

Dataset identification

Activity name	combine harvesting
Geography	CH (Switzerland)
dataset UUID	57f6bfec-7cb8-4484-b6af-24a84052344b
Synonym	None
ISIC 4 classification	0161:Support activities for crop production
Time period	1991-01-01 to 2002-12-31 Valid for the entire period
Dataset type	Ordinary transforming activity
Technology level	Current
Version - system model	3.2 - undefined

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Notes: 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, e.g. through the ecoinvent website. Amount and identity of the exchanges in an undefined dataset are independant of modeling choices in by the different system models. Linked dataset are available in separate documents.

[Link to the dataset on the ecoinvent website](#)

Dataset authorship

Role	Date	Name	Contact
Data generator	2010-07-28	Silvio Blaser	art@ecoinvent.org
Data entry	2010-07-28	Silvio Blaser	art@ecoinvent.org
Review	2003-08-06	Roland Hischier, ecoinvent Centre	roland.hischier@empa.ch
Review	2011-09-28	Roland Hischier, ecoinvent Centre	roland.hischier@empa.ch

Exchange summary

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Reference products	Material for treatment	Byproduct classif.	Amount
combine harvesting	no	allocatable product	1.0 ha
Inputs from technosphere			Amount
diesel			33.3 kg
harvester			6.3 kg
shed			8.58e-3 m2
Emissions to air			Amount
Ammonia			6.66e-4 kg
Benzene			2.43e-4 kg
Benzo(a)pyrene			9.99e-7 kg
Cadmium			3.33e-7 kg
Carbon dioxide, fossil			1.03e+2 kg
Carbon monoxide, fossil			0.32 kg
Chromium			1.67e-6 kg
Copper			5.66e-5 kg
Dinitrogen monoxide			4.00e-3 kg
Methane, fossil			4.30e-3 kg
NM VOC, non-methane volatile organic compounds, unspecified origin			0.145 kg
Nickel			2.33e-6 kg
Nitrogen oxides			1.7 kg
PAH, polycyclic aromatic hydrocarbons			1.10e-4 kg
Particulates, < 2.5 um			0.149 kg

Emissions to air	Amount
Selenium	3.33e-7 kg
Sulfur dioxide	0.0336 kg
Zinc	3.33e-5 kg
Emissions to soil	Amount
Cadmium	8.82e-7 kg
Lead	3.78e-6 kg
Zinc	2.38e-3 kg

Dataset description

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General comments

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](#), 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. The original ecoinvent version 2 documentation can be consulted [here](#).

Included activities start

From agricultural field foreseen to be processed.

Included activities ends

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 were 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 comments

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 comments

The inventory applies for Swiss Agricultural Field Work processes.

Time period comments

Measurements were made in the last few years (1999-2001).

Detailed information for exchanges

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Reference product	Annual prod.vol.	Amount
combine harvesting	1.45e+5 ha	1.0 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		8.58e-3 m2
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: 1.73; Pedigree matrix: [1, 4, 1, 1, 1]		
Emissions to air	Subcompartment	Amount
Ammonia	non-urban air or from high stacks	6.66e-4 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	2.43e-4 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-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: 2.25; Pedigree matrix: [1, 2, 1, 1, 3]		
Cadmium	non-urban air or from high stacks	3.33e-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: 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]		

