# The openLCA format converter – new release May 2013

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# 1 The format converter – introduction & motivation

The format converter is created and maintained by GreenDelta since 2006. Motivation for creating it was already described in earlier documentation [1]:

"The converter aims to provide a surrogate for a format consensus. It provides the technical means for loss-less data exchange between the most important LCA data formats today, and thus enables users to switch between them as they need. In that sense, it resembles very much an electrical adaptor. [...] it might even be a more convenient solution since it allows using different formats in parallel."

The format converter was the first released element in the openLCA project, [2]. Since its beginning, it was released as free, open source software, under the Mozilla Public Licence. The latest version is available from the openLCA website [3]. Up to now, there are four releases:

Home / openIca_converter				
Name +	Modified +			
↑ Parent folder				
openIca_converter_2.1	2010-09-30			
openIca_converter_2.0	2010-06-04			
openIca_converter_1.1	2007-08-15			
converter1.0	2007-05-04			

Figure 1: Previous releases of the format converter, with release date

This text is about the release for a format converter version 3.0, which is then the fifth release.

# 2 Release March 2013 – what's new

The new release contains the following main changes and updated:

- new formats have been added: SimaPro CSV and SimaPro EcoSpold (i.e. the EcoSpold 1 'dialect' that is used by the LCA Software SimaPro);
- for the ILCD format, the new flows from the ELCD III database have been taken into account;
- the user interface is updated and extended.

We are grateful for support that we received from PRé Consultants (www.pre-sustainability.com) for this converter release.



# 3 A quick documentation for the new converter

# 3.1 Converter requirements

The format converter has only moderate hardware requirements that should be met by all modern computers. The software itself requires less than 20 MB of hard disc space. If larger amounts of data need to be converted in one go, the conversion is faster if more RAM is available.

Since the openLCA converter is a Java software, it runs under Windows, Linux, and MAC OS. A Java version of 1.6 or higher is required. If you are unsure about whether Java is installed on your computer, you can follow these steps to find out:

www.openlca.org/documentation/index.php/Verify\_Java\_version.

# 3.2 Converter features

#### The converter is a tool for converting LCA data sets from one LCA data format to another.

It currently covers the following data formats:

- EcoSpold 1: data format released by the ecoinvent centre, Switzerland [4]
- **EcoSpold 1 SimaPro** (new): The SimaPro LCA software uses a slightly different EcoSpold format than the ecoinvent centre; it has now been integrated in the format converter as well
- **EcoSpold 2**: data format released also by the ecoinvent centre, Switzerland [5]; designed to be a successor of EcoSpoldy 1, will be broadly available with the upcoming ecoinvent 3 database.
- **ILCD**: Data format released by the Joint Research Centre (JRC) of the European Commission, in version 1.1 [6]
- **CSV SimaPro** (new): A data format used by the SimaPro software for import and export; in contrast to EcoSpold 1, it supports parameters.

Not all data formats are available for all conversion directions; Table 1 gives an overview.



from/to	EcoSpold 1	EcoSpold 1 (SimaPro)	EcoSpold 2	ILCD 1.1	CSV (SimaPro)
EcoSpold 1		х	x	x	-
EcoSpold 1 (SimaPro)	x		x	x	-
EcoSpold 2	x	x		x	x
ILCD 1.1	x	x	x		-
CSV (SimaPro)	-	-	x	-	

#### Table 1: Supported LCA data formats in the openLCA converter, version 3

In a conversion, the format converter applies a **mapping** of elements in one format and format reference to elements in the other format. For example, flow nr. 188,"Carbon dioxide, biogenic" in a data set in EcoSpold 1 format becomes, when this data set is converted into ILCD, a flow with UUID o8a91e7o-3ddc-11dd-9241-0050c2490048,"carbon dioxide (biogenic)". As a result of the mapping, the converted data set integrates much better with original data sets from the target format. This is especially important for the application of Life Cycle Impact Assessment methods.

Finally, the converter offers various **tools for analysing the conversion results**. These will be explained later more in detail.

# 3.3 Using the converter

#### 3.3.1 Overview of conversion steps

Using the format converter is straightforward:

- o. Download the converter, unzip the archive, and start the converter application, in Windows by double-clicking on the converter jar file.
  - templates
     converter.ini
     openLCAConverter\_v3.jar

Download and extraction of the downloaded zip archive needs to be done only once. As soon as the converter is open, follow these principal steps (see also Figure 2):

- 1. Select a source file.
- 2. Select a target directory.
- 3. Select a target format.
- 4. Run the conversion.



Conversion Database XPath Search About						
OPENLCa format converter						
Target: C:\Users\Imo\Desktop						
3 EcoSpold 1 EcoSpold 1 EcoSpold 1 EcoSpold 1 (SimaPro) EcoSpold 2 ILCD CSV (SimaPro) The converter is a free and open source toor for the transformation of the XML based LCA data formats						
EcoSpold 01 / 02, ILCD and SimaPro CSV.						
<ul> <li>Using the converter is straightforward: <ol> <li>Select a source format file: XML files or ZIP files containing XML files with ILCD or EcoSpold 01 /02 data sets are allowed.</li> <li>Select a target directory: In this directory the created files are stored, so you need write permissions for this directory.</li> <li>Select a target format: The selected format must be different from the source format.</li> <li>Run the conversion by clicking on the green arrow.</li> </ol> </li> <li>OpenLCA is administered and developed by <u>GreenDelta</u>. For further information about the project please visit the <u>project website</u>. If you need help to get started you can also read our <u>online help</u>.</li> </ul>						

Figure 2: Four main steps of data conversion in the format converter.

