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Version 2.0

## **RSB GHG Calculation Methodology**

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## Introduction

This standard specifies the provisions that shall be complied with by operators participating in the *RSB certification systems*.

The *participating operator* shall have control over and take full responsibility, accountability and liability for all operations, processes, activities and sites in relation to the implementation of and compliance with the *RSB standards* at all times.

This standard describes the methodology for the calculation of the lifecycle greenhouse gas emissions of biofuel production in the certification scheme of the Roundtable on Sustainable Biofuels; in short, this report constitutes the "RSB GHG Calculation Methodology".

## Table of Content

<b>Introduction .....</b>	<b>2</b>
<b>List of figures .....</b>	<b>5</b>
<b>List of tables.....</b>	<b>6</b>
<b>1     Scope definition .....</b>	<b>10</b>
1.1    Goal of this methodology .....	10
1.2    Functional Unit.....	10
1.3    System Boundaries .....	11
1.4    Biofuel Feedstocks .....	11
1.5    Input data .....	11
1.6    Background (Default) data.....	12
1.7    Co-Products and waste.....	12
1.8    Geographic Scope.....	12
1.9    Input Data.....	12
1.10   GHG and GWP .....	12
1.11   GHG calculations for the Directive 2009/28/EC .....	12
<b>2     Modeling of agriculture .....</b>	<b>14</b>
<b>3     Modeling CO<sub>2</sub> emissions from land use.....</b>	<b>19</b>
3.1    Introduction .....	19
3.2    Scope .....	19
3.3    Calculation of Carbon Stocks.....	24
<b>4     Agriculture: modeling of ammonia emissions .....</b>	<b>50</b>
4.1    Ammonia (NH <sub>3</sub> ) computation from mineral fertilizers .....	50
4.2    Ammonia (NH <sub>3</sub> ) computation from organic fertilizers .....	50
<b>5     Agriculture: modeling of N<sub>2</sub>O and NO<sub>x</sub> emissions.....</b>	<b>53</b>
5.1    N <sub>2</sub> O emissions.....	53
5.2    NO <sub>x</sub> emissions.....	53
<b>6     Agriculture: modeling of nitrate emissions .....</b>	<b>54</b>
6.1    Origin of model and model structure .....	54
6.2    Computation.....	56
6.3    Tables.....	59

6.4	Inputs.....	67
6.5	Modelling of nitrate for RED calculations .....	72
<b>7</b>	<b>Field burning before harvest – sugarcane .....</b>	<b>73</b>
<b>8</b>	<b>Modeling of fuel production and fuel refining.....</b>	<b>74</b>
<b>9</b>	<b>Modeling of transport and storage .....</b>	<b>75</b>
<b>10</b>	<b>Fuel Combustion Emissions.....</b>	<b>76</b>
<b>11</b>	<b>References .....</b>	<b>77</b>

**Annex 1 – Global Warming Potentials**

**Annex 2 – Pathways**

**Annex 3 – Land Use Tables**

**Annex 4 – Ecoinvent Emission Factors**

**Annex 5 – Options for the treatment of co-products**

**Annex 6 – Lower heating values**

**Annex 7 – Peer Reviewer Comments**

## List of figures

<b>Figure 3-1: Land use changes, which can be calculated with the RSB Methodology. The categories are taken from the IPCC Guidelines 2006, p. 1.9. The RSB Methodology covers transformation of several natural and managed ecosystems to cropland.....</b>	<b>22</b>
<b>Figure 6-1. Structure of the nitrate model and data flows .....</b>	<b>56</b>

