depict the quality level of the indicators that are also used for ILCD-EL compliance. Further details on the review as well as the reviewer's name may be provided. Additionally, a number of different reviews may be added.

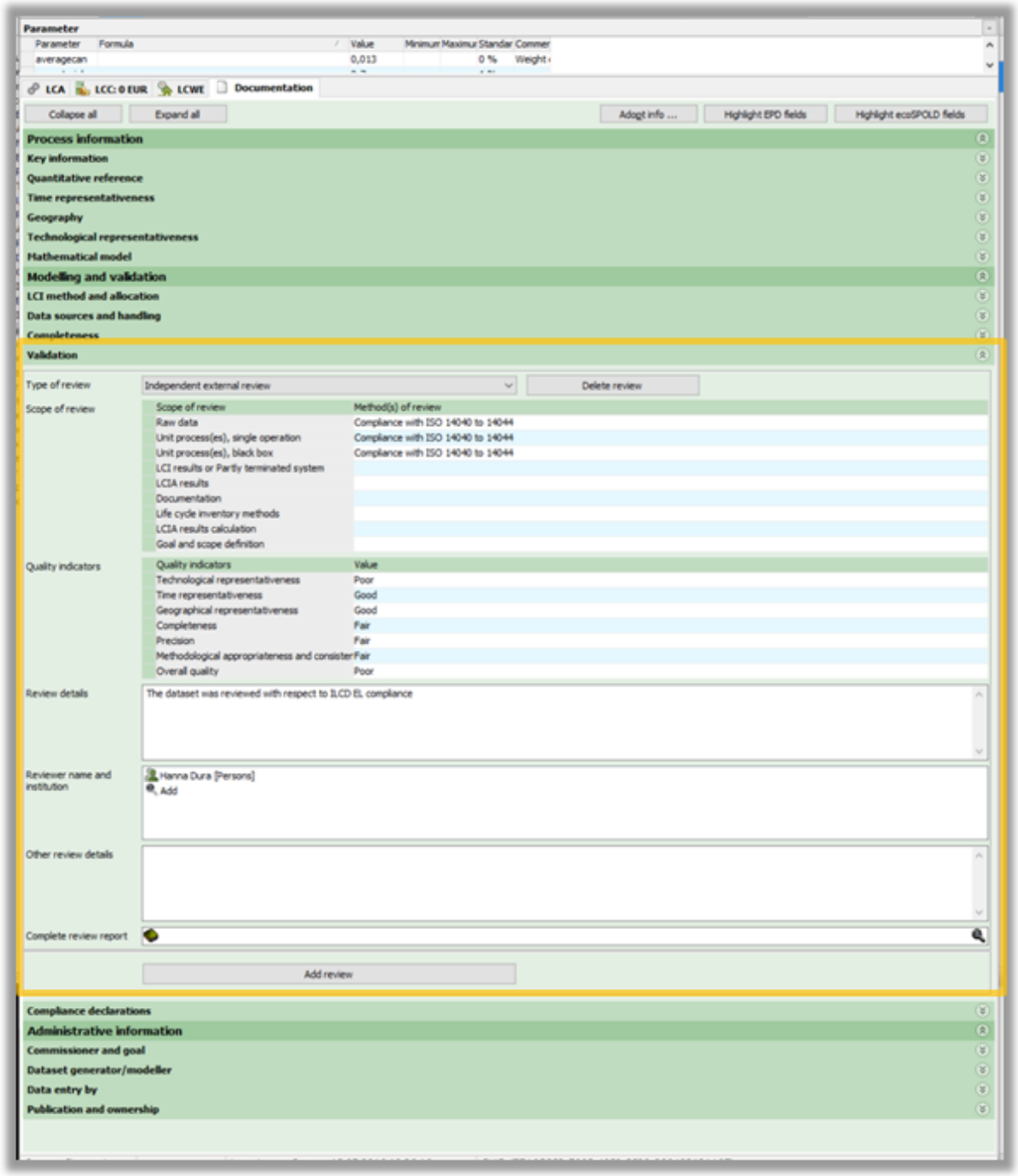


Figure 0.32. Result documentation of dataset review in GaBi

ILCD-EL compliant dataset in SimaPro

SimaPro does not currently provide individual entry fields for the provision of the ILCD-EL criteria. As detailed in this annex, the best option is to include all information as lined out in sections not covered by specific fields in SimaPro, in the general comment field, as described.