When the conversion is finished, you should inspect the results.

#### 3.3.2 Converting data sets

The steps for converting data sets have already been introduced in the previous section.

#### 1) Select the source file

In the first step, the source file needs to be selected. To do so, click on the folder symbol in the source line of the converter:

Depending on the data format, the file ending can vary (zip, csv, xml).

- for EcoSpold 1, the file extension needs to be XML or zip (an archive of EcoSpold XML files)
- for EcoSpold 2, the file extension needs to be spold or zip (an archive of EcoSpold 2 spold files)





- For ILCD, the file extension needs to be zip (an archive of ILCD 1.1. XML files, in the characteristic ILCD folder structure)
- For csv, the file extension is (obviously) csv.

You can convert one single or also multiple process data sets in one go - but you can select only one file

as source file. Therefore, for converting multiple data sets, you can combine them in one zip archive, or, for EcoSpold 1, also append all in one XML file.

The source format is automatically detected. If no suiteable format is found, the conversion will not start, and an error message will be thrown instead.

#### 2) Select the target directory

As a next step, the target location needs to be selected. The converted file(s) will be created in the selected folder, with the name of the target format (e.g, ILCD, or EcoSpold\_o1). To select, click on the folder symbol in the 'target' line.

#### 3) Select the target format

Next, the target format needs to be selected, via the dropdown menu. The target format must b different from the source format, otherwise an error is thrown.

#### 4) Start the conversion

Pressing the green arrow (right near the target format, 4 in Figure 2) starts the conversion.

# 3.3.3 Converting data sets – specific settings for EcoSpold 2 to SimaPro CSV conversion

For converting Ecospold 2 to SimaPro CSV, additional settings are necessary.

The SimaPro CSV format is a format that is used by the SimaPro LCA software for data exchange. It contains more information than EcoSpold 1 for a process data set. For example, it includes parameters in the process. SimaPro CVS files are obtained as an export of SimaPro (Figure 3).







Output setup		
Output type CSV file	Contents C Summary C Details	Grouping C Category C One list
Selection Current Selection C All of this project C All (including libraries) C All (including libraries) C Related objects (system descriptions, I include sub product stages and process	(1) (1) (1969) (10310) substances, units, etc.) sses	Output fields         Skip empty fields         Uncertainty values         Convert expressions to constants
Format options CSV file format separator: C Tab C Comma Semicolon Page break after each object		EcoSpold options Use multiple xml files Export mapping file Export ElementaryFlows.xml Only used elementary flows Ecoinvent compatible
Restore default settings		<u>Q</u> K Cancel

Figure 3: Creating a SimaPro CSV file (SimaPro 7.3.3 screenshot).



Figure 4: An example SimaPro CSV file

If you select SimaPro CSV as target format, the user interface changes (Figure 5), and a new menu entry appears, 'Settings'.



🐸 openLCA - Data Converter 3.0		_ D <mark>_X</mark>						
Conversion <u>Settings</u> <u>Data</u>	base XPath Search About							
OPENLCa format converter								
Source: C:\Users\ac\Documents\Arbeit\gd\proj\Format Konvei								
Target:	C:\Users\ac\dev							
Preferred langugage: en (default) Scan languages								
Split into separate files:								
	CSV (SimaPro)							

Figure 5: Converter user interface (upper part) for converting to SimaPro CSV format

#### 3.3.3.1 Preferred language

EcoSpold 2 files may contain text in different languages. In the CSV file, always one language is possible. Therefore, a selection of the preferred language is required prior to the conversion. This preferred language will then be entered into the csv file. The default language is English, it is also always provided in an EcoSpold 2 file. "Scan languages" will scan through the files that are selected as conversion source. After the scan is completed, all available languages can be selected in the "preferred language" combo box.



# Figure 6: After the available languages have been checked in the source files, a preferred language can be selected

For a single data entry, the preferred language will be taken the first. If the preferred language is not available for the specific data entry, then the first available language entry is taken. This principle is also followed when the dataset are scanned in the settings, which will be explained later.

#### 3.3.3.2 Split CSV files

Checking "Split into separate files" will create one csv file for each process data set; the name of the csv file is then the EcoSpold 2 field activityId. Otherwise, one csv file for all process data sets is created.

#### 3.3.3.3 Additional settings

For converting to CSV format, further settings are available from the "Settings" menu entry: The product name can be "designed", mappings for geography and compartments can

🤐 openLCA - Data Converter 3.0					
	Conversion	Settings	<u>Database</u>	<u>XPat</u>	



be managed, and units can be edited.

#### 3.3.3.3.1 Product name

SimaPro uses the product name as a unique identifier for linking process data sets. The converter creates unique names as a combination of different attributes; the order of these attributes can be specified in the product name dialogue. To do so, just type into the "order" number entries the order of the respective EcoSpold 2 attributes. You can save your modification, and you can also revert back to the default order ("restore defaults" button near the save button).

