Brief Description of the Format Converter Plugin Functionality

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Preparations prior to conversion

Selecting, opening and validating the source document (i.e. the source data format) are first steps in the conversion procedure. The source document is parsed and transformed into an UML tree structure. The root element in the tree serves to identify the specific "source" (input) data format („ecoSpold" → EcoSpold; „processOrLCIResultDataSet" → ELCD; „iso_ts_14048" → ISO@Spine).

The recognised and validated type of the source document is shown (fig. 1).

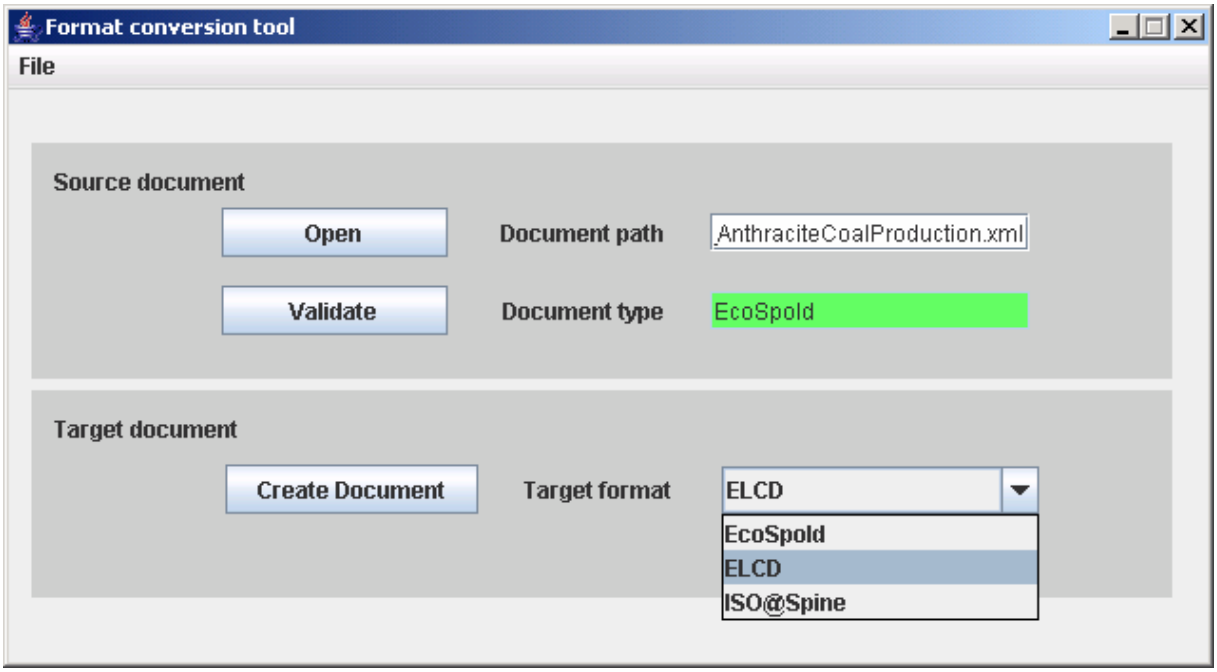


Fig. 1: Selecting and validating the source document, and selecting the target format in the format converter application

The user then selects where the output format ("target format") shall be created (fig. 2).