SimaPro

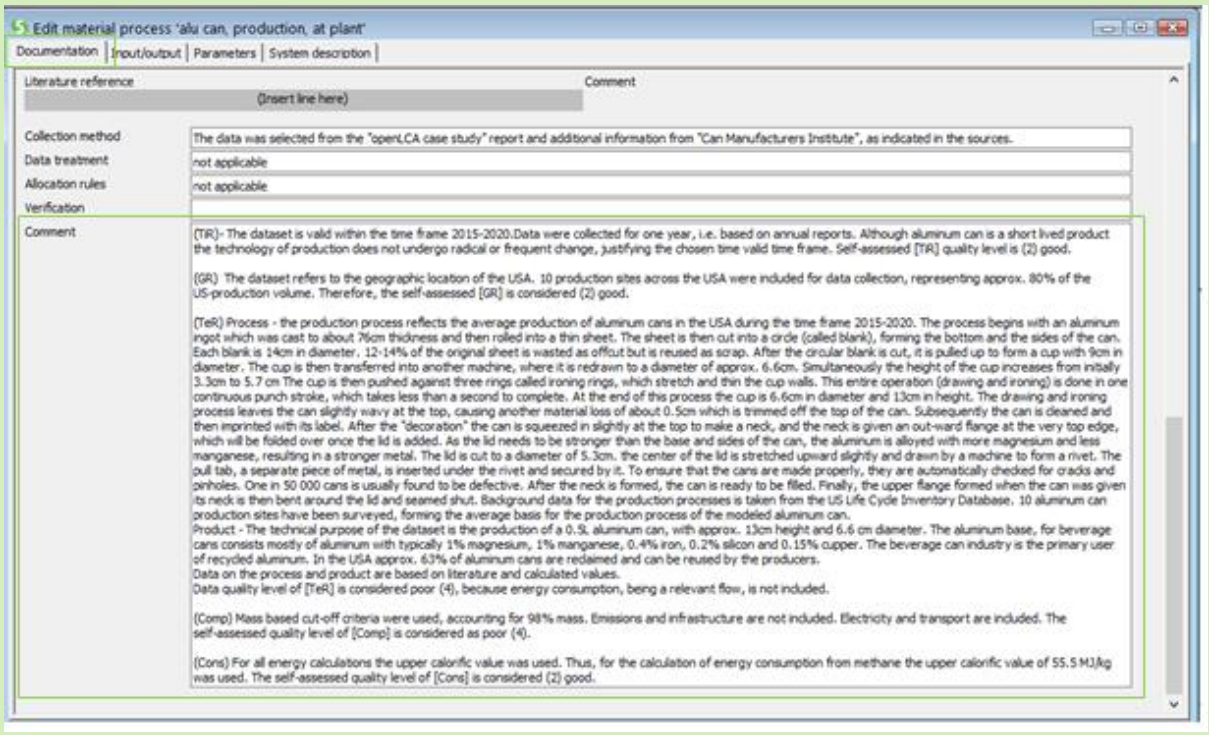
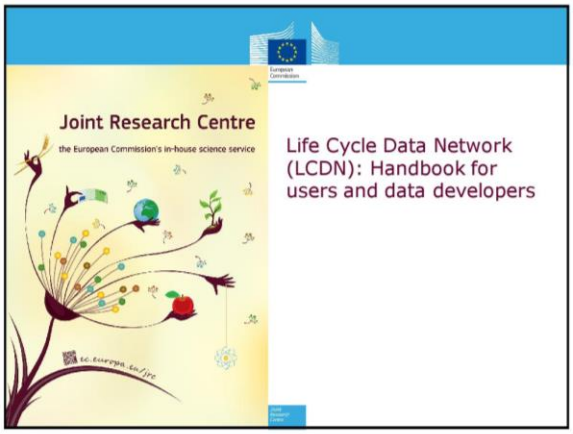
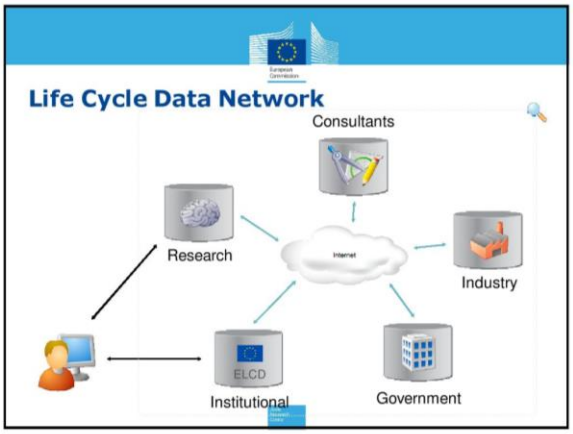


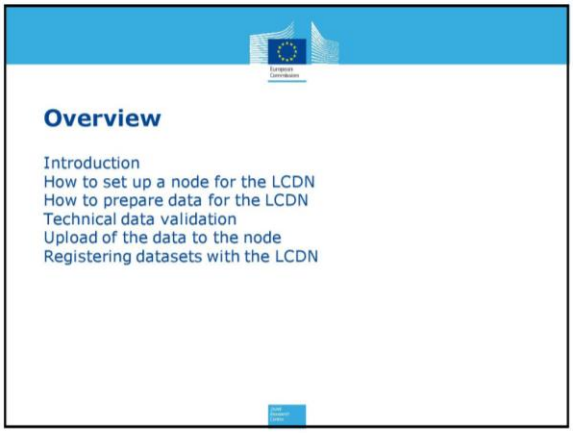
Figure 0.33. Provision of information on ILCD-EL criteria in SimaPro

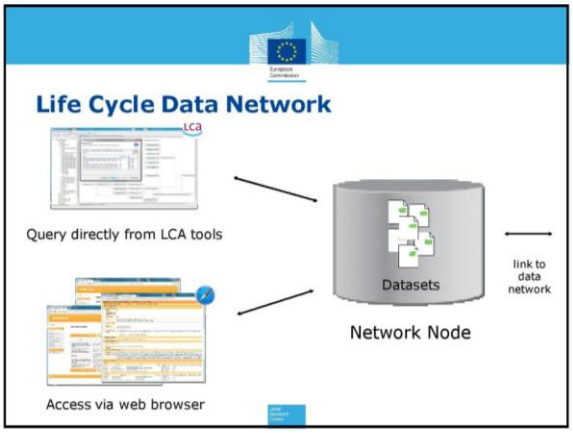
Annex II — LCDN handbook training slides

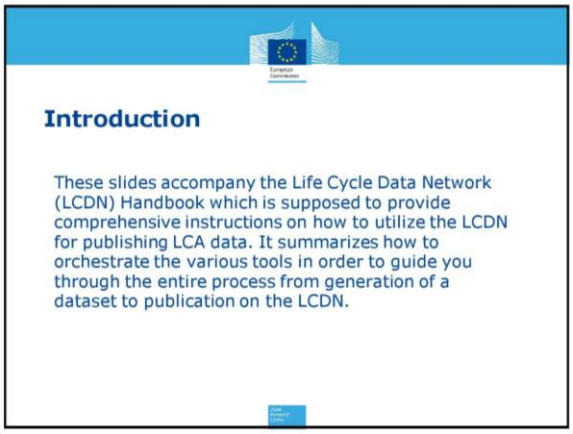
This section contains a set of slides used for training courses, related to the content of this report.

