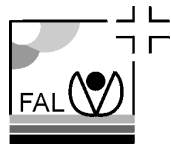


4th International Conference on: Life Cycle Assessment in
the Agri-food sector, October 6-8, 2003, Horsens, Denmark

The ecoinvent database: use for the agri-food sector



A joint initiative of the
ETH domain and Swiss
Federal Offices



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Overview

- Project ecoinvent 2000
- ecoinvent Database
- Datasets for the Agri-Food Sector
- Examples
- Conclusions



Project ecoinvent 2000

- Joint initiative of the ETH domain and Swiss Federal Institutes
- 12 institutes (public and private) involved in data acquisition
- Goals of the project:
 - Harmonisation of LCI for major economic sectors
 - Update for the year 2000
 - Creation of a common database
 - Publication of the database on the web (September 2003)



ecoinvent Database: Characteristics (1)

- Detailed recording of resources and emissions
- Full transparency (unit process data and LCI data) and flexibility
- Geographic reference and process stage defined for each dataset
- Data for European and Swiss markets
- Common quality standards
- Internal review process



ecoinvent Database: Characteristics (2)

- Land use: new scheme
- Consequent inclusion of infrastructure and land use
- Matrix calculation
- Data exchange format EcoSpold
- Documentation by meta-data and extended reports (CD-ROM)
- Uncertainty: quantitative and qualitative indicators for each exchange (resource or emission), Monte-Carlo simulation
- <http://www.ecoinvent.ch>
- Costs: 1'200 € first, 600 € following licences



ecoinvent: datasets

Over 2500 datasets from various areas:

Area	Number of datasets
Agriculture	254
Chemicals	217
Constructions materials and processes	245
Energy systems	1170
Glass	28
Metals	131
Paper & cardboard	64
Plastics	56
Transportation	102
Washing agents	19
Waste management	267
Water supply	5
Total	2558



Categories of emissions and resources

Over 1000 exchanges:

EcoCategory	#	EcoSubCategory	#
air	392	high population density	141
		low population density	151
		low population density, long-term	4
		lower stratosphere + upper troposphere	23
		unspecified	73
soil	113	agricultural	68
		forestry	2
		industrial	28
		unspecified	15
water	369	ground-	52
		ground-, long-term	47
		lake	2
		ocean	84
		river	153
		unspecified	31
resource	156	biotic	5
		in air	5
		in ground	61
		in water	11
		land	74
Total			1030

ecoinvent Database: Example of a Search

Adresse <http://db.ecoinvent.org/ecoquery/searchprocrresults.php?browse=0&searchword=wheat> Wechseln zu Links >>

Google Web-Suche Site-Suche Seiten-Info Aufwärts Hervorheben

[Startpage] [Database search] [Show download-basket] [Logout] [Help] [Deutsche Version]

User: **nemecek** | Status: **ecoinvent User** | Data: **V1.01 (2003)** | Datasets in download-basket: **0**

Processes found

Your search brought the following results:

13 processes were found.

no.	category / subcategory	datasetname	location	unit	infra.	synonyms
<input type="checkbox"/> 1	agricultural means of production / feed	wheat IP, at feed mill	CH	kg	No	-
<input type="checkbox"/> 2	agricultural means of production / feed	wheat organic, at feed mill	CH	kg	No	-
<input type="checkbox"/> 3	agricultural means of production / seed	wheat seed IP, at regional storehouse	CH	kg	No	-
<input type="checkbox"/> 4	agricultural means of production / seed	wheat seed organic, at regional storehouse	CH	kg	No	-
<input type="checkbox"/> 5	agricultural production / plant production	wheat grains extensive, at farm	CH	kg	No	-
<input checked="" type="checkbox"/> 6	agricultural production / plant production	wheat grains IP, at farm	CH	kg	No	-
<input type="checkbox"/> 7	agricultural production / plant production	wheat grains organic, at farm	CH	kg	No	-
<input type="checkbox"/> 8	agricultural production / plant production	wheat straw extensive, at farm	CH	kg	No	-
<input type="checkbox"/> 9	agricultural production / plant production	wheat straw IP, at farm	CH	kg	No	-
<input type="checkbox"/> 10	agricultural production / plant production	wheat straw organic, at farm	CH	kg	No	-