Save	the preferences			
Set t	he preferences to def	ault		
🤐 openLCA - Data Converter	3.0			
<u>Conversion</u> Settings <u>D</u>	atabase <u>XPath Search</u> <u>Abo</u>	<u>ut</u>		
Product name Compartm	OPENI format	Units		
	ł			
Specify the order of elements	in product flow names.			
Order N	ame (FieldID) from the Ecospol	d 2 documentatio	on	
1	Flow Name (1000)			
2 3	Geography (410)			
3	Activity Name (100)			
4	System Model Name (3005)			
5	Activity Type (110)			
Example with default Settings	(1,2,3,4,5):			
Flow Name Geograph	y Activity Name	System Model Name	Activity Type	]
1,1-difluoroethane, HFC-152a RoW	1,1-difluoroethane production, HFC-152a	Alloc.	U	

Figure 7: Settings for CSV format, product name, default



Conversion       Settings       Database       XPath Search       About         Product name       Compartments       Geography       Electricity Units         Product name       Compartments       Geography       Electricity Units         Specify       Save       der of elements in product flow names.         Order       Name (FieldID) from the Ecospold 2 documentation						
Product name       Compartments       Geography       Electricity Units         Product name       Compartments       Geography       Electricity Units         Specify       Save       der of elements in product flow names.         Order       Name (FieldID) from the Ecospold 2 documentation						
Specify Save der of elements in product flow names.						
Specify Save der of elements in product flow names.						
Specify Save der of elements in product flow names.						
Order Name (FieldID) from the Ecospold 2 documentation						
3 V Flow Name (1000)						
2 deography (410)						
1 Activity Name (100)						
4 System Model Name (3005)						
Б Activity Type (110)						
Example with default Settings (1,2,3,4,5):						
Flow Name Geography Activity Name System Model Name Activity Type						
1,1-difluoroethane, HFC-152a RoW 1,1-difluoroethane production, HFC-152a Alloc. U						

Figure 8: Settings for CSV format, product names, modification

Unchecking the checkbox under name will have the effect that the attribute is omitted in the product name. However, be aware that the product may not be unique any more if attributes are omitted.

#### 3.3.3.3.2 Compartment and geography mapping icons

Compartment and geography mapping each contain following buttons:

2	Scan the data in the source file
2	Open the mapping file
	Save the mappings
4	Add a new row to the list
×	Remove the selected rows

#### 3.3.3.3.3 Compartment Mapping

The mappings for compartments are used for the elementary flows. They map a compartment together with a subcompartment to a SimaPro elementary type. Open the provided mapping in the database (Figure 9) or scan the source files for compartments (Figure 10).



🤐 Öffnen	
Suchen in:	🚔 database 💌 👔 🏠 🖺 🗐
ES ES ES ES ES ES ES	2_TO_CSV_COMPARTMENT_MAP.csv       Image: FLOW_MAP_ES1_TO_ILCD.         2_TO_CSV_ELECTRICITY_UNITS.csv       Image: FLOW_MAP_ES2_TO_ILCD.         2_TO_CSV_GEOGRAPHY_MAP.csv       Image: FLOW_MAP_ILCD_TO_ES1.         2_TO_CSV_SUBCOMPARTMENT_MAP.csv       Image: FLOW_MAP_ILCD_TO_ES2.         2_UNITS.csv       Image: Image: FLOW_MAP_ILCD_TO_ES2.
•	
Dateiname:	ES2_TO_CSV_COMPARTMENT_MAP.csv
Dateityp:	*.csv
	Öffnen Abbrechen

Figure 9: Opening the compartment mapping in the database

🤐 openLCA - Data Converter 3	.0		×				
Conversion Settings Da	atabase <u>XPath Search</u> <u>Abou</u>	<u>ut</u>					
OPENLCa format converter							
Product name Compartments Geography Electricity Units							
Compartment mapping							
ES2 Compartment	ES2 Subcompartment	SimaPro Element Type/Subcompartment					
Resource	in air	-					

Figure 10: Result after scanning the compartments in the source data sets

You can then click on the "SimaPro Element" column on the right and assign the SimaPro compartments (Figure 11).



🤐 openLCA - Data Converter 3.	0	[	- • •
<u>Conversion</u> Settings <u>Da</u>	tabase <u>XPath Search</u> <u>Ab</u>	out	
	OPEN	LCa	
Product name Compartme	ents Geography Electric	ty Units	
Compartment mapping			
ES2 Compartment	ES2 Subcompartment	SimaPro Element Type/Subcompartr	nent
Resource	in air		R
		Economic issue	100
		Economic issue/unspecified	
		Emission to air	
		Emission to air/high. pop.	
		Emission to air/indoor	
		Emission to air/low. pop.	
		Emission to air/low. pop., long-term	
		Emission to air/stratosphere	v

Figure 11: Assigning SimaPro Compartments to EcoSpold 2 compartments

#### When you are done, save.

Product name	Compartments	Geography	Electricity Uni	s
Compartment map	oping			
ES2 Compartmen	nt Save ES:	2 Subcompartn	ment Sir	naPro Element Type/Subcompartment
Resource	in a	air	Re	source/biotic

#### 3.3.3.3.4 Geography mapping

Also for geography, SimaPro works with a fixed list of locations; values in the EcoSpold 2 field 'geography shortName (410) ' need to be assigned to this list. This is done in the geography mapping. The structure is very similar to the compartment mapping (Figure 12).



🤐 openLCA - Data Converter 3.0		×
Conversion Settings Database	XPath Search About	
ß	OPENLCa format converter	
Product name Compartments Geo	ography Electricity Units	
Geography mapping		
EcoSpold 2	SimaPro	
DE	unknown	
🤐 openLCA - Data Converter 3.0		×
<u>Conversion</u> Settings <u>Database</u> X	KPath Search About	
	OPENLCa format converter	
Product name Compartments Geo	ography Electricity Units	
Geography mapping		
EcoSpold 2	SimaPro	
DE	Europe. Western       Asia, South East       Asia, former USSR       Australia       Europe, Eastern       Europe, Western       Mixed data       North America       Oceans	

Figure 12: Assigning SimaPro locations to EcoSpold 2 locations

#### 3.3.3.3.5 Electricity units

Electricity units are used for the conversion of intermediate exchanges. If in EcoSpold 2, the inputGroup (1500) is 5 and the EcoSpold activity is a process, then this exchange is normally written to the "materials/fuels" section in the SimaPro csv. However if the exchange has one of the units in the "electricity units" list, then it is written to the "electricity/heat" section.