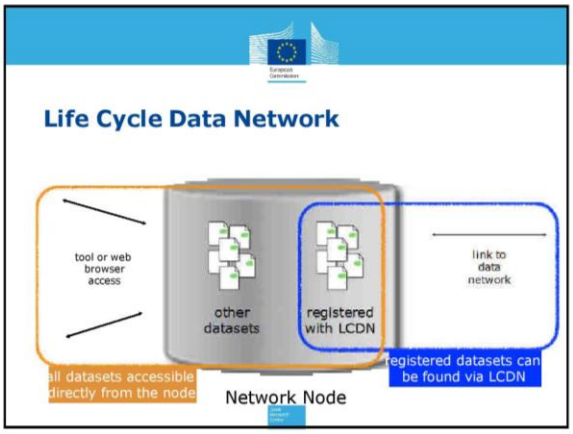












Node Setup

Notice

This should be done by experienced IT personnel only.

Database Setup

1. Create a new, empty database schema using an UTF-8 character set and the default collation. For example, when using phpMyAdmin, use the "Create new database" section on the main page:

System Prerequisites

The following components need to be installed on the target system:

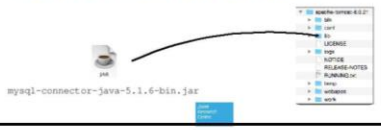
- Java 1.7 or newer
- J2EE servlet container (recommended: Apache Tomcat 8.0)
- MySQL 5.x database

In general it is recommended to use the latest available releases.

It is strongly recommended to run the node on a system with a GNU/Linux or *nix based operating system.

Database Setup

2. Obtain and install MySQL database driver
   a. Download the MySQL database driver here: http://dev.mysql.com/downloads/connector/j/ .
   b. Unpack it and place the mysql-connector-java-5.x.xx-bin.jar file into the $CATALINA_HOME/lib folder.



Obtaining soda4LCA

The latest soda4LCA release can be downloaded at https://bitbucket.org/okusche/soda4lca/downloads.

Unzip the package and locate the "doc" folder which contains the documentation.

The documentation is also available for reading online at https://bitbucket.org/okusche/soda4lca/.

Basic Application Setup

1. Edit the $CATALINA_HOME/conf/server.xml file and add the following Resource declaration to the <GlobalNamingResources> section:

```
<Resource auth="Container"
  driverClassName="com.mysql.jdbc.Driver"
  maxActive="8"
  maxIdle="4"
  validationQuery="SELECT 1"
  testOnBorrow="true"
  removeAbandoned="true"
  removeAbandonedTimeout="300"
  logAbandoned="true"
  name="jdbc/soda4LCAdbconnection"
  type="javax.sql.DataSource"
  url="jdbc:mysql://localhost/soda4LCAdb?useUnicode=yes&amp;characterEncoding=UTF-8"
  username="myusername"
  password="mypassword"
/>
```

Adjust username, password and database URL (hostname and port) according to your local database setup.

Basic Application Setup

2. (optional) To avoid NotSerializableExceptions during Tomcat restarts, session persistence can optionally be disabled by uncommenting the line <Manager pathname="" /> in the context.xml file.

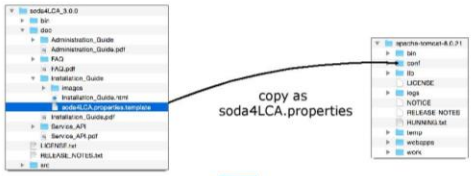
Configuration and Customization

Uncomment the files.location.datafiles property (by removing the leading hash mark) and set the path to a location outside the webapps folder.

```
#
# data and temp directories
#
# data files is where external files attached to source datasets will be stored, defaults
# to WEB-INF/var/files
# uploads is where uploaded files are temporarily stored, defaults to WEB-INF/var/uploads
# zips is where zip files are temporarily stored, defaults to WEB-INF/var/zips
#
# IMPORTANT: files.location.datafiles should point to somewhere outside the
# directory containing web application, otherwise you will lose your data files
# on re- or undeploy!
#
#files.location.datafiles = /usr/local/soda4LCA/datafiles
#files.location.uploads = /tmp/uploads
#files.location.zipfiles = /tmp/zips
```

Basic Application Setup

3. Place a copy of the soda4LCA.properties.template file from the Installation_Guide folder in $CATALINA_HOME/conf/soda4LCA.properties



Configuration and Customization

Consult the Installation Guide for details on all other configuration options:

https://bitbucket.org/okusche/soda4lca

Configuration and Customization

```
#
# node information
# NOTE: service.nodeid may not contain spaces!
#
service.node.id = NODEID
service.node.name = name of this node
service.node.description = description of this node
service.node.operator = name of the organization operating this node

#
# administrative contact for this node
#
service.admin.name = name of administrative contact
service.admin.phone = +49
service.admin.email = admin@foo.org
service.admin.www = http://www.foo.org/

#
# title of the database instance
#
title = @APP-TITLE@
```

Open the soda4LCA.properties file with a text editor and adjust at least the following settings:

Put your desired values on the right side of the equals sign on every line.

Copy the Binary WAR

Copy the Node.war to the webapps folder of your Tomcat installation.

Run the Application

Start Tomcat and point your browser to the URL that you configured for soda4LCA, by default
http://localhost:8080/Node/

Change Admin Password

Enter the current password and a new one and confirm.