Add marked Add all displayed Remove all displayed

Internet

Datasets for the Agri-Food Sector: Overview

1. Datasets on agricultural products:

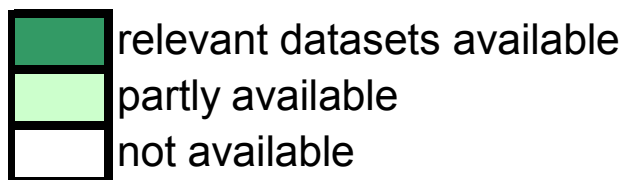
- Arable crop products: cereals, maize, potatoes, beets, beans and peas, oil crops
- Hay: intensive and extensive
- Reference to Swiss lowlands
- Integrated and organic production, integrated extensive variant for cereals and rape seed

2. Datasets on agricultural means of production: infrastructure (buildings and machinery) and its usage, fertilisers, pesticides, seed and animal feed

3. Background datasets for the food processing industry: energy systems, transports, detergents, packaging materials, construction materials and processes, waste management

Datasets for the Agri-Food Sector: Production branches

Production branches	Buildings	Machinery	Work processes	Inputs	Products
Arable crops	relevant datasets available	relevant datasets available	relevant datasets available	relevant datasets available	relevant datasets available
Fodder crops	relevant datasets available	relevant datasets available	relevant datasets available	relevant datasets available	partly available
Horticulture (Field)	relevant datasets available	partly available	partly available	relevant datasets available	not available
Horticulture (Greenhouse)	not available	partly available	partly available	relevant datasets available	not available
Fruit growing	partly available	partly available	partly available	relevant datasets available	not available
Vineyards	partly available	partly available	partly available	relevant datasets available	not available
Cattle production	relevant datasets available	relevant datasets available	relevant datasets available	relevant datasets available	not available
Pig production	relevant datasets available	relevant datasets available	relevant datasets available	relevant datasets available	not available
Poultry production	not available	partly available	partly available	relevant datasets available	not available



Datasets for the Agri-Food Sector: Examples

	Subcategory	Number of modules	Example of inventories for the subcategories		
			Name	Location	Unit
Infra-structure	Buildings	13	label housing system, pig	CH	pig place
	Machinery	6	agricultural machinery, tillage, production	CH	kg
Operation of infrastructure	Building usage	8	dried roughage store, air dried, solar, operation	CH	kg
	Machinery and equipment usage	33	tillage, ploughing	CH	ha
			milking	CH	kg
Drying	4	grain drying, high temperature	CH	kg	
Agricultural inputs	Mineral fertilisers	24	ammonium nitrate, as N, at regional storehouse	RER	kg
	Organic fertilisers	6	horn meal, at regional storehouse	CH	kg
	Pesticides	68	cyclic N-compounds, at regional storehouse	RER	kg
	Seed	22	sugar beet seed IP, at regional storehouse	CH	kg
	Feed	10	barley IP, at fodder mill	CH	kg
Agricultural outputs	Plant production	59	potatoes organic, at farm	CH	kg
			hay intensive IP, at farm	CH	kg
	Animal production	1	tallow, at plant	CH	kg
Total		254			



Example: Meta Data (extract)