## List of tables

<b>Table 1-1: Lower Heating Values (LHV)</b>	10
<b>Table 2-1: Fertilizers in the RSB Tool</b>	15
<b>Table 2-2: Available pesticides in the RSB tool and their category</b>	16
<b>Table 2-3: Agricultural machine use in the RSB Tool</b>	17
<b>Table 2-4: Effluents and their description in this document</b>	18
<b>Table 3-1: Vegetation values for annual cropland (general)</b>	28
<b>Table 3-2: Vegetation values for perennial crops (general). Only the carbon accumulation of the half production cycle is taken into account. Consequently, the sum of AGB and BGB (which reflect the carbon accumulated over 20 years) is multiplied with 0.5. Source: adapted from (Commission 2010)</b>	28
<b>Table 3-3: Vegetation values for specific perennial crops. Values reflect literature data. The half cycle is taken into account, i.e. the amount of carbon accumulated after 10 years. Source: adapted from (Commission 2010)</b>	28
<b>Table 3-4: Vegetation values for miscanthus (specific). Due to the annual harvest AGB is not taken into account. However, BGB, i.e. carbon accumulation due to roots, is accounted for. The carbon content per kg dry mass is assumed to be 50% Source: adapted from (Commission 2010)</b>	29
<b>Table 3-5: Vegetation values for sugar cane (source: adapted from (Commission 2010))</b>	29
<b>Table 3-6: Vegetation values for grassland (general). Source: adapted from (IPCC 2006; Commission 2010)</b>	30
<b>Table 3-7: Vegetation values for scrubland namely land with vegetation composed largely of woody plants lower than 5 meter not having clear physiognomic aspects of trees. Source: adapted from (Commission 2010)</b>	30
<b>Table 3-8: Vegetation values for forest land – excluding forest plantations – having between 10% and 30% canopy cover. Values are calculated using 20% of the values of the AGB + BGB values of mature forest outlined by the IPCC (without DOM). Values are rounded Source: adapted from (Commission 2010)</b>	31
<b>Table 3-9: Vegetation values for forest land – excluding forest plantations – having more than 30% canopy cover. Calculated on the basis of (IPCC 2006) using a carbon content of 0.47 kg C per kg d.m. DOM only includes litter, i.e. if specific values for the dead wood stock must be added separately.</b>	33
<b>Table 3-10: Foregone sequestration caused by deforestation of forest. Values are calculated on the basis of Table 4.9 (IPCC 2006) using a using a carbon content of 0.47 kg C per kg d.m.</b>	34
<b>Table 3-11: Vegetation values for forest plantations. The half cycle is used to assess the carbon accumulation within the accounting period, i.e. the total carbon accumulation is divided by two. Source: adapted from (IPCC 2006) and (Commission 2010)</b>	36

<b>Table 3-12: Default crop parameters. Carbon fraction of the respective crops can be used to determine <math>C_L</math>, the biomass carbon loss due to biofuel harvest. Only relevant if no default data for <math>C_{Gn}</math> (the mean net increase in biomass carbon stocks due to biomass growth) is available. Source: Ecoinvent (Jungbluth, Chudacoff et al. 2007) .....</b>	<b>39</b>
<b>Table 3-13: Emission factors (g kg dry matter burnt) for various types of burning. Source: adapted from (IPCC 2006).....</b>	<b>39</b>
<b>Table 3-14: Impact factor (Global Warming Potential) for prominent greenhouse gases according to ReCiPe (Goedkoop, Heijungs et al. 2009). .....</b>	<b>40</b>
<b>Table 3-15: Combustion factor values (proportion of pre-fire fuel biomass consumed) for fires in a range of vegetation types. Source: adapted from (IPCC 2006). .....</b>	<b>40</b>
<b>Table 3-16: <math>SOC_{REF}</math>, i.e. standard soil organic carbon content in the 0-30 centimetre topsoil layer (source: (IPCC 2006)) .....</b>	<b>44</b>
<b>Table 3-17: Default emission factors to estimate direct <math>N_2O</math> emissions from managed soils (source: (IPCC 2006)).....</b>	<b>45</b>
<b>Table 3-18: Factors for cropland (<math>FLU_C</math>) and for perennial crops (<math>FLU_P</math>), namely multi-annual crops whose stem is usually not annually harvested such as short rotation coppice and oil palm (source: adapted from (IPCC 2006)) .....</b>	<b>45</b>
<b>Table 3-19: Guidance on management and input for cropland and perennial crops (source: adapted from (IPCC 2006)) .....</b>	<b>47</b>
<b>Table 3-20: Factors for grassland, including savannahs (source: adapted from (IPCC 2006)) .....</b>	<b>47</b>
<b>Table 3-21: Guidance on management and input for grassland (source: adapted from (IPCC 2006)) ...</b>	<b>48</b>
<b>Table 3-22: Factors for forests (source: adapted from (Commission 2010)) .....</b>	<b>49</b>
<b>Table 3-23: Guidance on management and input for forest land(source: adapted from (IPCC 2006)) ..</b>	<b>49</b>
<b>Table 4-1: <math>NH_3</math>-emissions from mineral fertilizers (% N emitted in form of <math>NH_3</math>).....</b>	<b>50</b>
<b>Table 4-2: TAN Values .....</b>	<b>51</b>
<b>Table 4-3: Nitrogen emission rates (er) of different animal categories and manure types .....</b>	<b>51</b>
<b>Table 6-1: Mean annual precipitation for each ecozone .....</b>	<b>55</b>
<b>Table 6-2: Default reference (under native vegetation) soil organic C stocks (<math>SOC_{REF}</math>) for mineral soils (tons C ha<sup>-1</sup> in 0-30 cm depth). Source: (IPCC 2006).....</b>	<b>59</b>
<b>Table 6-3: Clay content for each USDA soil order .....</b>	<b>60</b>
<b>Table 6-4: Root depth for each crop .....</b>	<b>61</b>
<b>Table 6-5: Unit uptake for each crop .....</b>	<b>62</b>
<b>Table 6-6: Nutrient uptake of cassava. Taken from (Howeler 2002).....</b>	<b>63</b>
<b>Table 6-7: Nutrition uptake (whole plant). Taken from (Embrapa 2006) .....</b>	<b>63</b>
<b>Table 6-8: Nutrient demand/uptake/removal of coconut-macronutrients.....</b>	<b>64</b>