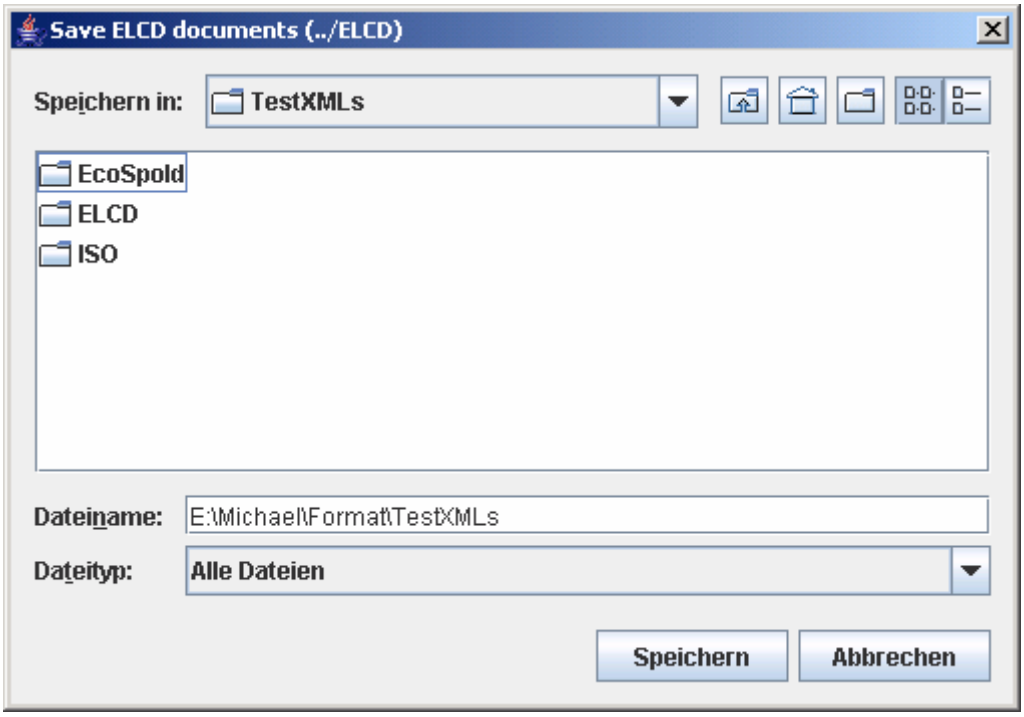


Fig. 2: Selecting where to create the target format files[1]

At the selected directory, a format-specific directory structure is created (fig. 3). In these directories, stylesheets, schemas, and other format-specific documents will be stored, e.g. ELCD Flowproperties, and ELCD Unitgroups. In case the directory and some or all of the files already exist, only new files will be added.

[1] Note: The forms use the language of the Operation System. The text is thus German because the Operation system is German. It will be English for an English Operation System.

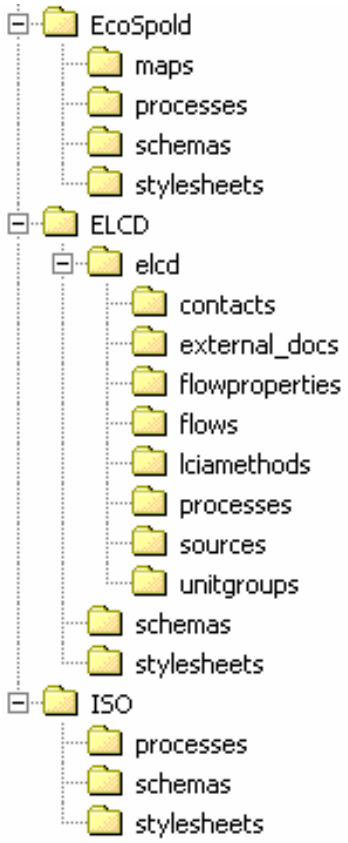


Fig. 3: Directory structures for the target format, as used and created by the conversion tool

For the ELCD format, this directory structure is identical with the current beta version of the ELCD database [1]. This means in other words that for any data set that is converted to ELCD target format, an ELCD database is created, and any tools that are able to read ELCD databases will be able to directly use the created ELCD dataset.

The ELCD format is, in its current beta version, implemented as a native XML database. XML documents are its basic, fundamental units that are used to store data sets, similar to table lines in relational databases.

As a consequence, a process data set is composed of various XML documents. For example, an XML document with process information for each process flow links to another XML document with additional flow information that in turn might link to additional XML files with additional flow properties.

This concept is fundamentally different to the concepts followed by EcoSpold and ISO@Spine format, where in fact all process specific information is stored in one single XML document.

These different concepts make a fully automated format conversion impossible; above all, a fully automated “to ELCD” conversion of flow specific information on amount and unit is not always possible: Processes link to flow, flow to flowproperty, flowproperty to

unitgroup; and some formats (ISO@Spine) use open lists for units, with any entry possible.

In order to enable the conversion, both ELCD flowproperty and the units of the source format are read dynamically, presented in a specific form, and the user then needs to manually assign source format unit and ELCD flowproperty, unitgroup, together with a unit conversion factor (fig. 4). Further ELCD fields min, max, sd, ∞ are currently implemented.