Emissions to air	Subcompartment	Amount
<p>Chromium</p> <p>Comment: Proxy, based on "Agricultural Field Work Processes" - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages).</p> <p>Uncertainty distribution: lognormal; GSD2: 2.25; Pedigree matrix: [1, 2, 1, 1, 3]</p>	non-urban air or from high stacks	1.67e-6 kg
<p>Copper</p> <p>Comment: Proxy, based on "Agricultural Field Work Processes" - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages).</p> <p>Uncertainty distribution: lognormal; GSD2: 2.25; Pedigree matrix: [1, 2, 1, 1, 3]</p>	non-urban air or from high stacks	5.66e-5 kg
<p>Dinitrogen monoxide</p> <p>Comment: Proxy, based on "Agricultural Field Work Processes" - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages).</p> <p>Uncertainty distribution: lognormal; GSD2: 1.27; Pedigree matrix: [1, 2, 1, 1, 3]</p>	non-urban air or from high stacks	4.00e-3 kg
<p>Methane, fossil</p> <p>Comment: Proxy, based on "Agricultural Field Work Processes" - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages).</p> <p>Uncertainty distribution: lognormal; GSD2: 1.27; Pedigree matrix: [1, 2, 1, 1, 3]</p>	non-urban air or from high stacks	4.30e-3 kg
<p>NMVOC, non-methane volatile organic compounds, unspecified origin</p> <p>Comment: Proxy, based on "Agricultural Field Work Processes" - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages).</p> <p>Uncertainty distribution: lognormal; GSD2: 1.23; Pedigree matrix: [1, 4, 1, 1, 1]</p>	non-urban air or from high stacks	0.145 kg
<p>Nickel</p> <p>Comment: Proxy, based on "Agricultural Field Work Processes" - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages).</p> <p>Uncertainty distribution: lognormal; GSD2: 2.25; Pedigree matrix: [1, 2, 1, 1, 3]</p>	non-urban air or from high stacks	2.33e-6 kg
<p>Nitrogen oxides</p> <p>Comment: Proxy, based on "Agricultural Field Work Processes" - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages).</p> <p>Uncertainty distribution: lognormal; GSD2: 1.23; Pedigree matrix: [1, 4, 1, 1, 1]</p>	non-urban air or from high stacks	1.7 kg
<p>PAH, polycyclic aromatic hydrocarbons</p> <p>Comment: Proxy, based on "Agricultural Field Work Processes" - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages).</p> <p>Uncertainty distribution: lognormal; GSD2: 1.76; Pedigree matrix: [1, 2, 1, 1, 3]</p>	non-urban air or from high stacks	1.10e-4 kg
<p>Particulates, < 2.5 um</p> <p>Comment: Proxy, based on "Agricultural Field Work Processes" - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages).</p> <p>Uncertainty distribution: lognormal; GSD2: 1.76; Pedigree matrix: [1, 2, 1, 1, 3]</p>	non-urban air or from high stacks	0.149 kg
<p>Selenium</p> <p>Comment: Proxy, based on "Agricultural Field Work Processes" - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages).</p> <p>Uncertainty distribution: lognormal; GSD2: 1.27; Pedigree matrix: [1, 2, 1, 1, 3]</p>	non-urban air or from high stacks	3.33e-7 kg

Emissions to air	Subcompartment	Amount
Sulfur dioxide	non-urban air or from high stacks	0.0336 kg
<p>Comment: Proxy, based on "Agricultural Field Work Processes" - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages).</p> <p>Uncertainty distribution: lognormal; GSD2: 1.14; Pedigree matrix: [1, 2, 1, 1, 3]</p>		

Zinc	non-urban air or from high stacks	3.33e-5 kg
<p>Comment: Proxy, based on "Agricultural Field Work Processes" - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages).</p> <p>Uncertainty distribution: lognormal; GSD2: 2.25; Pedigree matrix: [1, 2, 1, 1, 3]</p>		

Emissions to soil	Subcompartment	Amount
Cadmium	agricultural	8.82e-7 kg
<p>Comment: Proxy, based on "Agricultural Field Work Processes" - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages).</p> <p>Uncertainty distribution: lognormal; GSD2: 1.23; Pedigree matrix: [1, 4, 1, 1, 1]</p>		

Lead	agricultural	3.78e-6 kg
<p>Comment: Proxy, based on "Agricultural Field Work Processes" - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages).</p> <p>Uncertainty distribution: lognormal; GSD2: 1.23; Pedigree matrix: [1, 4, 1, 1, 1]</p>		

Zinc	agricultural	2.38e-3 kg
<p>Comment: Proxy, based on "Agricultural Field Work Processes" - pdf-document on the dedicated talk page of ecoinvent (www.ecoinvent.org/talk-pages).</p> <p>Uncertainty distribution: lognormal; GSD2: 1.23; Pedigree matrix: [1, 4, 1, 1, 1]</p>		

Source

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Source information

First author: Nemecek, T.

Additional author(s): Kägi, T., Blaser, S.

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