<b>Table 6-9 Copra yield per nut (Source: FAO / (Ohler 2000)).....</b>	<b>64</b>
<b>Table 6-10: N uptake for corn (Eghball and Power 1999).....</b>	<b>65</b>
<b>Table 6-11: Types of slurry and nitrogen content.....</b>	<b>70</b>
<b>Table 6-12: Types of manure and nitrogen content .....</b>	<b>71</b>
<b>Table A3-1: Above ground biomass in forests (source: (IPCC 2006), table 4.7 p. 4.53). .....</b>	<b>1</b>
<b>Table A3-2: Continued; Above ground biomass in forests (source: (IPCC 2006), table 4.7 p. 4.54).....</b>	<b>2</b>
<b>Table A3-3: Default Values for litter and dead wood (source: (IPCC 2006), table 2.2 p. 2.27). .....</b>	<b>3</b>
<b>Table A3-4: Relative stock change factors (FLU, FMG, and FI) over 20 years) for different management activities on cropland (source: (IPCC 2006), table 5.5 p. 5.17). .....</b>	<b>3</b>
<b>Table A3-5: Relative stock change factors for grassland management (source: (IPCC 2006), table 6.2 p. 6.16). .....</b>	<b>4</b>



## **A. Intent of this standard**

This standard is intended to define the GHG calculation methodology to be used by *participating operators* in the *RSB certification scheme* when calculating GHG emissions for the scope of its operations.

The intent of this standard is to ensure that all operators participating in the *RSB certification systems* use the same, standardized methodology to calculate GHG emissions.

## **B. Scope of this standard**

This standard is an international standard and valid worldwide, and specifies the GHG calculation methodology to be used by RSB *participating operators* producing, converting, processing, trading, transporting, and distributing *biomass/biofuels* in the *RSB certification systems*.

This standard applies to all *participating operators* in the *RSB certification systems*.

## **C. Status and effective date**

The version 2.0 of the RSB GHG Calculation Methodology shall be effective on 1 March 2011.

## **D. Note on use of this standard**

All aspects of this standard are considered to be normative, including the intent, scope, standard effective date, note on the use of this standard, references, terms and definitions, requirements and annexes, unless otherwise stated. Users implementing this standard shall ensure that the intent of this standard is met. To ensure that the intent of this standard is met users shall implement all of the requirements specified in this standard, and any and all additional measures necessary to achieve the intent of this standard.