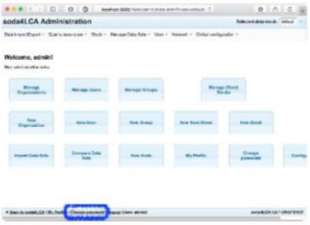
Change Admin Password

Login as user „admin" with password „default"

Register Node with LCDN

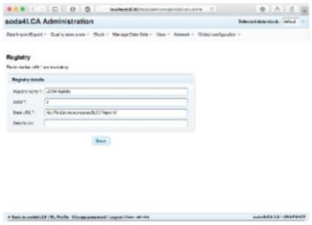
Go to Network / Registries from menu

Change Admin Password



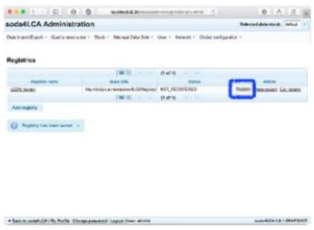
Select „Change password"

Register Node with LCDN



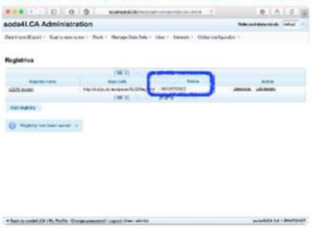
Enter information as shown above and save

Register Node with LCDN



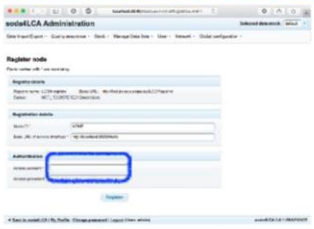
then, select „Register"

Register Node with LCDN



Once the registration has been approved by the JRC, the status will change to „REGISTERED".

Register Node with LCDN



Verify your node ID and URL and choose credentials that will be needed later for deregistration (keep them safe)

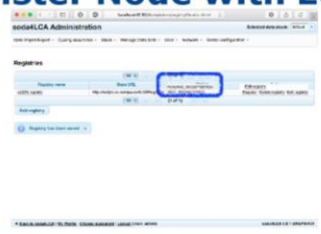
Service Oriented Database Application for LCA

soda 4LCA

GPL Free Software

Free as in Freedom

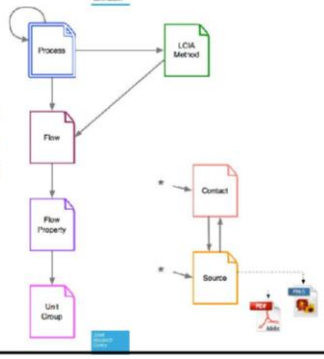
Register Node with LCDN



Save. Status will show „PENDING_REGISTRATION". Send an email to eplca@jrc.ec.europa.eu asking to register the new node.

Data Export

ILCD Dataset Types



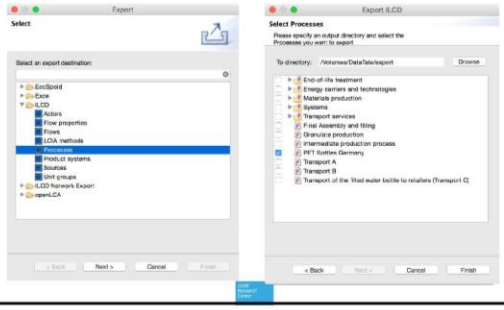
ZIP-Archive

Data Export in SimaPro

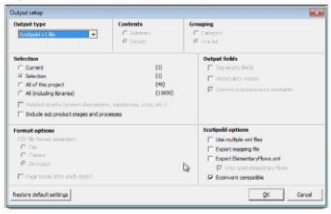
SimaPro 8.1 and newer: native ILCD export

earlier versions: EcoSpold export, use openLCA Converter to convert to ILCD

Data Export in openLCA



Data Export in SimaPro



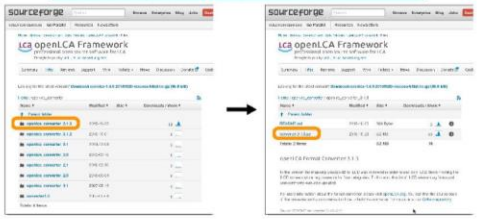
The result will require conversion to ILCD using the openLCA Converter

Data Export in GaBi

Using the openLCA Converter

Obtaining the software

http://sourceforge.net/projects/openlca/files/openlca_converter/



Change to the folder with the latest version and download the converter-3.x.x.jar file.

Running the Software

This file is an executable JAR file, which requires Java to be installed on the local machine in order to run it. Launch the converter by simply double-clicking the executable file you downloaded. If you get a message that the file cannot be opened, you need to obtain Java from http://java.com/download/

Conversion Finished

openLCA Converter Main Window

Resulting Files

The result will be stored in the specified target folder.
For later upload, you may want to store the result in a ZIP archive (the inner „ILCD" folder needs to be at root level of the ZIP).

