

# ecoSpold version 2 improved data format meeting the challenges of future LCI databases



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LCA IX conference

session «Databases»

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**Roland Hischier, Bo Weidema & the ecoinvent DB structure WG**  
ecoinvent Centre

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- Motivation for the revision
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  - Facilitating database maintenance and extension
  - Better support for alternative modelling options
  - Support for mass, energy and monetary balances
  - Support for language versions & better documentation
- Compatibility & implementation
- Conclusions



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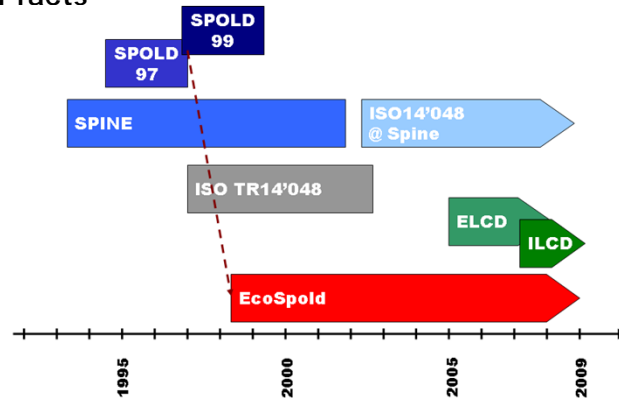


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# ecoSpold version 1

## Historical facts



- ... is « Open source »
- ... is available as an import (and partly as an export) interface implemented by all major LCA software providers

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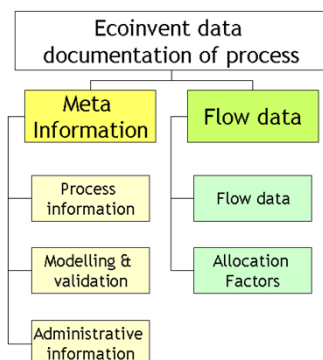
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# ecoSpold version 1

## Historical facts

ecoSpold v1 ...



- ... is Compliant with ISO/TS 14048;
- ... enables extensive documentation, individual determination of allocation factors, confidential data management (if required);
- ... facilitates the communication between LCA practitioners;
- ... is working, is widely applied (e.g. US, AUS, ecoinvent, ...) and accepted;

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# Motivation

## Drivers for the revision of the ecoSpold format

- Databases grow, and maintaining consistency between datasets over geographies and time become an increasing concern
- Taking advantage of new IT developments (e.g. UUIDs)
- Increasing flexibility of application for different models (attributional, consequential, substance flow analysis, life cycle costing, IO-LCA, equilibrium models)
- Support for formulas, images, numerical data quality indicators, multiple classifications, tags
- Removing annoying issues discovered during use of version 1
- Support for more language versions
- Data exchange to ILCD



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# Timetable

## Revision process for version 2

- 06/08 • Ecoinvent ad hoc Working Group on Database Structure with 12 selected experts
- 03/09 • Open hearing (October-December 2008)
- 03/09 • First public beta May 2009
- 08/09 • Separate meeting with ILCD developers to ensure easy conversion
- 08/09 • Second public beta August 2009 with conversion tool from v1
- 02/10 • Editing tool (ecoEditor 2) under development (release 2009)
- 02/10 • Extensive testing during the next half year
- 02/10 • Final release early 2010
- 02/10 • Implementation in ecoinvent database for 2011 release



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## What is new?

### Facilitating database maintenance and extension

#### (i) parent-child relationship

5 ways to fill a field in a child activity dataset:

- 1) **Leave field blank:** The value from the parent activity dataset applies.
- 2) **Fill in content:** Filled in value applies & value from parent dataset is ignored.
- 3) **Formulas in mathematical relation field linked to amount field:** Fill in content in mathematicalRelation field including reserved variable PARENTVALUE, e.g. formula  $PARENTVALUE * 0.5$  results in halving the value of the parent amount field.
- 4) **Text strings with {{PARENTTEXT}}:** Field content from parent dataset is included in text string.
- 5) **TTextAndImage fields support both {{PARENTTEXT}} and text variables:** Define text in parent dataset as a variable and use this in TTextAndImage fields as {{variablename}}. This variable may then be redefined in child activity dataset while keeping rest of parent text intact. This allows easy changes of text parts in child processes.

