



# ecoinvent

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## ecoinvent 3.8 Dataset Documentation

'power sawing, without catalytic converter - RER - power sawing, without catalytic converter'

**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 within the dataset, i.e. in ecoSpold format.

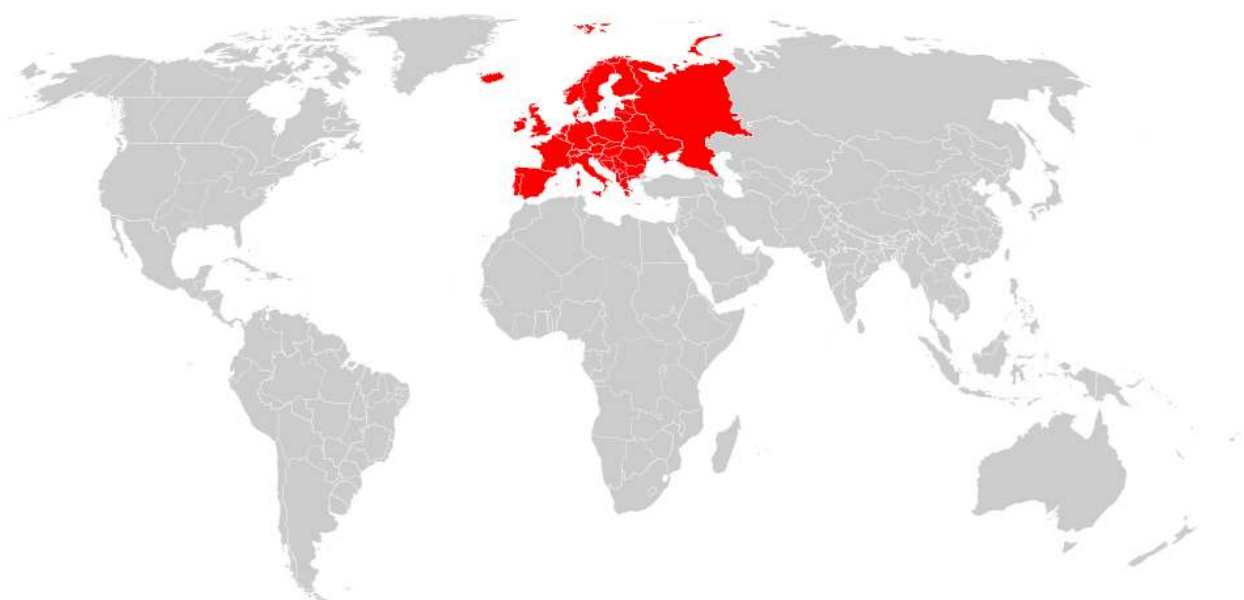
[Link to the dataset on ecoquery website](#)

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## Dataset Identification

Activity name	power sawing, without catalytic converter
Geography	RER (Europe)
Time period	2011-01-01 to 2021-12-31 - Valid for the entire period
Synonyms	chainsaw, chain saw
ISIC rev.4 ecoinvent	1610: Sawmilling and planing of wood
Reference product	power sawing, without catalytic converter
CPC classification	88311: Wood manufacturing services
Dataset type	Ordinary transforming activity
Technology level	Current
Version - system model	3.8 - Allocation, EN15804



## Dataset Authorship

Data generator	Frank Werner, Werner Umwelt & Entwicklung
Data entry	Frank Werner, Werner Umwelt & Entwicklung
Review	Emilia Moreno Ruiz, ecoinvent Centre

## Exchange Summary

Reference product	Byproduct classification	Amount
power sawing, without catalytic converter	allocatable product	1 hour

Inputs from technosphere	Amount
petrol, two-stroke blend	1.6 kg
power saw, without catalytic converter	0.0004 unit
vegetable oil, refined	0.54 kg