To modify this list, simply click in the list on one line and then delete or add. Capital writing is ignored. If you have changed anything, don't forget to save.



🥶 openLCA - Data Converter 3.0	- • •
Conversion Settings Database XPath Search About	
OPENLCa format converter	
Product name Compartments Geography Electricity Units	
Electricity units	
Unit	
kwh 	
mj mi/ka	
kwh/s	
kw	
kwn/kwp mw	
mj/nm3	
kwh/year k	
mj/kwh	
just_an_example	

Figure 13: Changing the electricity units

Once you are done with the settings specification, you can (save and edits and) go back to the conversion, with a click on the conversion menu entry.

#### 3.3.4 Conversion results

As soon as the conversion is finished, the converter shows the log file that contains links to the created files. For ILCD and EcoSpold 2 formats, more than one data set is created per input process data set, due to the additional flow data sets and so on. If errors occur during the conversion, a log file is created (Figure 14); a list of the created files is always shown (Figure 14, Figure 15).



🥶 openLCA - Data Converter 3.0	
Conversion Database XPath Search About	
OPENLCa Format converter	
Source: C:\Users\ac\Desktop\EcoSpold01\processes\03f6ff7	
Target: C:\Users\ac\dev	
ILCD	
A file with encountered errors was created: file/C:/Users/ac/dev/ILCD/log.html	
13 files created (0 seconds)	
Zuckerrübensilage (Wassergehalt 77%), frei EOH-Anlage process data set file:/C:/Users/ac/dev/ILCD/ILCD/processes/4da0ad02-o7f2-a940-4124-000057caa23f_01.00.000.xml	
<u>concrete, exacting, at plant</u> flow data set file:/C/Users/ac/dev/ILCD/ILCD/flows/22c3d88b-ba52-0bd7-68fd-00003dbd57a0_01.00.000.xml	
Kohlenstoff, biogen flow data set file:/C/Users/ac/dev/ILCD/ILCD/flows/2d252399-4332-7d64-9e38-000028633010_01.00.000.xml	
Schmieröl ab Hof	

Figure 14: Conversion overview, with errors.

🤐 openLCA - Data Conve	erter 3.0		
Conversion Databas	<u>se XPath Search</u>	About	
	0	Penica	
Source:	C:\Users\ac\Docu	ments\Arbeit\gd\proj\OS\Format\Foi	
Target	C:\Users\ac\dev		
	ILCD	▼ 🔶	
9747 files created	(167 seconds)		Ĵ
1,1-difluoroethane, HFC	-152a, at plant		
process data set file:/C:/Users/ac/dev/ILCD/IL	.CD/processes/783d678	89-fc38-0260-3144-00002ff3d7b9_01.00.0	000.xml
1,1-dimethylcyclopentar	ie, from naphtha, at	<u>plant</u>	
process data set file:/C:/Users/ac/dev/ILCD/IL	.CD/processes/2c32177	79-d488-42e0-8d44-000021b3325f_01.00	1.000.xml
1-butanol, propylene hyd	droformylation, at pla	ant	
file:/C:/Users/ac/dev/ILCD/IL	.CD/processes/3bee934	42-5161-a4c7-5723-00002ff39be0_01.00.	.000.xml
<u>1-pentanol, at plant</u>			
file:/C:/Users/ac/dev/ILCD/IL	.CD/processes/7b6b369	92-4cef-c1d9-e9dd-0000669ccfda_01.00.	.000.xml

Figure 15: Conversion overview, conversion without errors.

# 3.3.4.1 Inspecting conversion results

There are various ways to access the converted files.



If you click on one of the links in the conversion index, you can inspect the XML file that is created.

🥴 openLCA - Data Converter 3.0				
Conversion Database XPath Search About				
OPENLCa format converter				
Source: C:\Users\ac\Documents\Arbeit\gd\proj\OS\Format\Foi				
Target: C:\Users\ac\dev				
<pre><?xml version="1.0" encoding="UTF-8"?> <?xml-stylesheet version="1.0" href="l./.stylesheets/process2html.xsl" type="text/xsl"?> <processdataset en"="" xmlns="http://ica.jrc.it/ILCD/Process" xmlns:common="http://ica.jrc.it/ILCD/ProcessDataSet.xsl &lt;processInformation&gt; &lt;dataSetInformation&gt; &lt;ul&gt; &lt;li&gt;&lt;astro-stateSetInformation&gt;&lt;/li&gt; &lt;li&gt;&lt;astro-stateSetInformation&gt;&lt;/astro-stateSetInformation&gt;&lt;/astro-stateSetInformation&gt;&lt;/astro-stateSetInformation&gt;&lt;/astro-stateSetInformation&gt;&lt;/astro-stateSetInformation&gt;&lt;/astro-stateSetInformation&gt;&lt;/astro-stateSetInformation&gt;&lt;/astro-stateSetInformation&gt;&lt;/astro-stateSetInformation&gt;&lt;/astro-stateSetInformation&gt;&lt;/astro-stateSetInformation&gt;&lt;/astro-stateSetInformation&gt;&lt;/astro-stateSetInformation&gt;&lt;/astro-stateSetInformation&gt;&lt;/astro-stateSetInformation&gt;&lt;/astro-stateSetInformation&gt;&lt;/astro-stateSetInformation&gt;&lt;/a&gt;&lt;/li&gt; &lt;/ol&gt;&lt;/td&gt;&lt;/tr&gt;&lt;tr&gt;&lt;td colspan=3&gt;L_kname&gt;&lt;/td&gt;&lt;/tr&gt;&lt;tr&gt;&lt;td colspan=4&gt;&lt;common:synonyms xml:lang=" xmlns:xsi="http://ica.jrc.it/ILCD/Process">R152a; 1,1-Difluoroethylene <classificationinformation></classificationinformation></processdataset></pre>				
<common:classification name="ILCD"> <common:class classid="fdebb7db-fd4d-4394-90a1-93bb765e2c92" level="0">chemicals</common:class> <common:class classid="f4786c7f-de48-4b0f-900a-1af56bdd17d3" level="1">organics</common:class></common:classification>				