# 1 Scope definition

## 1.1 Goal of this methodology

This standard describes the methodology for the calculation of the lifecycle greenhouse gas emissions of biofuel production in the certification scheme of the Roundtable on Sustainable Biofuels (RSB); in short, this report constitutes the “RSB GHG Calculation Methodology”.

“Annex 5 – Options for the treatment of co-products” provides a discussion on key aspects of the RSB Methodology and the rationale for those choices.

The technical leads in the development of this methodology were Dr. Mireille Faist Emmenegger, Dr. Jürgen Reinhard, and Dr. Rainer Zah from the Swiss Federal Laboratories for Materials Science and Technology (EM-PA), who worked in conjunction with the Secretariat of the RSB.

The RSB GHG Calculation Methodology described herein has been incorporated into the online RSB Tool. In addition, the RSB Tool calculates lifecycle GHG emissions according to the Directive 2009/28/EC of the European Union (EU RED). The RSB and EU RED methodologies are very similar; any differences have been pointed out in this report and are summarized below in this chapter.

## 1.2 Functional Unit

The functional unit is one megajoule (MJ) of finished biofuel product. Results will be published on a Lower Heating Value (LHV) at 0% water.

**Table 1-1: Lower Heating Values (LHV)**

Biofuel	Source	LHV [MJ/kg]
Ethanol	Biograce <sup>1</sup>	26.81
Methanol	Biograce1	19.9
Fatty Acid Methyl Esters	Biograce1	37.2
Synthetic Diesel (BtL)	Biograce1	44.0
Hydrogenated vegetable oil	Biograce1	44.0
Pure vegetable oil	Biograce1	36.0
Dimethylether	Pacific Northwest Laboratory <sup>2</sup>	28.88

<sup>1</sup> BioGrace\_GHG\_calculations\_-\_version\_4\_-\_Public.xls, sheet "standard values". Available on <http://biograce.net/content/ghgcalculationtools/excelghgcalculations>.

<sup>2</sup> GREET Transportation Fuel Cycle Analysis Model, GREET 1.8b, developed by Argonne National Laboratory, Argonne, IL, released September 5, 2008. [http://www.transportation.anl.gov/modeling\\_simulation/GREET/index.html](http://www.transportation.anl.gov/modeling_simulation/GREET/index.html)

## **1.3 System Boundaries**

The system boundary is from cradle (fossil fuel feedstock extraction and biofuel feedstock production, respectively, for fossil fuels and biofuels) up to, but not including, use of the fuel in an engine. However, theoretical (stoichiometric) emissions from fuel combustion are included.

Infrastructure is included and the data come from the EcoInvent database. Infrastructure includes farm equipment (e.g., tractors), fossil feedstock production equipment (e.g., drilling equipment), fuel production equipment (e.g., refineries), and other. This differs from the RED calculations where infrastructure is excluded, also in the background processes (see also chapter 1.11).

Transportation of feedstock to processing facilities to fuel production facilities, and transportation of fuel to the point of consumption is included.

### **1.3.1 Integrated operations**

Some processing plants can be integrated with other operations: for example, an ethanol plant can be integrated with the CHP plant. Two system boundaries are possible:

- 1) the system boundary is drawn as closely as possible around the biofuel operation. Inputs of the connected plant (e.g. electricity from CHP plant) are treated either with specific (delivered by the operator) data or with standard data (e.g. from ecoinvent).
- 2) the system boundary is drawn around the whole operation scope of the operator. The operator has to deliver data on the whole operation.

In practice, the boundary of the GHG calculation has to coincide with the scope of certification. The boundary should include all operations that are required for the production of the biofuel or the processing of co-products and waste.

## **1.4 Biofuel Feedstocks**

The tool allows the calculation of operator's data for all biofuel pathways and feedstocks. However, RSB aims to include all relevant biofuel pathways and feedstocks in the tool. The current list of pathways and feedstocks is included in Annex 2 – Pathways. Broadly speaking, feedstocks include:

- Agricultural & forestry commodities (e.g., soybeans, wood);
- Agricultural & forestry by-products (e.g., wheat straw, waste wood);
- Animal husbandry by-products (e.g., tallow);
- Waste oil

## **1.5 Input data**

The RSB Methodology requires that operators enter data relevant to their operations. Default values of material and energy usage are not employed; rather, operator-specific values (e.g., amount of fertilizer, amount

and type of energy, etc.) are required. There are, however, default emission factors (such as the carbon intensity associated with materials and energy production). See next section.