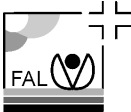
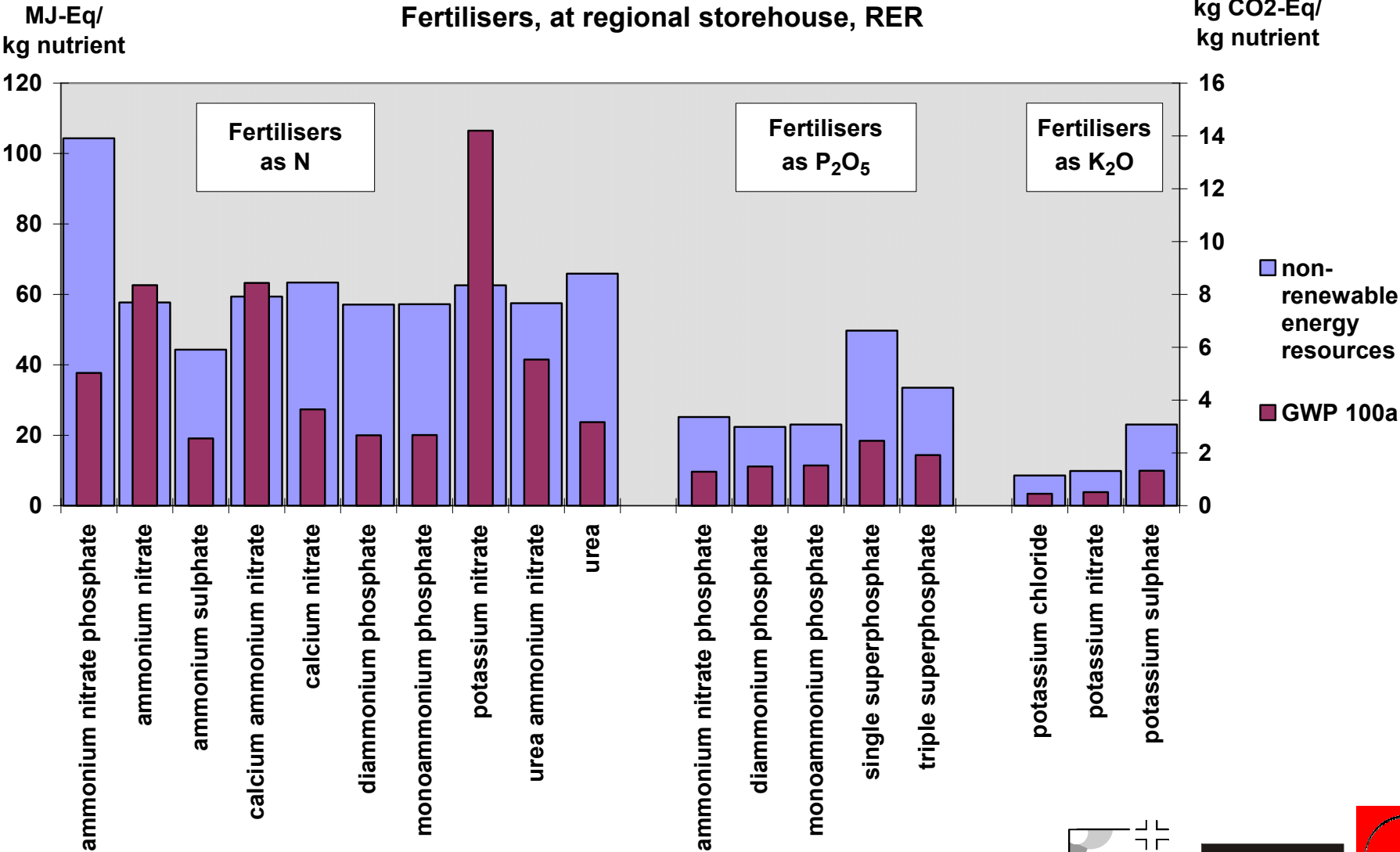
Type	Field ID	Field name	Field contents
Reference Function	401	Name	wheat extensive
	493	InfrastructureProcess	0 (=no)
	403	Unit	ha
	404	Amount	1
	402	IncludedProcesses	The inventory includes the processes of soil cultivation, sowing,
	490	LocalName	Weizen Extenso
	492	GeneralComment	Inventory refers to the production of 1 kg wheat extensive grains respectively straw, both with a moisture content of 15 %.
	495	Category	agricultural production
	496	SubCategory	plant production
TimePeriod	601	StartDate	1996
	602	EndDate	1999
	603	DataValidForEntirePeriod	1 (=yes)
	611	OtherPeriodText	The yield data have been collected for the years 1996-1999.
Geography	662	Location	CH
	663	Text	Refers to an average production in the Swiss lowlands.
Technology	692	Text	Integrated production with extensive plant protection
Representativeness	722	Percent	86
	724	ProductionVolume	CH prod of wheat: 561000t in 2000. % refers to fract of tot area in lowlands
	725	SamplingProcedure	Data were compiled from statistics, pilot network,