Start Conversion

Converting Data from SimaPro pre-8.1

Detailed instructions at
http://www.pre-sustainability.com/data-conversion-tool-ilcd-format

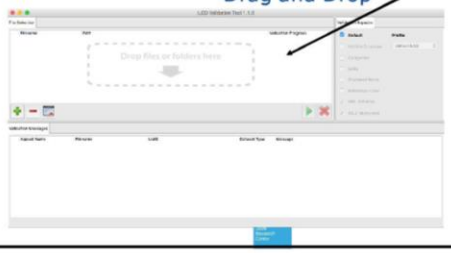
Data Validation

ILCD Entry Level Requirements

Compliance area	Requirements
Documentation	• ILCD format to be used
Nomenclature	• Compliance with ILCD nomenclature document (e.g. use of ILCD reference elementary flows). • Certain aggregated elementary flows (e.g. VOC) are permitted • Terminology use not enforced.
Data quality	• "Not defined", i.e. no data quality levels (Note: this requirement is covered as part of „Documentation") • Data quality needs to be stated using ISO quality criteria • Technological, geographical and time-related representativeness to be documented
Method	• ISO 14040 and 14044 compliant process-based LCA • Methodological ILCD compliance not enforced; applied modelling framework(s) and allocation/substitution approaches to be documented
Review	• Use of reviewers from registry not required "Qualified reviewer" required (based on ISO 14025): • knowledge of relevant sector • knowledge of represented process or product • LCA method expertise and experience • Qualified independent external reviewer in line with ISO 14044 (chapter 5.1) requirements BUT separate review report is not required (review documented in data set) OR • Qualified independent external reviewer in line with ISO 14044 (chapter 5.1) requirements, BUT separate review report is required (with the ILCD template / minimum review documentation scope), in addition to review documentation provided within data set • Review on unit process level may not be required, depending on data quality claims

ILCD Validation Tool

Drag and Drop



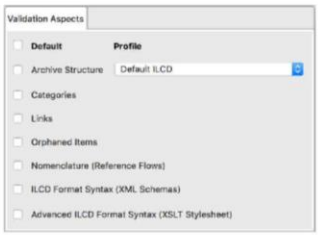
Data Validation

ILCD Validation Tool

- technical validation of ILCD datasets
- free
- cross-platform (Windows, Mac, Linux)
- custom validation profiles

Download at
https://bitbucket.org/okusche/ilcdvalidationtool/

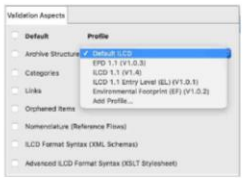
Validation Aspects



ILCD Validation Tool

ILCD Validation Tool

Profile Selection

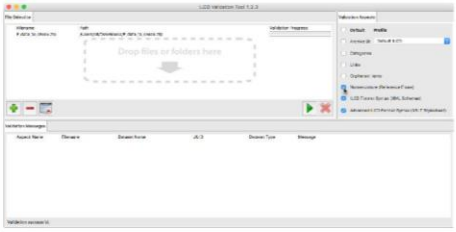


Currently Available Profiles

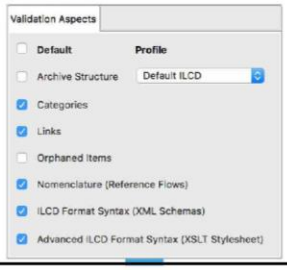
Default ILCD (built-in)
EPD
ILCD Entry Level (EL)
Environmental Footprint (EF)