#### Figure 16: XML view of one created file

Clicking on the conversion index icon goes back to the conversion overview. As an alternative, you can open the conversion list also in a webbrowser by clicking on the 'open in browser' icon, or access it in the file explorer by clicking on the respective 'open in file explorer' icon.

xtri Conversion index coding="UTF-8"?<br xtrii-stylestreet version="1.0" href="/</td <td>Open in browser</td> <td>Open in file explorer</td>	Open in browser	Open in file explorer

If the conversion index is open in a web browser, a click on one of the links in the index will open the respective file in the web browser. For those formats that provide stylesheets, the XML file is formatted according to the style sheet of the format. For example, for ILCD, you see the typical yellow / orange table structure (Figure 17, Figure 18). These formatted tables are usually much nicer to browse through, but they might not contain all information that is provided in the XML file.



Firefox T	
Conversion Result +	
Image: State of the state	۶ 🎓 🥐 🔻
🧧 Most Visited 🎉 LEO Deutsch-Englisch 🗧 openLCA Framework   😑 Informationen zur Fors 🔘 PROSUITE - prosuite.org 🗍 Welcome to the openL	» 🔝 Bookmarks
9747 files created (167 seconds)	
<u>1,1-difluoroethane, HFC-152a, at plant</u> process data set file:/C:/Users/ac/dev/ILCD/ILCD/processes/783d6789-fc38-0260-3144-00002ff3d7b9_01.00.000.xml	
<u>1.1-dimethylcyclopentane, from naphtha, at plant</u> process data set file:/C:/Users/ac/dev/ILCD/ILCD/processes/2c321779-d488-42e0-8d44-000021b3325f_01.00.000.xml	
<u>1-butanol, propylene hydroformylation, at plant</u> process data set file:/C:/Users/ac/dev/ILCD/ILCD/processes/3bee9342-5161-a4c7-5723-00002ff39be0_01.00.000.xml	
<u>1-pentanol, at plant</u> process data set file:/C:/Users/ac/dev/ILCD/ILCD/processes/7b6b3692-4cef-c1d9-e9dd-0000669ccfda_01.00.000.xml	
<u>1-propanol, at plant</u> process data set file:/C:/Users/ac/dev/ILCD/ILCD/processes/41eba9ba-2df9-d7ff-033b-00003c114c02_01.00.000.xml	
2.3-dimethylbutan, from naphtha, at plant process data set file:/C:/Users/ac/dev/ILCD/ILCD/processes/7cb4efb7-88ca-060e-84b2-00004af513b5_01.00.000.xml	
2,4-D, at regional storehouse process data set file:/C:/Users/ac/dev/ILCD/ILCD/processes/31807f39-eaea-783d-97f9-0000195fe3fc_01.00.000.xml	
2,4-D, at regional storehouse process data set file:/C:/Users/ac/dev/ILCD/ILCD/processes/72041bb3-3b7e-d67b-a8a9-000018797714_01.00.000.xml	<b>.</b>

#### Figure 17: Conversion index in a web browser.

Firefox 🔻		3
Process data set: 1-pentanol, at plant; (en) +		
File:///C:/Users/ac/dev/ILCD/ILCD/process	es/7b6b3692-4cef-c1d9-e9dd-0000669ccfda_01.00.000.xml 😭 🗟 🗸 Google 🔎 🎓 🥙	Ŧ
🔊 Most Visited 🎉 LEO Deutsch-Englisch 📧 op	enLCA Framework   🖃 Informationen zur Fors 🔘 PROSUITE - prosuite.org 🗌 Welcome to the openL 🛛 🔹 🗷 Bookma	rks
Process data set: 1-pentanol, at pla	nt; (en)	Â
Table of Contents: Process information	- Modelling and validation - Administrative information - Inputs and Outputs	
Process information		=
Key Data Set Information		
Location	RER	
Geographical representativeness description	The inventory is modelled for Europe.	
Reference year	1989	
Name	Base name	
	1-pentanol, at plant	
Use advice for data set	This data set was automatically converted with the openLCA data converter. Before you use this data set you should check the entries and the compliance with the ILCD conformity. You can edit this data set with the ILCD Editor freely available at http://lct.jrc.ec.europa.eu/assessment/tools.	
Technical purpose of product or process	Hydroformylation of butene	
Classification ()	Class name / Hierarchy level chemicals / organics	
General comment on data set	The multioutput-process "amyl alcohol production process" delivers the co-products 1-pentanol, 2-methyl- 1-butanol, and 3-methyl-1-butani. The allocation is based on mass balance.	
	Copyright? Yes Owner of data set (contact data set) Ecoinvent Centre	
Quantitative reference		
Reference flow(s)		Ŧ

Figure 18: A data set converted to ILCD format, opened in a web browser.