Emissions to air	Amount
Acetaldehyde	0.000687 kg
Acetone	0.000157 kg
Acrolein	4.41e-05 kg
Benzaldehyde	0.000461 kg
Benzo(a)pyrene	2.38e-07 kg
Carbon dioxide, fossil	2.15 kg
Carbon monoxide, fossil	0.981 kg
Dinitrogen monoxide	8.64e-05 kg
Formaldehyde	0.0351 kg
Methane, fossil	0.0413 kg
NMVOC, non-methane volatile organic compounds, unspecified origin	0.298 kg
Nitrogen oxides	0.0086 kg
PAH, polycyclic aromatic hydrocarbons	5.95e-05 kg
Pentane	0.0342 kg
Propanal	0.000124 kg
Sulfur dioxide	3.2e-05 kg
Toluene	0.0332 kg

Emissions to soil	Amount
Oils, non-fossil	0.054 kg

# Dataset Description

## General comment



The inventory represents the operation of a professional power saw with a fuel consumption of 1.6 kg of standard two-stroke petrol blend (0.75 kg/l) for power saws per working hour and with a power output of about 3.1 - 3.2 kW.

### Included activities start

Service beginning with the input of fuel into the power saw.

### Included activities end

Includes the input of machinery infrastructure, the input of fuel, lubricants/greases as well as their disposal, and the emissions into air from fuel consumption. Wood is not included in the dataset.

### Sampling procedure

Producer data and data from several scientific papers (emission measurements from different types of power saws, different fuels and additives).

### Extrapolations

This dataset has been extrapolated from year 2012 to the year of the calculation (2021). The uncertainty has been adjusted accordingly.

### Technology comment

The module represents average technology used in Europe around 2010.

### Geography comment

Data sourced from several European studies.

## Detailed Information For Exchanges

Reference product	Annual prod.vol.	Amount
power sawing, without catalytic converter	3.48e+9 hour	1 hour

**Production volume:** 3.48e+9 hour

**Production volume comment:** 1,00,000 chainsaws with 2500 PMH, weighted by RER GDP/Global GDP

Reference Product Properties	Amount
Biogenic carbon content in accompanying packaging	0 kg C
Use of renewable primary energy resources used as raw materials (PERM)	0 MJ
Use of renewable primary energy excluding renewable primary energy resources used as raw materials (PERE)	32.6 MJ
Use of non renewable primary energy resources used as raw materials (PENRM)	0 MJ
Use of non renewable primary energy excluding non renewable primary energy resources used as raw materials (PENRE)	93.2 MJ

Inputs from technosphere	Amount
petrol, two-stroke blend	1.6 kg
<p><b>Activity Link:</b> market for petrol, two-stroke blend - GLO</p> <p><b>Comment:</b> Average consumption per working hour; reference for normalizing values from different sources.</p> <p><b>Uncertainty distribution:</b> lognormal; <b>GSD2:</b> 1.25; <b>Pedigree matrix:</b> [4, 5, 4, 1, 1]</p> <p><b>Source:</b> Willared, J. (2011)</p>	
power saw, without catalytic converter	0.0004 unit
<p><b>Activity Link:</b> market for power saw, without catalytic converter - GLO</p> <p><b>Comment:</b> Calculated based on producer information.</p> <p><b>Uncertainty distribution:</b> lognormal; <b>GSD2:</b> 1.25; <b>Pedigree matrix:</b> [4, 5, 4, 1, 1]</p> <p><b>Source:</b> Kellenberger D. (2007)</p>	
vegetable oil, refined	0.54 kg
<p><b>Activity Link:</b> market for vegetable oil, refined - GLO</p> <p><b>Comment:</b> Lubricating oil for chain.</p> <p><b>Uncertainty distribution:</b> lognormal; <b>GSD2:</b> 1.23; <b>Pedigree matrix:</b> [3, 5, 4, 1, 1]</p> <p><b>Source:</b> Kellenberger D. (2007)</p>	

Emissions to air	Subcompartment	Amount
Acetaldehyde	non-urban air or from high stacks	0.000687 kg
<p><b>Comment:</b> Various sources: Magnussen et al (2002), Magnussen et al. (2000), Spielmann et al. 2007) as adequate.</p> <p><b>Uncertainty distribution:</b> lognormal; <b>GSD2:</b> 1.79; <b>Pedigree matrix:</b> [1, 5, 4, 1, 5]</p> <p><b>Source:</b> Magnusson R. (2000)</p>		
Acetone	non-urban air or from high stacks	0.000157 kg
<p><b>Uncertainty distribution:</b> lognormal; <b>GSD2:</b> 2.01; <b>Pedigree matrix:</b> [1, 5, 4, 1, 5]</p> <p><b>Source:</b> Magnusson R. (2002)</p>		

