# ecoinvent 3.11 Dataset Documentation

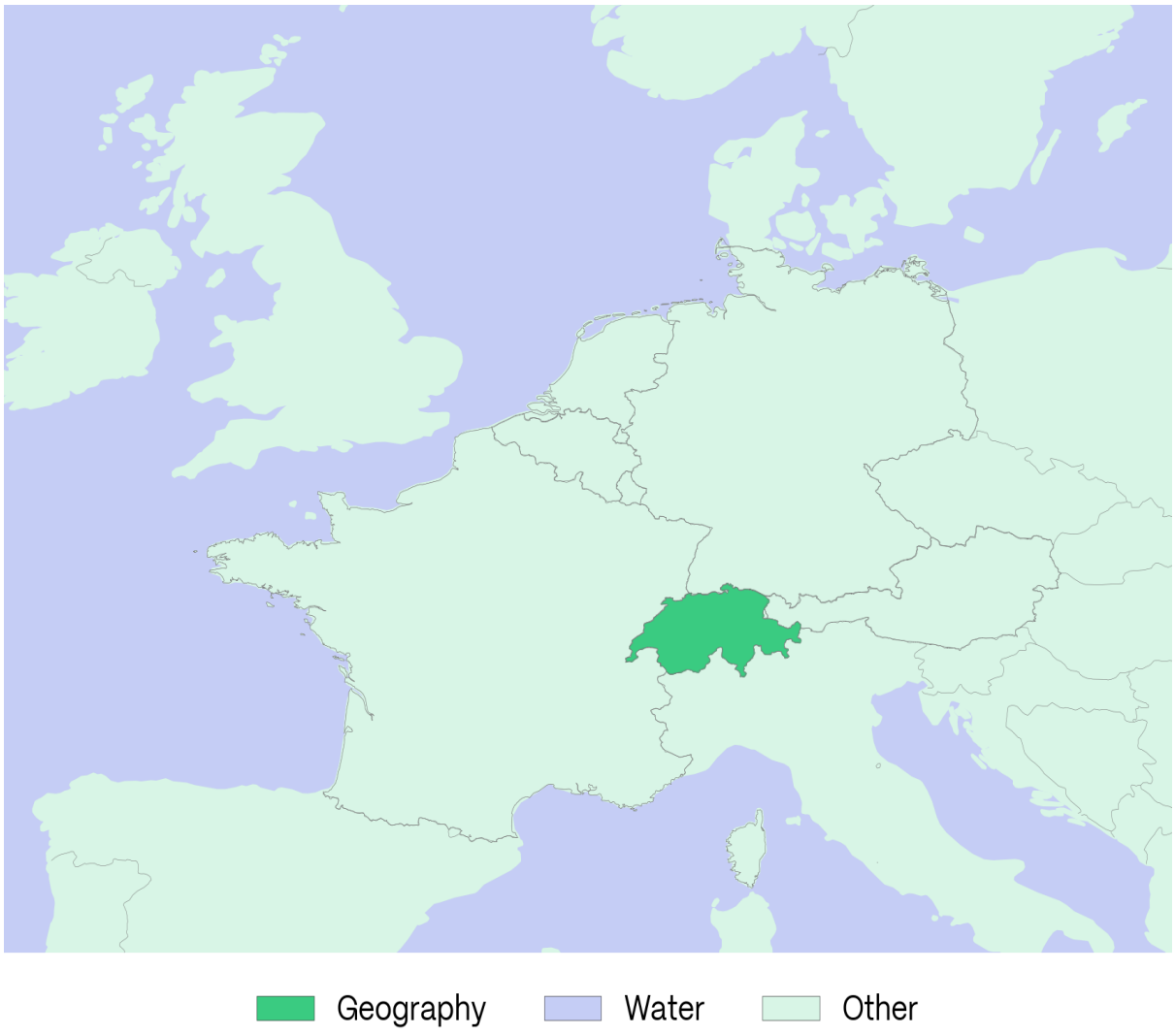
'combine harvesting – CH'

**Note:** This document contains only an extract of the information in the dataset. Additional data about properties of exchanges, mathematical relations, parameters, and contact information for authors and reviewers are available in the full dataset, i.e. in ecoSpold format. Amount and identity of the exchanges in an undefined dataset are independent of modeling choices of the different system models. Linked dataset are available in separate documents.