required for LCDN

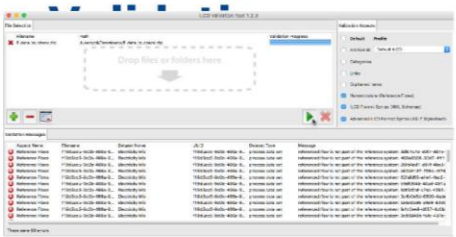
Selecting Aspects & Profile



Validation Aspects Required to Pass for LCDN

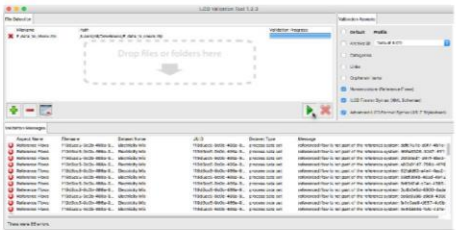


Running

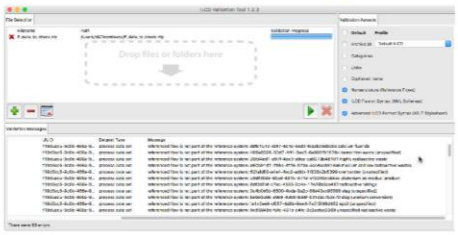


Adding a File

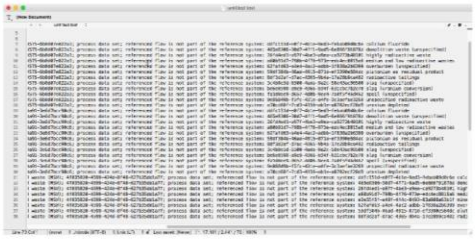
Validation Messages



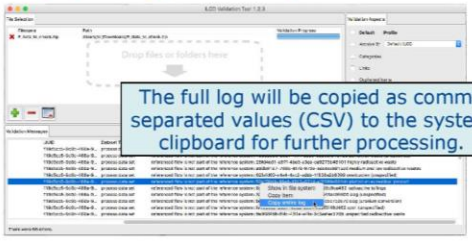
Validation Messages



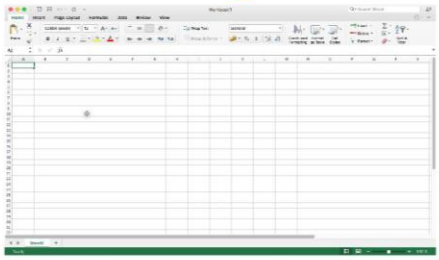
Paste into text editor



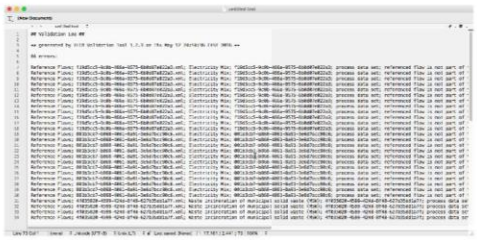
Copy Log to Clipboard



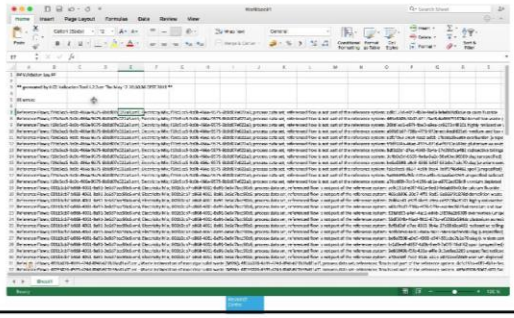
Post Processing in Excel



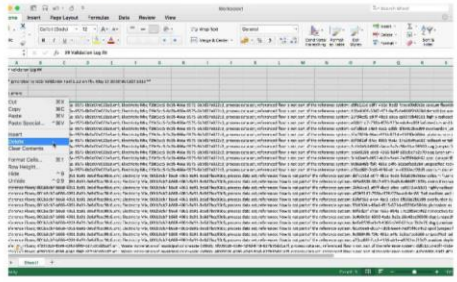
Paste into text editor



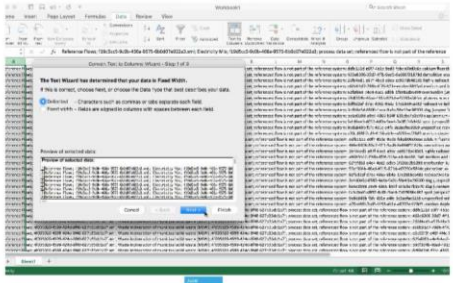
Paste into Excel



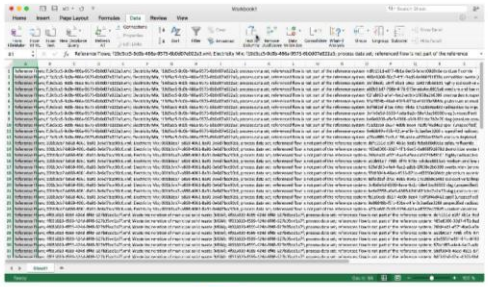
Delete log header



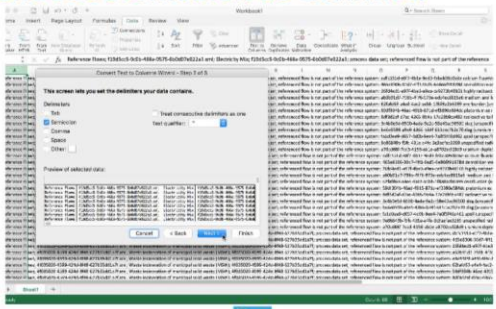
Choose „Delimited"



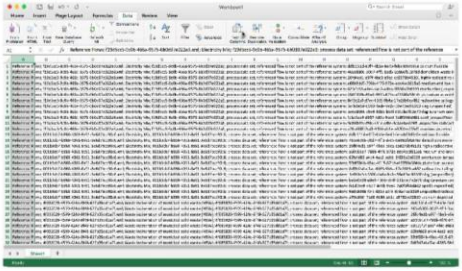
All contents is in column A



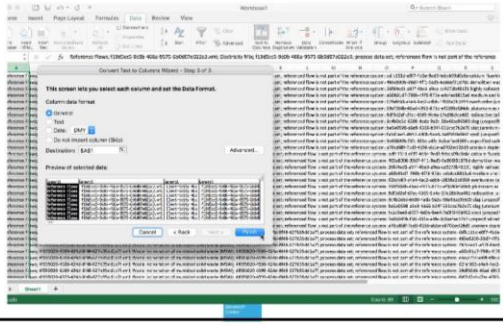
Choose semicolon as delimiter



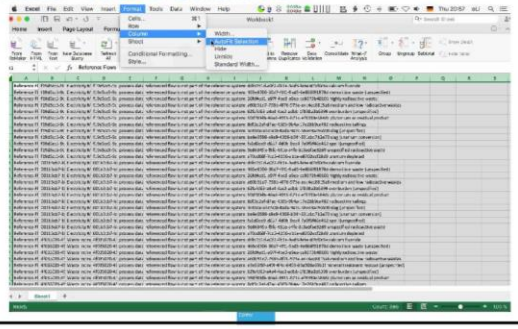
Choose Data>Text to Columns



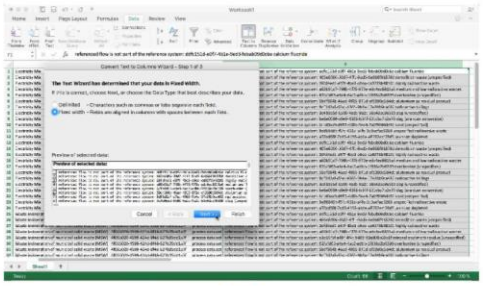
Finish the wizard



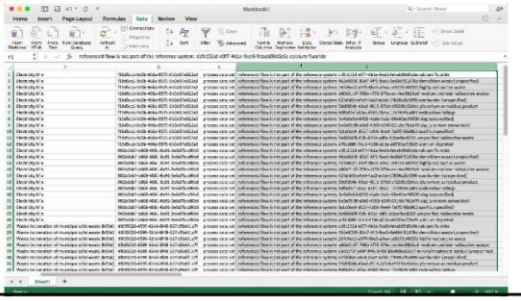
Auto-fit the columns



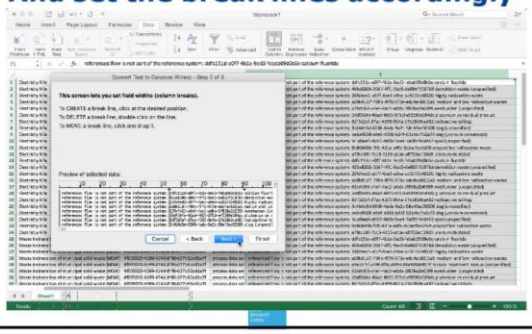
Now select „fixed width"