Acrolein	non-urban air or from high stacks	4.41e-05 kg
<b>Uncertainty distribution:</b> lognormal; <b>GSD2:</b> 2.05; <b>Pedigree matrix:</b> [1, 5, 5, 1, 5] <b>Source:</b> Magnusson R. (2002)		
Benzaldehyde	non-urban air or from high stacks	0.000461 kg
<b>Uncertainty distribution:</b> lognormal; <b>GSD2:</b> 2.05; <b>Pedigree matrix:</b> [1, 5, 5, 1, 5] <b>Source:</b> Magnusson R. (2002)		
Benzo(a)pyrene	non-urban air or from high stacks	2.38e-07 kg
<b>Uncertainty distribution:</b> lognormal; <b>GSD2:</b> 2.33; <b>Pedigree matrix:</b> [1, 5, 5, 1, 5] <b>Source:</b> Magnusson R. (2000)		
Carbon dioxide, fossil	non-urban air or from high stacks	2.15 kg
<b>Comment:</b> Calculated based on a C content of petrol of 0.847 kg C/kg and 43% of carbon content emitted as CO <sub>2</sub> (personal communication power saw producer). <b>Uncertainty distribution:</b> lognormal; <b>GSD2:</b> 1.31; <b>Pedigree matrix:</b> [1, 5, 5, 3, 1] <b>Source:</b> Willared, J. (2011)		
Carbon monoxide, fossil	non-urban air or from high stacks	0.981 kg
<b>Comment:</b> Calculated based on a C content of petrol of 0.8472 kg C/kg and 31% of carbon content emitted as CO (personal communication power saw producer). <b>Uncertainty distribution:</b> lognormal; <b>GSD2:</b> 1.59; <b>Pedigree matrix:</b> [2, 5, 4, 1, 1] <b>Source:</b> Willared, J. (2011)		
Dinitrogen monoxide	non-urban air or from high stacks	8.64e-05 kg
<b>Uncertainty distribution:</b> lognormal; <b>GSD2:</b> 1.79; <b>Pedigree matrix:</b> [1, 5, 4, 1, 5] <b>Source:</b> Spielmann, M. (2007)		
Formaldehyde	non-urban air or from high stacks	0.0351 kg
<b>Comment:</b> Various sources: Magnussen et al (2002), Magnussen et al. (2000), Spielmann et al. 2007) as adequate. <b>Uncertainty distribution:</b> lognormal; <b>GSD2:</b> 1.79; <b>Pedigree matrix:</b> [1, 5, 4, 1, 5] <b>Source:</b> Magnusson R. (2000)		
Methane, fossil	non-urban air or from high stacks	0.0413 kg
<b>Uncertainty distribution:</b> lognormal; <b>GSD2:</b> 1.79; <b>Pedigree matrix:</b> [1, 5, 4, 1, 5] <b>Source:</b> Spielmann, M. (2007)		
NM VOC, non-methane volatile organic compounds, unspecified origin	non-urban air or from high stacks	0.298 kg
<b>Comment:</b> Amount of NM VOC emissions that are not inventoried as individual substances based on total NM VOC emissions of 26% of carbon content (personal communication by power saw producer) and based on a C content of petrol of 0.857 kg C/kg and excluding PAH, which are inventoried separately. <b>Uncertainty distribution:</b> lognormal; <b>GSD2:</b> 1.79; <b>Pedigree matrix:</b> [3, 5, 4, 3, 5]		
Nitrogen oxides	non-urban air or from high stacks	0.0086 kg
<b>Comment:</b> Personal communication of power chain producer. <b>Uncertainty distribution:</b> lognormal; <b>GSD2:</b> 1.79; <b>Pedigree matrix:</b> [1, 5, 4, 1, 5] <b>Source:</b> Willared, J. (2011)		