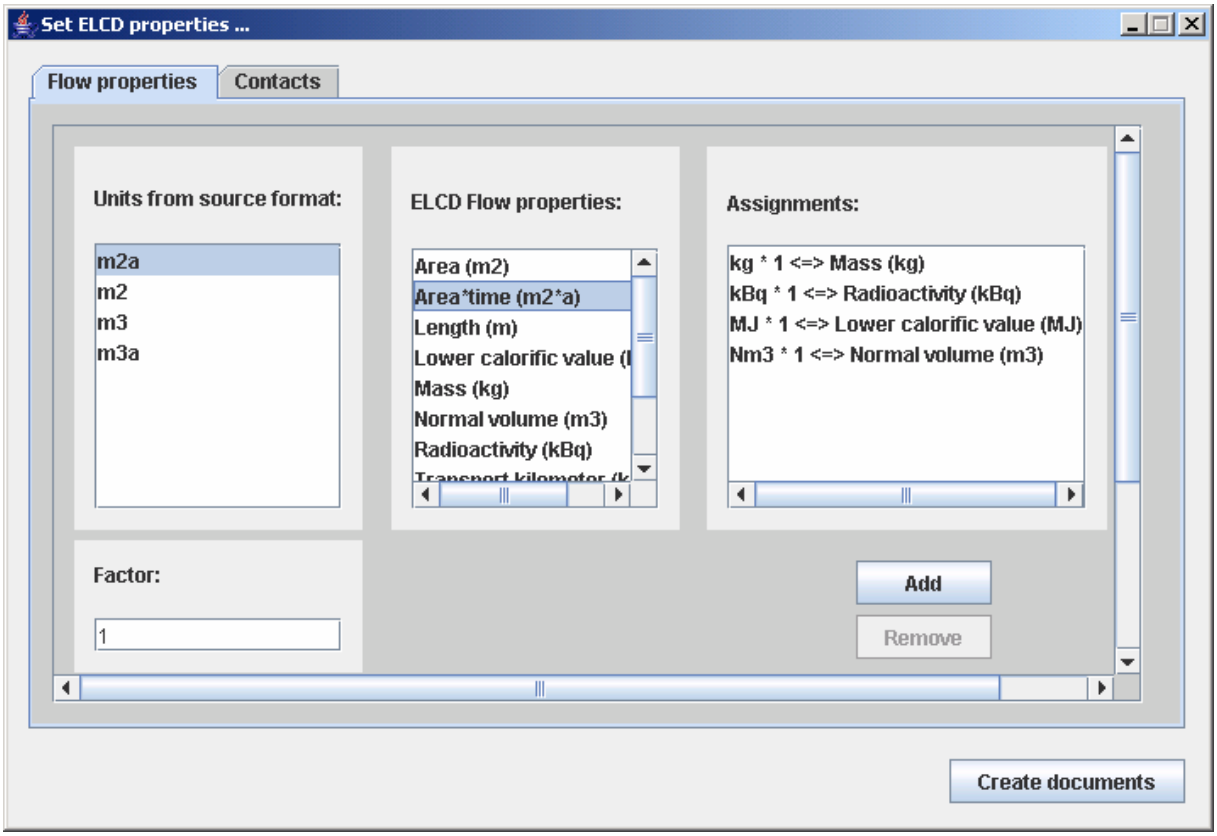


Fig. 4: Assigning units to ELCD flow properties in the conversion tool

Once a mapping of these units is saved, the preparatory works are finalised and the format conversion can be started.

The conversion process

In the conversion process, a meta format is created first from the source document. For EcoSpold and ISO@Spine, this meta format is, basically, a “clean copy” of the source format where any namespace information and processing instructions are sorted out. For ELCD, a hierarchical tree structure with all process specific information is created. In order to do so, all links in the ELCD files are followed (leading to other XML files), the

files are parsed and compiled (fig. 5). Direct editing of the resulting tree structure, for all formats, is planned.