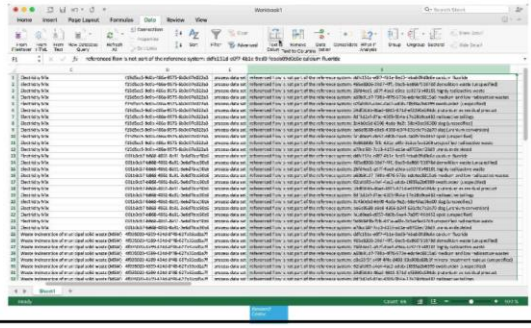
Now select the column F to separate flow UUIDs and names



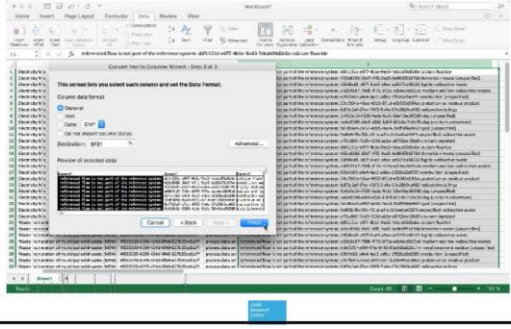
And set the break lines accordingly



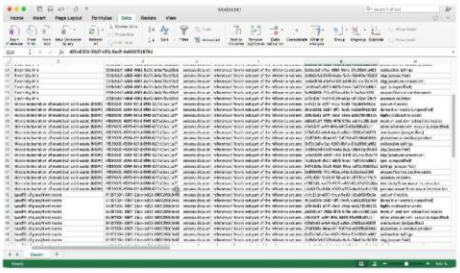
Choose „Text to Columns" again



Finish the wizard...



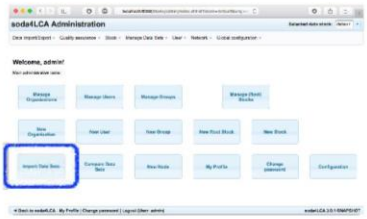
Voilá!



Uploading Data

Navigate to the ZIP or XML file(s) you want to upload on your local filesystem, select them and choose „OK".

Uploading Data



In the Administration section, choose „Import"

Uploading Data

Now upload the files by selecting „Upload".

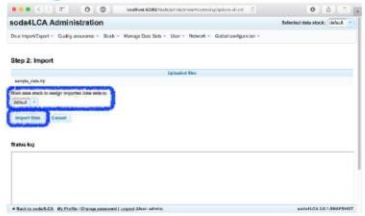
Uploading Data

Choose „Browse"

Uploading Data

Once the upload has been completed, select „Continue".

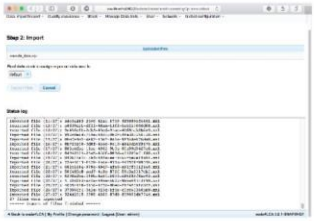
Uploading Data



Review the list of uploaded files, select a destination data stock and then start the import by selecting „Import".

Dataset Management (optional)

Uploading Data



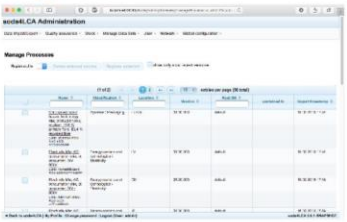
The import may take a while, review the status log for error messages. It's finished when you see the above message.

Dataset Management (optional)

Data Stocks

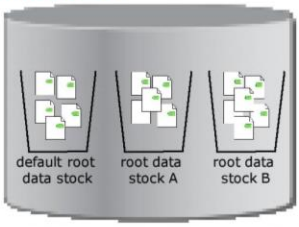
Datasets in a node can be organized in data stocks which can be used to, for example, separate public and private datasets.

Uploading Data



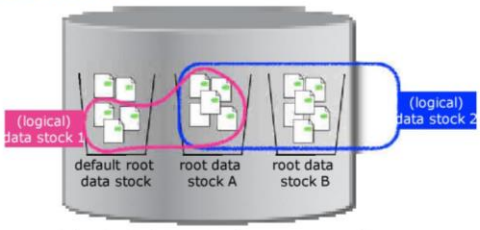
Now you can review the datasets in your local node in the „Manage Processes" view.

Root Data Stocks



Each dataset belongs to exactly one root data stock.
Every node has one default root data stock.

Data Stocks

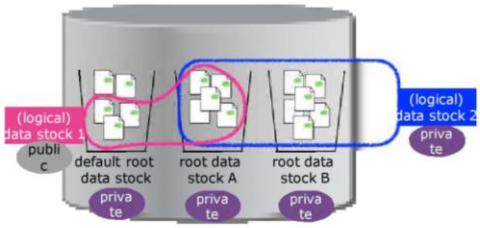


A logical data stock may contain an arbitrary number of datasets.

Public and Private Data

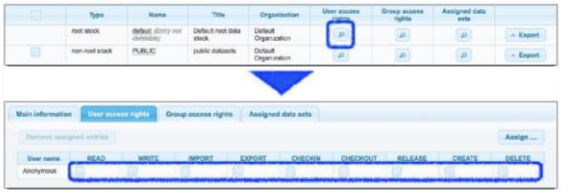
Now we have two data stocks: the default one (a root data stock) and the new (logical) datastock „PUBLIC".