PAH, polycyclic aromatic hydrocarbons	non-urban air or from high stacks	5.95e-05 kg
<p><b>Comment:</b> Amount of PAH that are not inventoried as individual substances as quantified based on Magnussen et al (2002) and Magnussen et al. (2000).  <b>Uncertainty distribution:</b> lognormal; <b>GSD2:</b> 2.29; <b>Pedigree matrix:</b> [1, 5, 4, 1, 5]</p>		
Pentane	non-urban air or from high stacks	0.0342 kg
<p><b>Uncertainty distribution:</b> lognormal; <b>GSD2:</b> 2.01; <b>Pedigree matrix:</b> [1, 5, 4, 1, 5]  <b>Source:</b> Magnusson R. (2002)</p>		
Propanal	non-urban air or from high stacks	0.000124 kg
<p><b>Uncertainty distribution:</b> lognormal; <b>GSD2:</b> 2.01; <b>Pedigree matrix:</b> [1, 5, 4, 1, 5]  <b>Source:</b> Magnusson R. (2002)</p>		
Sulfur dioxide	non-urban air or from high stacks	3.2e-05 kg
<p><b>Comment:</b> Calculated based on an assumed S content of 0.001% (by mass) as the threshold value for the Swiss tax on sulfur in Petrol.  <b>Uncertainty distribution:</b> lognormal; <b>GSD2:</b> 1.2; <b>Pedigree matrix:</b> [1, 1, 4, 1, 1]  <b>Source:</b> Schweizer Bundesrat (2003)</p>		
Toluene	non-urban air or from high stacks	0.0332 kg
<p><b>Uncertainty distribution:</b> lognormal; <b>GSD2:</b> 2.01; <b>Pedigree matrix:</b> [1, 5, 4, 1, 5]  <b>Source:</b> Magnusson R. (2002)</p>		

Emissions to soil	Subcompartment	Amount
Oils, non-fossil	forestry	0.054 kg
<p><b>Comment:</b> 10% of the oil from lubricating the chain.  <b>Uncertainty distribution:</b> lognormal; <b>GSD2:</b> 1.65; <b>Pedigree matrix:</b> [1, 5, 5, 3, 1]  <b>Source:</b> Kellenberger D. (2007)</p>		

## Selected Impact Assessment Results

Method	Category	Indicator	Score
EF v3.0 EN15804	climate change	global warming potential (GWP100)	10.9 kg CO <sub>2</sub> -Eq
ecological scarcity 2013	total	total	2.97e+4 UBP
EF v3.0	material resources: metals/minerals	abiotic depletion potential (ADP): elements (ultimate reserves)	2.32e-05 kg Sb-Eq



## Direct impact contributions

EF v3.0 EN15804, climate change, global warming potential (GWP100): **10.9 kg CO2-Eq**

Exchange	Amount	Impact (kg CO2-Eq)	Impact %
<b>vegetable oil, refined</b> market for vegetable oil, refined - GLO	0.54 kg	4.56	41.69%
<b>Carbon dioxide, fossil</b> air - non-urban air or from high stacks	2.15 kg	2.15	19.65%
<b>Carbon monoxide, fossil</b> air - non-urban air or from high stacks	0.981 kg	1.54	14.09%
<b>Methane, fossil</b> air - non-urban air or from high stacks	0.0413 kg	1.52	13.89%
<b>petrol, two-stroke blend</b> market for petrol, two-stroke blend - GLO	1.6 kg	1.06	9.74%
<b>power saw, without catalytic converter</b> market for power saw, without catalytic converter - GLO	0.0004 unit	0.076	0.7%
<b>Dinitrogen monoxide</b> air - non-urban air or from high stacks	8.64e-05 kg	0.0257	0.24%