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## What is new?

### Facilitating database maintenance and extension

#### (ii) geographical information

EcoSpold02 Schema Documentation - Mozilla Firefox

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file:///C:/Documents and Settings/All Users/Documents/Arbeitsdaten/a\_econvent Centre/16 Transformation f

EcoSpold02 Schema Documentation

**Geography**

Multiple occurrences: No Required: Yes

Contains information about the geographic validity of the process. The geography may be the point location of the activity, a line describing a mobile activity, or an area of a distributed activity or of a production mix, containing several located activities. For markets (consumption mixes), the geography describes the market boundaries, across which imports and exports are limited.

Name	FieldID	SpoldID, version	Options	Type	Size	Multiple Occurrences	Req	Multi Language
@geographyId	400	new		TUuid	36	No	Yes	No
Reference to valid locations file with detailed geography information.								
locationShortname	410	662		TString40	40	No	No	Yes
Optional descriptive shortname of the location referenced by geographyId, e.g. the regional codes of EcoSpold version 1.								
generalComment	420	663		TTextAndImage		No	No	Yes
Free text for further explanations. Especially for area descriptions, the nature of the geographical delimitation may be given, especially when this is not an administrative area. Justifications for market boundaries may also be provided here.								
List of text, imageUri and variable elements. The text and imageUri elements can be used to describe the current section and they can be combined in any order given by their index attribute. Text variables are defined by the variable elements, which may be used in the text as {{variablename}}. If a parent text field includes a variable, this variable may be redefined by the child activity dataset while keeping the rest of the parent text intact. This allows easy changes of text parts in child processes.								

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## What is new?

### Facilitating database maintenance and extension

#### (ii) geographical information

- More than just „countryCode“ ...
  - ... point sources,
  - ... linear sources,
  - ... specific surface area
- KML format
- Default values for all countries / regions (similar to ecoSpold v1) in separate KML file



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## Master file in KML

Uuid →

CountryCode  
(as ecoSpold v1) →

GIS  
coordinates →

```

<?xml version="1.0" encoding="UTF-8"?>
<!-- Antigua and Barbuda's name -->
<!-- shortname kml:lang="en">AG</shortname> -->
<kml>
  <MultiGeometry>
    <Polygon>
      <outerBoundaryIs>
        <LinearRing>
          <coordinates>
            -61.686668,17.024441,0 -61.73806,16.989719,0 -61.82917,16.996944,0 -61.876114,17.016941,0 -61.880562,17.019722,0
            -61.883614,17.023609,0 -61.885834,17.028053,0 -61.887222,17.033054,0 -61.891113,17.094166,0 -61.887222,17.105274,0
            -61.884171,17.109722,0 -61.832779,17.163887,0 -61.826393,17.167221,0 -61.794449,17.16333,0 -61.784172,17.158333,0
            -61.744171,17.137218,0 -61.674171,17.093609,0 -61.67028,17.090275,0 -61.668892,17.084999,0 -61.666389,17.04583,0
            -61.667503,17.040554,0 -61.682503,17.027496,0 -61.686668,17.024441,0
          </coordinates>
        </LinearRing>
      </outerBoundaryIs>
    </Polygon>
    <Polygon>
      <outerBoundaryIs>
        <LinearRing>
          <coordinates>
            -61.729172,17.608608,0 -61.731117,17.547222,0 -61.73278,17.541111,0 -61.738892,17.540554,0 -61.751945,17.549442,0
            -61.815559,17.583885,0 -61.834724,17.588608,0 -61.839447,17.586666,0 -61.842781,17.582775,0 -61.847504,17.58083,0
            -61.853058,17.583054,0 -61.856674,17.592499,0 -61.873894,17.688889,0 -61.875282,17.698608,0 -61.873062,17.703888,0
            -61.850281,17.722775,0 -61.845558,17.724998,0 -61.839172,17.72472,0 -61.787224,17.700554,0 -61.783615,17.69722,0
            -61.74334,17.653053,0 -61.74028,17.649166,0 -61.73806,17.644722,0 -61.731674,17.624996,0 -61.729172,17.608608,0
          </coordinates>
        </LinearRing>
      </outerBoundaryIs>
    </Polygon>
  </MultiGeometry>
</kml>
</geography>
  