Data Stocks Permissions



Permissions can be assigned individually to both types of data stocks.

Public and Private Data

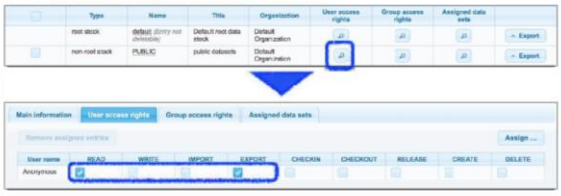


Edit the user access permissions for the default data stock and remove all permissions.

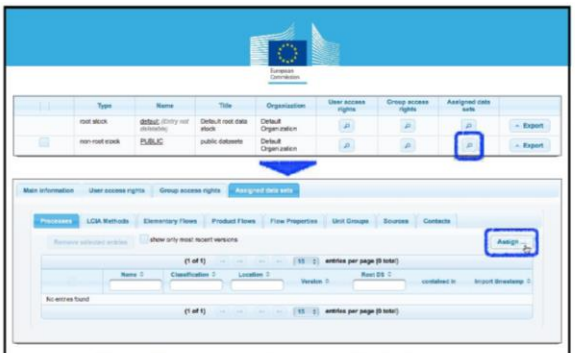
Public and Private Data

Create a new (logical) data stock named „PUBLIC"

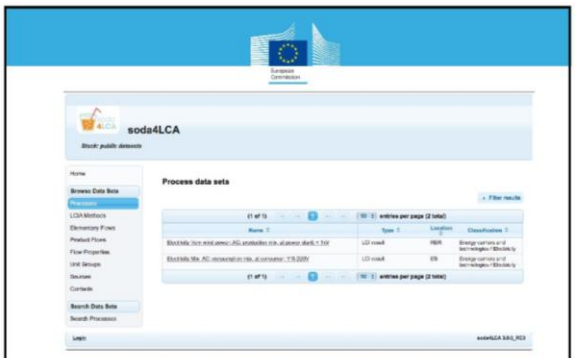
Public and Private Data



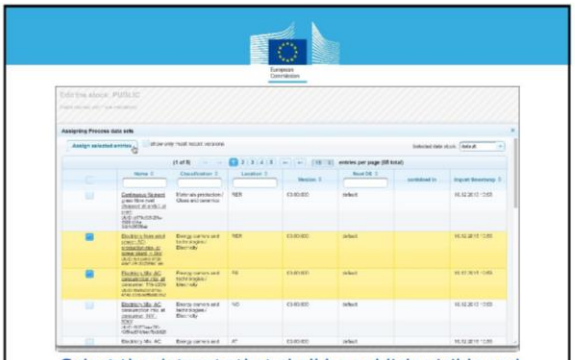
Now edit the user access permissions for the „PUBLIC" data stock and grant READ and EXPORT permissions.



Go to the „Assigned datasets" of data stock „PUBLIC" and select „Assign…"



As an anonymous user who is not logged in, only these two datasets are visible. All others remain private and thus hidden.

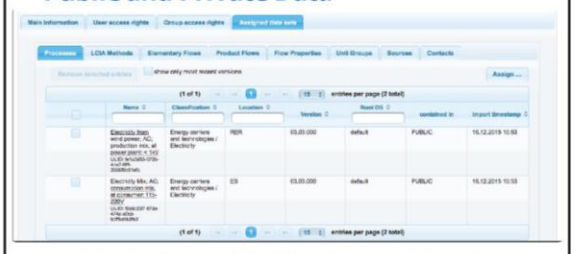


Select the datasets that shall be publicly visible and select „Assigned selected entries".

Dataset Registration

Go to „Manage Processes" view

Public and Private Data

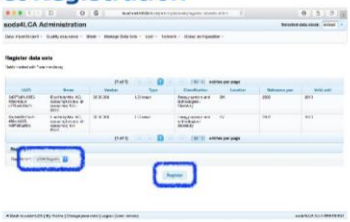


They will appear in the list of assigned datasets.

Dataset Registration

Select the datasets to be registered with the LCDN. Choose „Register selected".

Dataset Registration

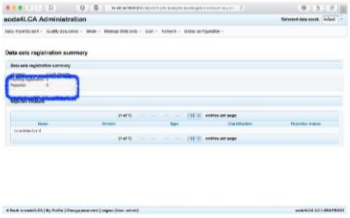


Review the list of datasets, select the registry and choose „Register".

Dataset Registration

In addition, in the dataset overview…

Dataset Registration

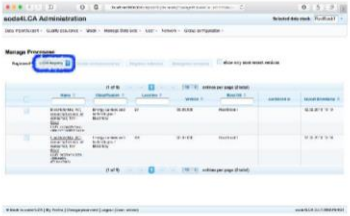


In the following page, a summary of the request will be given.

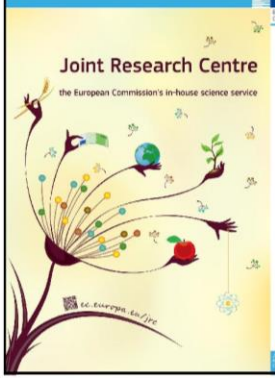
Dataset Registration

… the registration information will show up at the bottom of the page.

Dataset Registration



Upon approval by the JRC, you can show registered data-sets in the „Manage Processes" view by selecting the registry



Thank you for your attention

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List of abbreviations and definitions

- DG — directorate-general
- EL — entry level
- EPLCA — European platform on life cycle assessment
- ILCD — International Reference Life Cycle Data System
- JRC — Joint Research Centre
- LCA — life cycle assessment
- LCDN — Life Cycle Data Network
- LCI — life cycle inventory

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doi:10.2788/585488
ISBN 978-92-79-64014-8