Example: Unit Process Inventory (extract)

Unit process inventory for: wheat IP, CH								
Exchanges	Location/ Category	Unit	Value	Uncert Type	SD 95%	Uncert Scores	wheat grains IP, at farm CH (kg)	wheat straw IP, at farm CH (kg)
ammonium nitrate, as N, at regional storehouse	RER	kg	6.71E+01	1	1.07	(2,1,1,1,1,na)	92%	8%
pesticide unspecified, at regional storehouse	CH	kg	2.60E-01	1	1.13	(2,2,3,1,1,na)	92%	8%
wheat seed IP, at regional storehouse	CH	kg	1.80E+02	1	1.07	(2,1,1,1,1,na)	92%	8%
.....								
tillage, ploughing	CH	ha	1.00E+00	1	1.07	(2,1,1,1,1,na)	92%	8%
grain drying, low temperature	CH	kg	7.64E+01	1	1.07	(2,1,1,1,1,na)	100%	
.....								
Occupation, arable, non-irrigated	resource/land	m2a	7.94E+03	1	1.77	(2,1,1,1,1,na)	92%	8%
Transformation, from pasture and meadow, intensive	resource/land	m2	2.90E+03	1	2.67	(2,1,1,1,1,na)	92%	8%
Carbon dioxide, in air	resource/in air	kg	1.39E+04	1	1.07	(2,2,1,1,1,na)	61%	39%
Energy, gross calorific value, in biomass	resource/biotic	MJ	1.67E+05	1	1.07	(2,2,1,1,1,na)	59%	41%
.....								
Ammonia	air/low population density	kg	9.06E+00	1	1.30	(2,2,1,1,1,na)	92%	8%
Phosphorus	water/river	kg	2.58E-01	1	1.77	(2,2,1,1,1,na)	92%	8%
Nitrate	water/ground-	kg	1.25E+02	1	1.77	(2,2,1,1,1,na)	92%	8%
Isoproturon	soil/agricultural	kg	1.27E+00	1	1.32	(2,2,3,1,1,na)	92%	8%
Cadmium	soil/agricultural	kg	3.91E-03	1	1.77	(2,2,1,1,1,na)	42%	58%
wheat grains IP, at farm	CH	kg	6.42E+03				100%	
wheat straw IP, at farm	CH	kg	3.91E+03					100%