## **1.6 Background (Default) data**

The calculations of background data (carbon intensity of fertilizer production processes, etc.) rely on data from the ecoinvent database ([www.ecoinvent.org](http://www.ecoinvent.org)). The carbon intensity of the background processes is documented in Annex 4 – Ecoinvent Emission Factors.

## **1.7 Co-Products and waste**

Co-products will be treated using an economic allocation methodology. Chapter 16 (Annex 5 – ) provides a discussion on different co-product treatment methodologies, their advantages and disadvantages, and the reasoning behind the RSB's decision to use an economic allocation methodology.

The definition of waste, and how to treat waste in GHG accounting, is to be defined.

## **1.8 Geographic Scope**

The tool is applicable to biofuel operations in any region of the world. Operators are required to enter actual data (material and energy usage, land use type, etc.) associated with their operations; hence, the tool does not include assumptions on data variability in different geographical areas.

## **1.9 Input Data**

Operators are required to enter relevant data associated with their operations. The tool uses the EcoInvent database for the background processes (e.g. fertilizer production). Other input data and assumptions are discussed in the following sections. See Annex 4 – Ecoinvent Emission Factors.

## **1.10 GHG and GWP**

The GHGs included in the calculation and their associated Global Warming Potentials are based on the ReCiPe method. ReCiPe includes more chemicals than IPCC (2007), but the latter includes 10 chemicals that are not included in ReCiPe. IPCC 2007 and ReCiPe GWP data are identical except for chloroform which has a higher value in IPCC (2007) than in ReCiPe (765 vs. 31 kgCO<sub>2</sub>). GHG and associated GWPs are included in Annex 1 – Global Warming Potentials. A comparison of ReCiPe and IPCC (2007) is included as well.

## **1.11 GHG calculations for the Directive 2009/28/EC**

For the calculations of greenhouse gas emissions according to the Directive 2009/28/EC of the European Parliament on the promotion of the use of energy from renewable sources (EU RED), the guidelines of the European Union are followed. The differences to the RSB methodology are the following:

- Allocation is based on energy content instead of economic value (according to Annex V, paragraph 17).

- The excess electricity from cogeneration in processing is taken into account using system expansion (according to Annex V, paragraph 16)
- The emission factors of theecoinvent datasets were calculated without infrastructure (according to Annex V, paragraph 1) and by taking only CH<sub>4</sub>, N<sub>2</sub>O and CO<sub>2</sub> into account (according to Annex V, paragraph 5).
- The agricultural residues are not taken into account for allocation as they are assumed to have zero GHG emissions (according to Annex V, paragraph 18).
- The RSB methodology uses a more refined model for the calculation of ammonia and nitrate emissions (used in the calculation of indirect N<sub>2</sub>O emissions).
- Differences in the calculation of greenhouse gas emissions from land use change are highlighted separately in Chapter 4.

## 2 Modeling of agriculture

The calculations include the production of fertilizers and pesticides, the energy used for agricultural machines as well as emissions on the field (e.g. dinitrogen emissions in the palm oil production).

The GHG emissions from agriculture are calculated as follow:

$$E_{Agriculture} \left[ \frac{kgCO_2}{ha} \right] = \frac{E_{fertilizers} \left[ \frac{kgCO_2}{ha} \right] + E_{pesticides} \left[ \frac{kgCO_2}{ha} \right] + E_{agricultural\ machines} \left[ \frac{kgCO_2}{ha} \right] + E_{effluents} \left[ \frac{kgCO_2}{ha} \right]}{product\ yield_{main\ product(crop)} \left[ \frac{kg\ produc\ yield}{ha} \right]} * Allocation\_factor$$

With

$$E_{fertilizers} \left[ \frac{kgCO_2}{ha} \right] = \sum fertilizer\_type_i \left[ \frac{kg}{ha} \right] * EF\_fert_i \left[ \frac{kgCO_2}{kg} \right]$$

EF<sub>fert<sub>i</sub></sub>: emission factor of the fertilizer type (e.g. ammonium nitrate). The emission factors of the fertilizer type are taken from the ecoinvent database (15 Annex 4 – Ecoinvent Emission Factors). The available fertilizers are shown in Table 2-1.