Then, you can simply work with the files outside of the converter and outside of a web browser; in windows, 'open file in explorer' just opens the windows explorer.



~ -		
C	ac + dev + ILCD + ILCD +	
Datei Bearbeiter	n Ansicht Extras ?	
Organisieren 🔻	In Bibliothek aufnehmen 🔻	Freigebe
🛛 🕹 He 🔼 👔	Vame	
<ul> <li>▲ B. ac</li> <li>▶ ₩ .</li> </ul>	<ul> <li>contacts</li> <li>external_docs</li> <li>flowproperties</li> <li>flows</li> <li>processes</li> <li>sources</li> <li>unitgroups</li> <li>ILCDClassification.xml</li> <li>ILCDFlowCategorization.xml</li> <li>ILCDLocations.xml</li> </ul>	

Figure 19: Converted files in windows explorer.

#### 3.3.4.2 Validating conversion results

A click on the 'cog' icon will start a validation of the converted files.

1 files	Validate output created (U s	econds)

Depending on the amount of converted data, this might take a while.

🤐 Run validation	<b>×</b>
VNidate 838aaa20-0117-	11db-92e3-0800200c9a6
	Cancel

The validation usually does not pass without errors. However, often, the errors are minor, although every error is classified as "severe" in the validation output. Figure 20 shows an example. In this example, the CAS number (which is taken from the source file) is not correctly formatted, for several flows. In the next figure, a date format is not correctly provided (Figure 21).



🤐 openLC	CA - Data Converter 3.0	x
Convers	sion <u>Database</u> <u>XPath Search</u> <u>About</u>	
	OPENLCa format enverter	
	Source: C:\Users\ac\Documents\Arbeit\gd\proj\Format Konvei	
	Target: C:\Users\ac\dev	
	EcoSpold 1	
Level	Message	-
INFO	Validate file c2e7279e-d1f3-40e6-a81a-9f9abd2f1752.xml	
SEVERE	Validation of file c2e7279e-d1f3-40e6-a81a-9f9abd2f1752.xml: cvc-pattern-valid: Wert "" ist nicht Facet-gültig in Bezug auf Muster "\d{6,6}-\d{2,2}-\d" für Typ "#AnonType_CASNumberTExchange".	
SEVERE	Validation of file c2e7279e-d1f3-40e6-a81a-9f9abd2f1752.xml: cvc-attribute.3: Wert <sup></sup> des Attributs "CASNumber" bei Element "exchange" hat keinen gültigen Typ "null".	
SEVERE	Validation of file c2e7279e-d1f3-40e6-a81a-9f9abd2f1752.xml: cvc-pattern-valid: Wert "" ist nicht Facet-gültig in Bezug auf Muster "\d{6,6}-\d{2,2}-\d" für Typ "#AnonType_CASNumberTExchange".	
SEVERE	Validation of file c2e7279e-d1f3-40e6-a81a-9f9abd2f1752.xml: cvc-attribute.3: Wert <sup>==</sup> des Attributs "CASNumber" bei Element "exchange" hat keinen gültigen Typ "null".	
SEVERE	Validation of file c2e7279e-d1f3-40e6-a81a-9f9abd2f1752.xml: cvc-pattern-valid: Wert "casNumber" ist nicht Facet-gültig in Bezug auf Muster "\d{6,6}-\d{2,2}-\d" für Typ "#AnonType_CASNumberTExchange".	•

#### Figure 20: Validation output example: ill-formatted CAS number

🐸 openLC	A - Data Converter 3.0			
Convers	ion <u>Database</u> <u>XPath Search</u> <u>About</u>			
	OPENLCA format converter			
	Source: C:\Users\ac\Desktop\EcoSpold01\processes\03f6ff7			
	Target: C:\Users\ac\dev			
	ILCD			
INFO	Validate file 676c4638-3181-0420-4fc4-000008b1bb88_01.00.000.xml			
INFO	Validate file 4da0ad02-c7f2-a940-4124-000057caa23f_01.00.000.xml			
SEVERE	Validation of file 4da0ad02-c7f2-a940-4124-000057caa23f_01.00.000.xml: cvc-datatype-valid.1.2.1: "Fri Aug 03 00:00:00 CEST 2012" ist kein gültiger Wert für "dateTime".			
SEVERE	Validation of file 4da0ad02-c7f2-a940-4124-000057caa23f_01.00.000.xml: cvc-type.3.1.3: Wert "Fri Aug 03 00:00:00 CEST 2012" des Elements "common:timeStamp" ist ungültig.			
SEVERE	Validation of file 4da0ad02-c7f2-a940-4124-000057caa23f_01.00.000.xml: cvc-complex-type.2.4.a: Ungültiger Content wurde beginnend mit Element "common:copyright" gefunden. "{"http://ca.jrc.it/ILCD/Common":dateOfLastRevision, "http://ca.jrc.it/ILCD/Common":dataSetVersion}" wird erwartet.			
INFO	Validate file 0000000-2d3a-79c0-9380-00003e916ccf_01.00.000.xml			
INFO	Validate file 00000000-31ae-55a4-76b8-0000660a6b7a_01.00.000.xml			
INFO	Validate file 0000000-b055-c060-88c0-00003f7e2f10_01.00.000.xml			
INFO	Validate file 0000000-b11c-4180-0d00-00006ba6dd4d 01.00.000.xml			

Figure 21: Validation output example: incorrect time format



Of course also more severe errors can happen. For example, the conversion from Figure 14 (conversion with errors), has the following error log (Figure 22).