```

## What is new?

### Better support for alternative modelling options

- Option to use tags and multiple classification schemes for activities and products, of which the ecoinvent v2 category/subcategory for activities is only one
- Option to declare market model (attributional, consequential) used for an activity
- Separate names for activities (processes) and products, allows flexible linking between activities via markets
- New field to declare an activity as a market activity
- New field to declare technology level (new, modern, current, old, outdated) for activities, for use in identification of marginal suppliers to a market
- Reduction of the number of required fields
- Addition of joker elements to enable simpler extension of format

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## What is new?

### Field „TechnologyLevel“

- **TechnologyLevel** is label for classifying technology of described activity and can be used in modelling to select processes with specific technological level. Field is required in ecoinvent quality network. For market processes, it is not defined.
  - New is a new technology, assumed to be on some aspects technically superior to the modern technology, but not yet the most commonly installed when investment is based on purely economic considerations.
  - Modern is the currently installed technology when investment is based on purely economic considerations. Used as the affected technology in expanding markets.
  - Current is a technology in between modern and old.
  - Old is the technology that is currently taken out of use when based on purely economic considerations. Used as the affected technology in declining markets.
  - Outdated is a technology no longer in use.
- Technology level is relative to year for which data are valid, as given in StartDate, EndDate fields.

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## What is new?

### Support for mass balances, energy balances and monetary balances

- Option to add multiple properties of exchanges, e.g. price, dry mass, water content, energy content, elementary or substance composition
- New numerical field to declare annual production volume
- New output type: "addition to capital goods"
- New field to declare product transfer coefficients (outputs relative to inputs)



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## What is new?

### Support for languages / better documentation

- Support for language versions
  - Option to add language versions for all text fields
- Support for better documentation
  - Option to add images
  - Option to add more than one validator
  - Fields for uncertainty information made more general and new numerical fields for the 5 data quality indicators



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## Compatibility & Implementation



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- Compatibility with ecoSpold version 1:
  - Forwards compatible (converter from v1 to v2)
  - NOT backwards compatible (too many new fields and functionalities), however
  - Does NOT *require* database changes in LCA software, except the ability to read ecoSpold 2 files
- Compatibility with ILCD format:
  - Complete, with use of additional namespaces
  - Converter to ILCD under development (expected November)
  - ecoEditor v2 can then also be used to produce ILCD datasets

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## Conclusion



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ecoSpold v2 data exchange format:

- Remains open source and flexible for different applications
- Meets the challenges raised by recent and expected developments in LCA modelling, the growth in data availability, and the expansion of the application area for LCI data
- Is expected to be implemented in all major LCA software by 2011

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Thank you



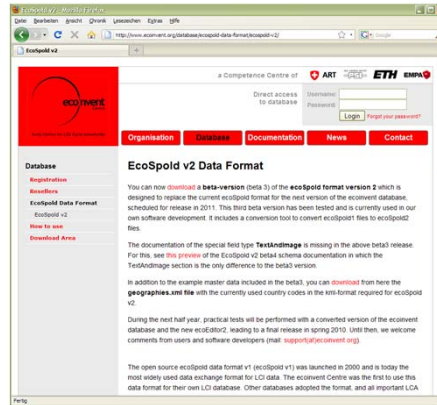
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<http://www.ecoinvent.org/database/ecospold-data-format/ecospold-v2/>

ecoinvent Centre, c/o Empa, Lerchenfeldstrasse 5, CH-9014 St-Gallen, Switzerland

[support@ecoinvent.org](mailto:support@ecoinvent.org)

[www.ecoinvent.org](http://www.ecoinvent.org)