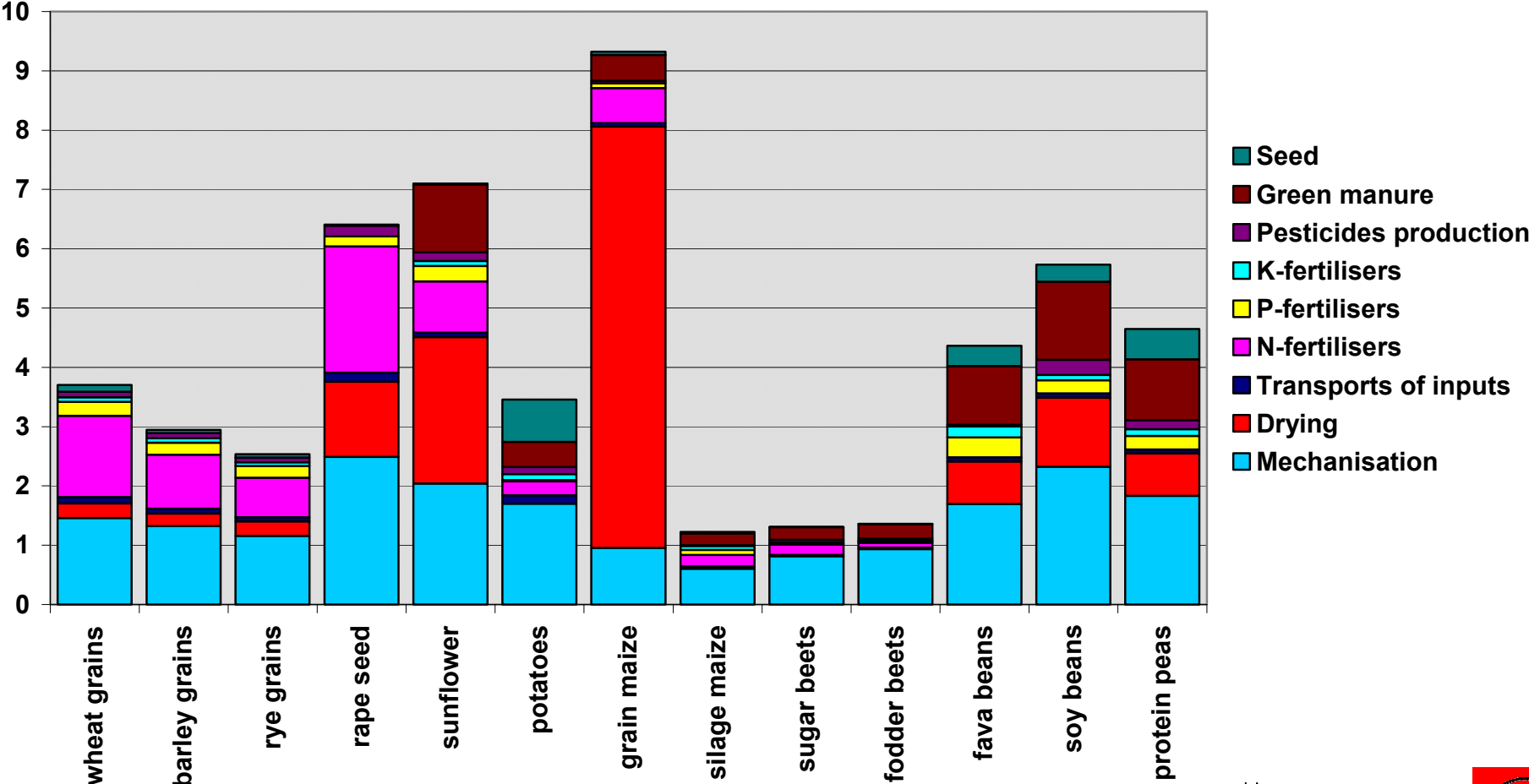


Example: Results for Mineral Fertilisers



Example: Results for Crop Production

Arable crop products IP, at farm: cumulative energy demand, non-renewable energy resources, total [MJ-Eq/kg DM]



Conclusions and Prospects

- Datasets are available in ecoinvent for
 - Most relevant agricultural infrastructure, inputs and processes
 - Several products (for Swiss conditions)
- Datasets available for the calculation of other agricultural products
- Applicability to other countries depends on
 - the goal of the study
 - the exact conditions
- Our wish: the ecoinvent database favours the use of LCA in the agri-food sector
- Development of ecoinvent Centre to the Swiss Centre for LCA
- For more information → special discussion forum LCA in Lausanne, Switzerland, **December 5, 2003** and www.ecoinvent.ch