# Table of Contents

## Dataset Identification

| | |
|---|---|
| Activity name | combine harvesting |
| Geography | Switzerland |
| Time period | 1991-01-01 to 2002-12-31 - Valid for the entire period |
| ISIC rev.4 ecoinvent | 0161: Support activities for crop production |
| Reference product | combine harvesting |
| CPC classification | 86119: Other support services to crop production |
| Dataset type | Ordinary transforming activity |
| Technology level | Current |
| Version - system model | 3.11 - Undefined |



## Dataset Authorship

| | |
|---|---|
| Data generator | Silvio Blaser, NOENTRY |
| Data entry | Silvio Blaser, NOENTRY |
| Review | Roland Hischier, Eidgenössische Materialprüf- und -forschungsanstalt |
| Review | Roland Hischier, Eidgenössische Materialprüf- und -forschungsanstalt |
| Review | Emilia Moreno Ruiz, ecoinvent Centre |

## Exchange Summary

| Reference product | Material for treatment | Byproduct classification | Amount |
|---|---|---|---|
| combine harvesting | None | allocatable product | 1 ha |

| Inputs from technosphere | Amount |
|---|---|
| diesel | 33.3 kg |
| harvester | 6.3 kg |
| shed | 0.00858 m2 |

| Emissions to air | Amount |
|---|---|
| Ammonia | 0.000666 kg |
| Benzene | 0.000243 kg |
| Benzo(a)pyrene | 9.99e-07 kg |
| Cadmium II | 3.33e-07 kg |
| Carbon dioxide, fossil | 1.03e+2 kg |
| Carbon monoxide, fossil | 0.32 kg |
| Chromium III | 1.67e-06 kg |
| Copper ion | 5.66e-05 kg |
| Dinitrogen monoxide | 0.004 kg |
| Methane, fossil | 0.0043 kg |
| NMVOC, non-methane volatile organic compounds | 0.145 kg |
| Nickel II | 2.33e-06 kg |
| Nitrogen oxides | 1.7 kg |

| | |
|---|---|
| PAH, polycyclic aromatic hydrocarbons | 0.00011 kg |
| Particulate Matter, < 2.5 um | 0.149 kg |
| Selenium IV | 3.33e-07 kg |
| Sulfur dioxide | 0.0336 kg |
| Zinc II | 3.33e-05 kg |

| Emissions to soil | Amount |
|---|---|
| Cadmium II | 8.82e-07 kg |
| Lead II | 3.78e-06 kg |
| Zinc II | 0.00238 kg |

# Dataset Description

**General comment**
This dataset represents an example of a typical combine harvesting. The working width is 4.5m. The functional unit (FU) is one ha harvested. The operation time is 1.3 h/FU. [This dataset was already contained in the ecoinvent database version 2. It was not individually updated during the transfer to ecoinvent version 3. Life Cycle Impact Assessment results may still have changed, as they are affected by changes in the supply chain, i.e. in other datasets. This dataset was generated following the ecoinvent quality guidelines for version 2. It may have been subject to central changes described in the ecoinvent version 3 change report (http://www.ecoinvent.org/database/ecoinvent-version-3/reports-of-changes/), and the results of the central updates were reviewed extensively. The changes added e.g. consistent water flows and other information throughout the database. The documentation of this dataset can be found in the ecoinvent reports of version 2, which are still available via the ecoinvent website. The change report linked above covers all central changes that were made during the conversion process.]

**Included activities start**
From agricultural field foreseen to be processed.

**Included activities end**
This activity ends with the delivery of harvesting by combined harvester.The dataset includes the diesel fuel consumption and the amount of agricultural machinery and of the shed attributed to harvesting. It was also taken into consideration the amount of emissions to the air from combustion and the emission to the soil from tyre abrasion during the work process. The following activities where considered part of the work process: preliminary work at the farm, such as attaching the adequate machine to the tractor; driving to field (with an assumed distance of 1 km); field work (for a parcel of land of 1 ha surface); driving to farm and concluding work, like uncoupling the machine. The overlapping during the field work is considered. The dataset doesn"t include the grain production, straw treatment, dust other than from combustion and noise.

**Sampling procedure**
Data on fuel consumption and emissions of CO, HC and NOx are expert estimations based on measurements for comparable activities. The other emissions were calculated basing on literature data and the measured fuel consumption.

**Extrapolations**
Processes are typical procedures for Switzerland around the year 2000, they are not statistical average processes.

**Technology comment**
The inventories are based on measurements made by the Swiss Federal Research Station for Agricultural Economics and Engineering of Taenikon (FAT). Fuel consumption and emissions were taken from recent literature of ART, expert's estimations or unpublished data.