🥴 openLCA - Data Converter 3.0				
Conversion Databa	se <u>XPath Search</u> <u>About</u>			
OPENLCa format converter				
Source:	C:\Users\ac\Desktop\EcoSpold01\processes\03f6ff7			
Target:	C:\Users\ac\dev			
	ILCD			
Level	Message			
SEVERE	No correspondig ILCD compartment for Hilfsflüsse/null			
₽ A				

#### Figure 22: error log example

It shows that a subcompartment for elementary flows is missing (hence the entry: "/null"), and for the main compartment, no reference counterpart and no mapping is provided. This needs to be fixed before the conversion.

The validation errors can also be fixed in the source files, but are sometimes rather formalistic errors, caused by field entries that violate the format specification. Of course, usually, you can still work with a data set even if the CAS number is not following the official specification.

#### 3.3.5 Other elements in the converter

Besides the conversion, the converter contains additional tools that can be useful "around" the conversion job. These tools are a query editor for the underlying database of the converter, and another editor for XPath expressions.

#### 3.3.5.1 Database query editor

The converter contains a HyperSQL database which is used for managing the mapping files of the converter. HyperSQL is a free and open source Java database engine. A copy of the HyperSQL license is available at [7]. The database can be accessed via the "database" menu entry of the converter; physically,



it is located in a subfolder of the converter which is created at its first start. This subfolder contains the different tables of the database as csv files (Figure 23).

Name	Änderungsdatum	Тур	Größe
COMPARTMENT_MAP_ES1_TO_ES2.csv	21.01.2013 17:04	Microsoft Excel-C	1 KB
COMPARTMENT_MAP_ES1_TO_ILCD.csv	21.01.2013 17:04	Microsoft Excel-C	1 KB
COMPARTMENT_MAP_ES2_TO_ILCD.csv	21.01.2013 17:04	Microsoft Excel-C	2 KB
COMPARTMENT_MAP_ILCD_TO_ES1.csv	21.01.2013 17:04	Microsoft Excel-C	1 KB
COMPARTMENT_MAP_ILCD_TO_ES2.csv	21.01.2013 17:04	Microsoft Excel-C	3 KB
database.properties	30.03.2013 14:51	PROPERTIES-Datei	1 KB
database.script	30.03.2013 14:51	SCRIPT-Datei	8 KB
ES1_COMPARTMENTS.csv	21.01.2013 17:04	Microsoft Excel-C	1 KB
ES1_ELEM_FLOWS.csv	21.01.2013 17:04	Microsoft Excel-C	225 KB
ES2_COMPARTMENTS.csv	21.01.2013 17:04	Microsoft Excel-C	2 KB
ES2_ELEM_FLOWS.csv	21.01.2013 17:04	Microsoft Excel-C	561 KB
ES2_GEOGRAPHIES.csv	21.01.2013 17:04	Microsoft Excel-C	14 KB
BS2_TO_CSV_COMPARTMENT_MAP.csv	21.01.2013 17:04	Microsoft Excel-C	1 KB
BS2_TO_CSV_ELECTRICITY_UNITS.csv	21.01.2013 17:04	Microsoft Excel-C	1 KB
BS2_TO_CSV_GEOGRAPHY_MAP.csv	21.01.2013 17:04	Microsoft Excel-C	1 KB
BS2_TO_CSV_SUBCOMPARTMENT_MAP.csv	21.01.2013 17:04	Microsoft Excel-C	1 KB
🖺 ES2_UNITS.csv	21.01.2013 17:04	Microsoft Excel-C	2 KB
BLOW_MAP_ES1_TO_ILCD.csv	21.01.2013 17:04	Microsoft Excel-C	181 KB
BLOW_MAP_ES2_TO_ILCD.csv	21.01.2013 17:04	Microsoft Excel-C	235 KB
BLOW_MAP_ILCD_TO_ES1.csv	21.01.2013 17:04	Microsoft Excel-C	148 KB
BLOW_MAP_ILCD_TO_ES2.csv	21.01.2013 17:04	Microsoft Excel-C	240 KB
ILCD_COMPARTMENTS.csv	21.01.2013 17:04	Microsoft Excel-C	5 KB
ILCD_ELEM_FLOWS.csv	21.01.2013 17:04	Microsoft Excel-C	2.460 KB
ILCD_FLOW_PROPERTIES.csv	21.01.2013 17:04	Microsoft Excel-C	11 KB
ILCD_UNIT_GROUPS.csv	21.01.2013 17:04	Microsoft Excel-C	1 KB
ProductNamePrefSave.ser	09.03.2013 19:01	SER-Datei	1 KB
IUNIT_MAP_ES1_TO_ILCD.csv	21.01.2013 17:04	Microsoft Excel-C	2 KB
UNIT_MAP_ES2_TO_ILCD.csv	21.01.2013 17:04	Microsoft Excel-C	2 KB
UNIT_MAP_ILCD_TO_ES2.csv	21.01.2013 17:04	Microsoft Excel-C	9 KB

Figure 23: Files in the 'database' subfolder of the converter.

You can browse the database using SQL syntax. Figure 24 shows a diagram of the different tables and their relations in the database (without the CSV additions).