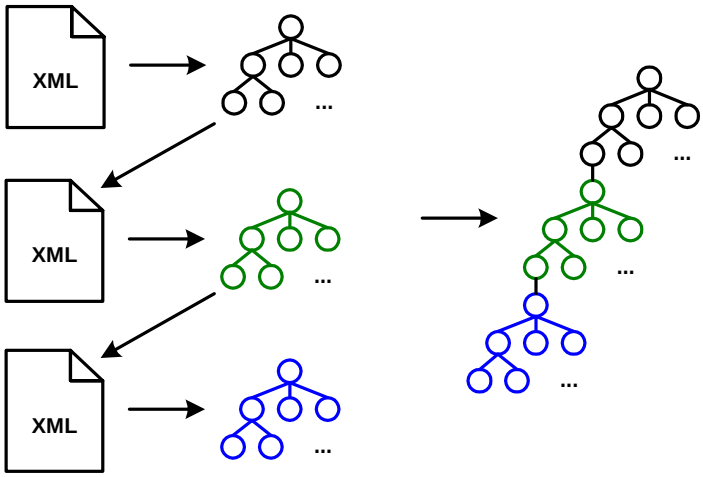


Fig. 5: Building the ELCD format tree by compiling single XML file trees

The tree structure that is generated in this way may be saved, optionally, as a meta document.

Next conversion step is a tree-to-tree transformation. In this step, the tree structure that is generated from the source format in the first step, is transformed into a tree structure that resembles the target format closely. An XSL document that contains format specific transformation rules helps in this process (fig. 6). .

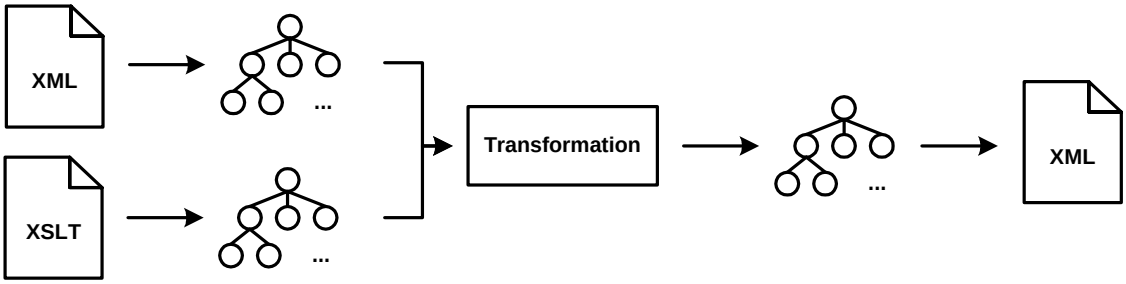


Fig. 6: Tree-to-tree transformation as second conversion step

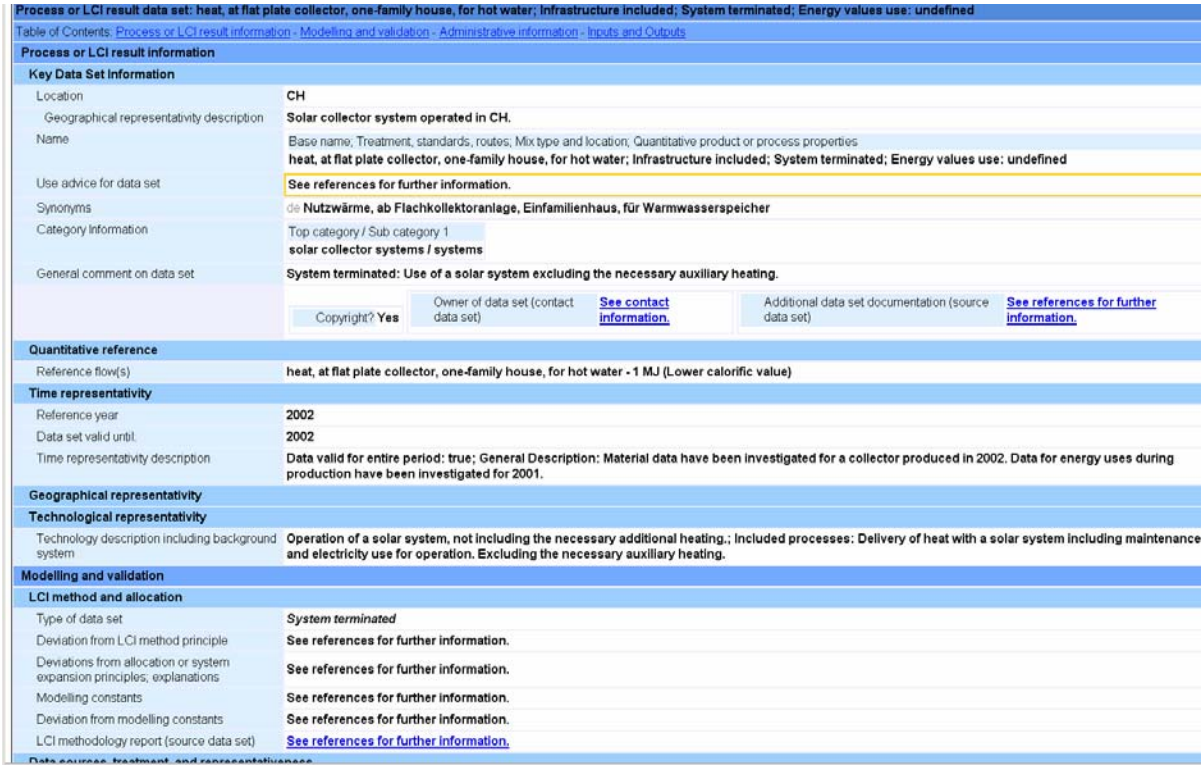
After the transformation is finished, a „post-processing“ step is needed, which is quite elaborate in the case of the ELCD format. The tree structure needs to be disaggregated again, and name space declarations, processing instructions and links to the single XML files need to be re-added, before the documents can be saved as documents according to the target format.