**Geography comment**
The inventory applies for Swiss Agricultural Field Work processes.

**Time period comment**
Measurements were made in the last few years (1999-2001).

# Detailed Information For Exchanges

| Reference product | Annual prod.vol. | Amount |
|---|---|---|
| combine harvesting | 1.45e+5 ha | 1 ha |

**Production volume:** 1.45e+5 ha
**Production volume comment:** FAOSTAT data year 2011 (total area of cereals)

| Inputs from technosphere | Amount |
|---|---|
| diesel | 33.3 kg |

**Comment:** Proxy, based on 'Agricultural Field Work Processes' - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages)
**Uncertainty distribution:** lognormal; **GSD2:** 1.05; **Pedigree matrix:** [1, 4, 1, 1, 1]

| | |
|---|---|
| harvester | 6.3 kg |

**Comment:** Proxy, based on 'Agricultural Field Work Processes' - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages)
**Uncertainty distribution:** lognormal; **GSD2:** 1.05; **Pedigree matrix:** [1, 4, 1, 1, 1]

| | |
|---|---|
| shed | 0.00858 m2 |

**Activity Link:** shed construction - CH
**Comment:** Proxy, based on 'Agricultural Field Work Processes' - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages)
This exchange has an activity link directly to the producing activity because the product is primarily consumed in the same geographical area where it is produced.
**Uncertainty distribution:** lognormal; **GSD2:** 1.73; **Pedigree matrix:** [1, 4, 1, 1, 1]

| Emissions to air | Subcompartment | Amount |
|---|---|---|
| Ammonia | non-urban air or from high stacks | 0.000666 kg |

**Comment:** Proxy, based on 'Agricultural Field Work Processes' - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages)
**Uncertainty distribution:** lognormal; **GSD2:** 1.27; **Pedigree matrix:** [1, 2, 1, 1, 3]

| | | |
|---|---|---|
| Benzene | non-urban air or from high stacks | 0.000243 kg |

**Comment:** Proxy, based on 'Agricultural Field Work Processes' - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages)
**Uncertainty distribution:** lognormal; **GSD2:** 1.27; **Pedigree matrix:** [1, 2, 1, 1, 3]

| | | |
|---|---|---|
| Benzo(a)pyrene | non-urban air or from high stacks | 9.99e-07 kg |

**Comment:** Proxy, based on 'Agricultural Field Work Processes' - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages)
**Uncertainty distribution:** lognormal; **GSD2:** 2.25; **Pedigree matrix:** [1, 2, 1, 1, 3]

| | | |
|---|---|---|
| Cadmium II | non-urban air or from high stacks | 3.33e-07 kg |

**Comment:** Proxy, based on 'Agricultural Field Work Processes' - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages)
**Uncertainty distribution:** lognormal; **GSD2:** 2.25; **Pedigree matrix:** [1, 2, 1, 1, 3]

| | | |
|---|---|---|
| Carbon dioxide, fossil | non-urban air or from high stacks | 1.03e+2 kg |

**Comment:** Proxy, based on 'Agricultural Field Work Processes' - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages)
**Uncertainty distribution:** lognormal; **GSD2:** 1.14; **Pedigree matrix:** [1, 2, 1, 1, 3]

| | | |
|---|---|---|
| Carbon monoxide, fossil | non-urban air or from high stacks | 0.32 kg |

**Comment:** Proxy, based on 'Agricultural Field Work Processes' - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages)
**Uncertainty distribution:** lognormal; **GSD2:** 2.24; **Pedigree matrix:** [1, 4, 1, 1, 1]

| | | |
|---|---|---|
| Chromium III | non-urban air or from high stacks | 1.67e-06 kg |

**Comment:** Proxy, based on 'Agricultural Field Work Processes' - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages)
**Uncertainty distribution:** lognormal; **GSD2:** 2.25; **Pedigree matrix:** [1, 2, 1, 1, 3]

| | | |
|---|---|---|
| Copper ion | non-urban air or from high stacks | 5.66e-05 kg |

**Comment:** Proxy, based on 'Agricultural Field Work Processes' - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages)
**Uncertainty distribution:** lognormal; **GSD2:** 2.25; **Pedigree matrix:** [1, 2, 1, 1, 3]

| | | |
|---|---|---|
| Dinitrogen monoxide | non-urban air or from high stacks | 0.004 kg |