Figure 24: Entity-relationship diagram of the database in the format converter



000		openLC	CA - Data C	onverter 3.0	
<u>Conversion</u>	Databas	e <u>XPath Search</u>	About		
			noni	62	
		C	format c	nverter	
	Query:	SELECT * FROM	ES1_COMPA	RTMENTS	
1; air; high p	opulation o	density;			
2; air; low po	pulation d	ensity;			
3; air; low po	pulation d	ensity, long-term;			
4; air; lower s	stratosphe	re + upper tropos	sphere;		
5; air; unspec	cified;				
6; resource; l	biotic;				
7; resource; i	n air;				
8; resource; i	n ground;				
9; resource; i	n water;				
10; resource;	ultural:				
12: soil: fores	try				
13: soil: indu	strial:				
14: soil: unsp	ecified:				
15; water; for	ssil-;				
16; water; gr	ound-;				
17; water; gr	ound-, lon	ig-term;			
18; water; lal	ke;				
19; water; oc	ean;				
20; water; riv	er;				
21; water; riv	er, long-te	erm;			
22; water; un	specified;				
23, water, gr	te_flow: u	, nsnecified			
24, IIIai-Was	te now, u	ispecified,			

Figure 25: Database query editor with an example query.

#### 3.3.5.2 XPath editor

The main function of the converter is to transfer data from one XML data format to another XML data format. To specify the conversion or analyse the conversion result it is helpful to know which kind of data are in the respective formats. As it is hard to read all the data from the XML files manually, the converter comes with a XML query tool – the XPath Search.

XPath is a query language for XML documents. You can find the official language specification here: <u>www.w3.org/TR/xpath/</u>, but you do not need to read this specification as the language is very simple and you can understand the key concepts with the query example below or the tutorial at <u>www.w</u> <u>3schools.com/xpath/</u>.

XPath example: 'ecoSpold/dataset/flowData/exchange/@name' selects all flow names in the process data set; name is the attribute, and ecoSpold, dataset and so forth are nodes.



🥴 openLCA - Data Converter 3.0					
Conversion Database XPath Search About					
OPENLCa format converter					
Source:	C:\Users\ac\Documents\EcoSpold01\processes\0a5				
XPath:	ecoSpold/dataset/flowData/exchange/@name				
XPath:       ecoSpold/dataset/flowData/exchange/@name         name_0; rye grains organic, at farm         name_10; building, multi-storey         name_11; Occupation, industrial area, built up         name_12; Occupation, construction site         name_13; Transformation, to industrial area, built up         name_14; Transformation, to industrial area, built up         name_15; rye organic, at feed mill         name_2; Heat, waste         name_3; natural gas, burned in industrial furnace >100kW         name_4; tap water, at user         name_6; transport, lorry 20-28t, fleet average         name_8; transport, lorry >20-28t, fleet average         name_8; transport, barge         name_9; transport, transoceanic freight ship					

You can also filter, e.g. for those names that contain transport:

'ecoSpold/dataset/flowData/exchange[contains(@name, 'transport')]/@name' produces this:

🥶 openLCA - Data Converter 3.0			
Conversion Database XPath Select About			
OPENLCa format converter			
Source:	C:\Users\ac\Documents\EcoSpold01\processes\0a5		
XPath:	)ata/exchange[contains(@name, 'transport')]/@name		
name_0; transport, lorr name_1; transport, lorr name_2; transport, bar name_3; transport, trar	y 20-28t, fleet average y >16t, fleet average ge isoceanic freight ship		



# 4 References and helpful links

[1]: Ciroth, A.: openLCA format converter user guide, Version 1.0 (2008)

- [2]: www.openLCA.org
- [3]: www.openLCA.org/downloads
- [4]: www.ecoinvent.org/fileadmin/documents/en/EcoSpoldSchema\_v1.o.zip
- [5]: www.ecoinvent.org/fileadmin/documents/en/EcoSpoldo2.v1.o.2.zip
- [6]: http://lca.jrc.ec.europa.eu/lcainfohub/developerDownload.vm
- [7]: http://hsqldb.org/web/hsqlLicense.html

# 5 Contact & thanks

The openLCA format converter is created and maintained since 2006 by GreenDelta (before October 15 2012: GreenDeltaTC) in Berlin, and released as free, open source software.

In the course of the development, we received support and funding from various institutions, especially:

- PRé Consultants, Amersfort, NL (www.pre-sustainability.com)
- The UNEP/SETAC life cycle intiative (www.lifecycleinitiative.org)
- The ecoinvent centre, Zurich, CH (www.ecoinvent.org)
- PE International, Stuttgart, DE (www.pe-international.com)
- Forschungzentrum Karlsruhe, Institue for Applied Informatics, DE (www.iai.fzk.de)

Many, many thanks. It is not exagerated that without the sponsors, the format converter and the whole openLCA project would not have gone far.

But likewise, input and feedback from users is very important for us and for the development of the converter.

ightarrow If you have ANY comments concerning the converter, be it

- Feature requests
- Possible bugs that you may have detected
- Improvement proposals
- **—** ...

then please do not hesitate to contact us:

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**I** gd@greendelta.com, **☎** +493048496030

THANK YOU.



# Annex

# 6 Ecospold 2 to CSV (SimaPro) conversion assumptions and requirements

# 6.1 Conversion assumptions

- 1. If the intermediate exchange with OutputGroup o has a positive amount then the activity is a Process.
- 2. If an intermediate exchange with OutputGroup o has a negative amount then the activity is a Waste treatment.
- 3. If an activity has more than one intermediate exchange with OutputGroup o then the exchanges are written:
  - For Processes to CoProducts
  - For Waste treatments to Avoided Products.

# 6.2 Conversion requirements

Each activity requires an intermediate exchange with OutputGroup o (reference flow).

The following fields are necessary to convert the data set (in brackets the EcoSpold 2 ID number of the field):

- Activity Id (102)
- Activity Name (100)
- Exchange Id (1005)
- Exchange Name (1000)
- Exchange Unit Name (1035)
- Exchange Amount (1020)
- Elementary Compartment (1660)