ecological scarcity 2013, total, total: **2.97e+4** UBP

Exchange	Amount	Impact (UBP)	Impact %
<b>vegetable oil, refined</b> market for vegetable oil, refined - GLO	0.54 kg	1.92e+4	64.66%
<b>NMVO, non-methane volatile organic compounds, unspecified origin</b> air - non-urban air or from high stacks	0.298 kg	4.17e+3	14.06%
<b>petrol, two-stroke blend</b> market for petrol, two-stroke blend - GLO	1.6 kg	2.02e+3	6.81%
<b>Carbon dioxide, fossil</b> air - non-urban air or from high stacks	2.15 kg	9.88e+2	3.33%
<b>Carbon monoxide, fossil</b> air - non-urban air or from high stacks	0.981 kg	7.06e+2	2.38%
<b>Methane, fossil</b> air - non-urban air or from high stacks	0.0413 kg	4.96e+2	1.67%
<b>Formaldehyde</b> air - non-urban air or from high stacks	0.0351 kg	4.91e+2	1.66%
<b>Pentane</b> air - non-urban air or from high stacks	0.0342 kg	4.79e+2	1.61%
<b>Toluene</b> air - non-urban air or from high stacks	0.0332 kg	4.65e+2	1.57%
<b>Nitrogen oxides</b> air - non-urban air or from high stacks	0.0086 kg	3.35e+2	1.13%
<b>power saw, without catalytic converter</b> market for power saw, without catalytic converter - GLO	0.0004 unit	2.01e+2	0.68%
<b>PAH, polycyclic aromatic hydrocarbons</b> air - non-urban air or from high stacks	5.95e-05 kg	77.4	0.26%
<b>Benzo(a)pyrene</b> air - non-urban air or from high stacks	2.38e-07 kg	22.6	0.08%
<b>Dinitrogen monoxide</b> air - non-urban air or from high stacks	8.64e-05 kg	12.1	0.04%
<b>Acetaldehyde</b> air - non-urban air or from high stacks	0.000687 kg	9.62	0.03%

5 minor direct contributors have been omitted for clarity

EF v3.0, material resources: metals/minerals, abiotic depletion potential (ADP): elements (ultimate reserves): **2.32e-05 kg Sb-Eq**

Exchange	Amount	Impact (kg Sb-Eq)	Impact %
<b>vegetable oil, refined</b> market for vegetable oil, refined - GLO	0.54 kg	1.93e-05	82.99%
<b>petrol, two-stroke blend</b> market for petrol, two-stroke blend - GLO	1.6 kg	2.1e-06	9.03%
<b>power saw, without catalytic converter</b> market for power saw, without catalytic converter - GLO	0.0004 unit	1.86e-06	7.98%

## Source

**First author** Magnusson R.  
**Additional author(s)** Nilsson C., Andersson B.  
**Title** Emissions of aldehydes and ketones from a two-stroke engine using ethanol and ethanol-blended gasoline as fuel  
**Year** 2002  
**Journal** Environmental Science and Technology  
**Volume number** 36  
**Issue number** 8

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**First author** Magnusson R.  
**Additional author(s)** Nilsson C., Andersson K., Andersson B., Rannug U., Östman C.  
**Title** Effect of gasoline and lubricants on emissions and mutagenicity of particles and semivolatiles in chain saw exhaust  
**Year** 2000  
**Journal** Environmental Science and Technology  
**Volume number** 34

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**First author** Spielmann, M.  
**Additional author(s)** Barreto L., Erni V., Frutig F., Thees O.  
**Title** Life cycle assessment of energy wood chip supply chains  
**Year** 2007

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**First author** Willared, J.  
**Title** Personal written communication, Mr. Willaredt, Husqvarna AB  
**Year** 2011

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**First author** Kellenberger D.  
**Additional author(s)** Althaus H.-J., Jungbluth N., Künniger T.  
**Title** Life Cycle Inventories of Building Products  
**Year** 2007  
**Volume number** 7

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**First author** Magnusson R.  
**Additional author(s)** Nilsson C, Andersson K., Andersson B., Gieling R., Wiberg K., Östman C., Rannug U.  
**Title** Determination of chemical composition and mutagenicity in particles from chainsaw exhaust; experimental set-up, stability and results from two different fuels  
**Year** 2010  
**Journal** Environmental Technology  
**Volume number** 21  
**Issue number** 7

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<b>First author</b>	Schweizer Bundesrat
<b>Title</b>	Verordnung über die Lenkungsabgabe auf Benzin und Dieselöl mit einem Schwefelgehalt von mehr als 0.001 Prozent
<b>Year</b>	2003

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