This step ends the conversion procedure.

The resulting process data sets are stored in the directory „processes“.

In the case of ELCD as a target format, for each flow an XML document in a directory “flows” is created, while files with information regarding references are stored in “sources”, and contact information in the directory “contacts”.

All of these files can be opened and navigated by following the links created in the new files, produced by the conversion tool. Format specific style sheets for ELCD and EcoSpold are integrated in these files as well, preserving the original visual formatting of each data format (fig. 7).



Process or LCI result data set: heat, at flat plate collector, one-family house, for hot water; Infrastructure included; System terminated; Energy values use: undefined

Table of Contents: Process or LCI result information - Modelling and validation - Administrative information - Inputs and Outputs

Process or LCI result information	
Key Data Set Information	
Location	CH
Geographical representativity description	Solar collector system operated in CH.
Name	Base name; Treatment, standards, routes; Mix type and location; Quantitative product or process properties heat, at flat plate collector, one-family house, for hot water; Infrastructure included; System terminated; Energy values use: undefined
Use advice for data set	See references for further information.
Synonyms	de Nutzwärme, ab Flachkollektoranlage, Einfamilienhaus, für Warmwasserspeicher
Category Information	Top category / Sub category 1 solar collector systems / systems
General comment on data set	System terminated: Use of a solar system excluding the necessary auxiliary heating.
	Copyright? Yes; Owner of data set (contact data set): See contact information.; Additional data set documentation (source data set): See references for further information.
Quantitative reference	
Reference flow(s)	heat, at flat plate collector, one-family house, for hot water - 1 MJ (Lower calorific value)
Time representativity	
Reference year	2002
Data set valid until	2002
Time representativity description	Data valid for entire period: true; General Description: Material data have been investigated for a collector produced in 2002. Data for energy uses during production have been investigated for 2001.
Geographical representativity	
Technological representativity	
Technology description including background system	Operation of a solar system, not including the necessary additional heating.; Included processes: Delivery of heat with a solar system including maintenance and electricity use for operation. Excluding the necessary auxiliary heating.
Modelling and validation	
LCI method and allocation	
Type of data set	*System terminated*
Deviation from LCI method principle	See references for further information.
Deviations from allocation or system expansion principles; explanations	See references for further information.
Modelling constants	See references for further information.
Deviation from modelling constants	See references for further information.
LCI methodology report (source data set)	See references for further information.

Fig. 7: Example for a conversion result – EcoSpold dataset to ELCD

References

[1] http://lca.jrc.ec.europa.eu/lcainfohub/datasetCategories.vm

[2] http://www.ecoinvent.org