**Comment:** Proxy, based on 'Agricultural Field Work Processes' - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages)
**Uncertainty distribution:** lognormal; **GSD2:** 1.27; **Pedigree matrix:** [1, 2, 1, 1, 3]

| | | |
|---|---|---|
| Methane, fossil | non-urban air or from high stacks | 0.0043 kg |

**Comment:** Proxy, based on 'Agricultural Field Work Processes' - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages)
**Uncertainty distribution:** lognormal; **GSD2:** 1.27; **Pedigree matrix:** [1, 2, 1, 1, 3]

| | | |
|---|---|---|
| NMVOC, non-methane volatile organic compounds | non-urban air or from high stacks | 0.145 kg |

**Comment:** Proxy, based on 'Agricultural Field Work Processes' - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages)
**Uncertainty distribution:** lognormal; **GSD2:** 1.23; **Pedigree matrix:** [1, 4, 1, 1, 1]

| | | |
|---|---|---|
| Nickel II | non-urban air or from high stacks | 2.33e-06 kg |

**Comment:** Proxy, based on 'Agricultural Field Work Processes' - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages)
**Uncertainty distribution:** lognormal; **GSD2:** 2.25; **Pedigree matrix:** [1, 2, 1, 1, 3]

| | | |
|---|---|---|
| Nitrogen oxides | non-urban air or from high stacks | 1.7 kg |

**Comment:** Proxy, based on 'Agricultural Field Work Processes' - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages)
**Uncertainty distribution:** lognormal; **GSD2:** 1.23; **Pedigree matrix:** [1, 4, 1, 1, 1]

| | | |
|---|---|---|
| PAH, polycyclic aromatic hydrocarbons | non-urban air or from high stacks | 0.00011 kg |

**Comment:** Proxy, based on 'Agricultural Field Work Processes' - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages)
**Uncertainty distribution:** lognormal; **GSD2:** 1.76; **Pedigree matrix:** [1, 2, 1, 1, 3]

| | | |
|---|---|---|
| Particulate Matter, < 2.5 um | non-urban air or from high stacks | 0.149 kg |

**Comment:** Proxy, based on 'Agricultural Field Work Processes' - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages)
**Uncertainty distribution:** lognormal; **GSD2:** 1.76; **Pedigree matrix:** [1, 2, 1, 1, 3]

| | | |
|---|---|---|
| Selenium IV | non-urban air or from high stacks | 3.33e-07 kg |

**Comment:** Proxy, based on 'Agricultural Field Work Processes' - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages)
**Uncertainty distribution:** lognormal; **GSD2:** 1.27; **Pedigree matrix:** [1, 2, 1, 1, 3]

| | | |
|---|---|---|
| Sulfur dioxide | non-urban air or from high stacks | 0.0336 kg |

**Comment:** Proxy, based on 'Agricultural Field Work Processes' - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages)
**Uncertainty distribution:** lognormal; **GSD2:** 1.14; **Pedigree matrix:** [1, 2, 1, 1, 3]

| | | |
|---|---|---|
| Zinc II | non-urban air or from high stacks | 3.33e-05 kg |

**Comment:** Proxy, based on 'Agricultural Field Work Processes' - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages)
**Uncertainty distribution:** lognormal; **GSD2:** 2.25; **Pedigree matrix:** [1, 2, 1, 1, 3]

| Emissions to soil | Subcompartment | Amount |
|---|---|---|
| Cadmium II | agricultural | 8.82e-07 kg |

**Comment:** Proxy, based on 'Agricultural Field Work Processes' - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages)
**Uncertainty distribution:** lognormal; **GSD2:** 1.23; **Pedigree matrix:** [1, 4, 1, 1, 1]

| | | |
|---|---|---|
| Lead II | agricultural | 3.78e-06 kg |

**Comment:** Proxy, based on 'Agricultural Field Work Processes' - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages)
**Uncertainty distribution:** lognormal; **GSD2:** 1.23; **Pedigree matrix:** [1, 4, 1, 1, 1]

| | | |
|---|---|---|
| Zinc II | agricultural | 0.00238 kg |

**Comment:** Proxy, based on 'Agricultural Field Work Processes' - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages)
**Uncertainty distribution:** lognormal; **GSD2:** 1.23; **Pedigree matrix:** [1, 4, 1, 1, 1]

## Source

| | |
|---|---|
| **First author** | Nemecek, T. |
| **Additional author(s)** | Kägi, T., Blaser, S. |
| **Title** | Life Cycle Inventories of Agricultural Production Systems |
| **Year** | 2007 |
| **Volume number** | 15 |

## Restriction of Use