**Table 2-1: Fertilizers in the RSB Tool**

<b>Fertilizers</b>	<b>Country</b>	<b>unit</b>	<b>nutrient</b>
ammonium nitrate phosphate, as N	RER	kg	N
ammonium nitrate, as N	RER	kg	N
ammonium sulphate, as N	RER	kg	N
calcium ammonium nitrate, as N	RER	kg	N
calcium nitrate, as N	RER	kg	N
diammonium phosphate, as N	RER	kg	N
monoammonium phosphate, as N	RER	kg	N
potassium nitrate, as N	RER	kg	N
urea ammonium nitrate, as N	RER	kg	N
urea, as N	RER	kg	N
ammonium nitrate phosphate, as P2O5	RER	kg	P
diammonium phosphate, as P2O5	RER	kg	P
monoammonium phosphate, as P2O5	RER	kg	P
thomas meal, as P2O5	RER	kg	P
triple superphosphate, as P2O5	RER	kg	P
single superphosphate, as P2O5	RER	kg	P
potassium chloride, as K2O	RER	kg	K
potassium nitrate, as K2O	RER	kg	K
potassium sulphate, as K2O	RER	kg	K
lime, algae	RER	kg	CaO
lime, from carbonation	RER	kg	CaO

The GHG emissions of pesticide use are calculated as follow:

$$E_{pesticides} \left[ \frac{kgCO_2}{ha} \right] = \sum pesticide\_type_i \left[ \frac{kg}{ha} \right] * EF_{pest_i} \left[ \frac{kgCO_2}{kg} \right]$$

EF<sub>pest<sub>i</sub></sub>: emission factor of the pesticide type (e.g. ammonium nitrate). The emission factors of the pesticide type are estimated with the value from the ecoinvent database for the dataset "pesticides, unspecified, RER" (Annex 4 – Ecoinvent Emission Factors). The available pesticides are shown in Table 2-2.

**Table 2-2: Available pesticides in the RSB tool and their category.**

Category	Specific pesticide
[Sulfonyl]Urea-compounds	Chlorosulfuron, Diuron, Fluometuron, Linuron
[Thio]Carbamate-compounds	Carbofuran, Carbaryl, EPTC, Butylate
Acetamide-Anilide-compounds	Propanil, Alachlor, Propachlor, Metolachlor
Benzimidazole-compounds	Benomyl
Benzo[thia]diazole-compounds	Bentazon
Benzoic-compounds	Dicamba, Chloramben
Bipyridylum-compounds	Diquat
cyclic N-compounds	Methazol
Dinitroaniline-compounds	Trifluralin
Diphenylether-compounds	Fluazifop-butyl
Dithiocarbamate-compounds	Maneb, Ferbam
Nitrile compounds	Bromoxynil
Nitro compounds	Dinoseb
Organophosphorus compounds	Glyphosat, Phorat, Malathion, Parathion, Methylparathion
Phenoxy compounds	MCPA, 2,4-D, 2,4,5-T
Phthalamide-compounds	Captan
Pyrethroid compounds	Cypermethrin
Pyridazine compounds	Norflurazon
Triazine compounds	Atrazine, Cyanazine, Chlorsulfuron

The GHG emissions of machine use are calculated as follow:

$$E_{\text{agricultural machines}} \left[ \frac{\text{kgCO}_2}{\text{ha}} \right] = \sum \text{machine\_type}_i \left[ \frac{\text{h}}{\text{ha}} \right] * EF_{\text{machine}_i} \left[ \frac{\text{kgCO}_2}{\text{h}} \right]$$

EF<sub>machine</sub>; emission factor of the machine type (e.g. harvesting machine). The emission factors of the machine type are taken from the ecoinvent database (15 Annex 4 – Ecoinvent Emission Factors). The available agricultural machines are shown in Table 2-3.



**Table 2-3: Agricultural machine use in the RSB Tool.**

application of plant protection products, by field sprayer
Baling
chopping, maize
combine harvesting
fertilising, by broadcaster
fodder loading, by self-loading trailer
grain drying, high temperature
grain drying, low temperature
grass drying
harvesting, by complete harvester, beets
harvesting, by complete harvester, potatoes
hayage, by rotary tedder
Hoeing
irrigating
loading bales
maize drying
Milking
mowing, by motor mower
mowing, by rotary mower
mulching
Planting
potato grading
potato haulm cutting
potato planting
slurry spreading, by vacuum tanker
solid manure loading and spreading, by hydraulic loader and spreader
Sowing
swath, by rotary windrower
tillage, cultivating, chiseling
tillage, currying, by weeder
tillage, harrowing, by rotary harrow
tillage, harrowing, by spring tine harrow
tillage, hoeing and earthing-up, potatoes
tillage, ploughing
tillage, rolling
tillage, rotary cultivator

transport, tractor and trailer

The GHG emissions due to effluents are calculated as follow.

$$E_{effluents} \left[ \frac{kgCO_2}{ha} \right] = \sum effluent_i \left[ \frac{kg}{ha} \right] * EF_{effluent_i} \left[ \frac{kgCO_2}{kg} \right]$$

The calculation of the different effluents is described in the following chapters (Table 2-4). Their specific emission factor (EF\_effluent<sub>i</sub>) is described in Annex 4 – Ecoinvent Emission Factors.

**Table 2-4: Effluents and their description in this document.**

Effluent	Chapter
CO <sub>2</sub> from land use	Chapter 3
Ammonia	Chapter 4
N <sub>2</sub> O and NO <sub>x</sub>	Chapter 5
Nitrate	Chapter 6
Emissions from fires (sugar cane)	Chapter 8

## 3 Modeling CO<sub>2</sub> emissions from land use

### 3.1 Introduction

Land use activities in the agro forestry sector are one main source for anthropogenic greenhouse gas (GHG) emissions. The most important GHG emissions of concern are CO<sub>2</sub>, N<sub>2</sub>O (di-nitrogen monoxide) and CH<sub>4</sub> (methane) (IPCC 2006). Approx. 30% of all anthropogenic GHG emissions between 1989 and 1998 could be allocated to land use activities (Carmenza and Blaser 2008). Land use changes, i.e. the transformation of one land use type to another, is responsible for approx. 2/3 of those emissions (Carmenza and Blaser 2008). In this context, optimization of land use activities and in particular land transformations plays a key role in reducing GHG emissions.

These guidelines establish the framework for the calculation of land carbon stocks according to the methodology of the Roundtable on Sustainable Biofuels (RSB). The guidelines provide all information required to calculate the CO<sub>2</sub> emissions associated with land use change.

### 3.2 Scope

#### 3.2.1 Types

The land-use categories for greenhouse gas inventory reporting are:

##### (i) Forest Land

This category includes all land with woody vegetation consistent with thresholds used to define Forest Land in the national greenhouse gas inventory. It also includes systems with a vegetation structure that currently fall below, but *in situ* could potentially reach the threshold values used by a country to define the Forest Land category.

##### (ii) Cropland

This category includes cropped land, including rice fields, and agro-forestry systems where the vegetation structure falls below the thresholds used for the Forest Land category.

##### (iii) Grassland

This category includes rangelands and pasture land that are not considered Cropland. It also includes systems with woody vegetation and other non-grass vegetation such as herbs and brushes that fall below the threshold values used in the Forest Land category. The category also includes all grassland from wild lands to recreational areas as well as agricultural and silvi-pastoral systems, consistent with national definitions.

##### (iv) Wetlands

This category includes areas of peat extraction and land that is covered or saturated by water for all or part of the year (e.g., peatlands) and that does not fall into the Forest Land, Cropland, Grassland or Settlements categories. It includes reservoirs as a managed sub-division and natural rivers and lakes as unmanaged sub-divisions.

**(v) Settlements**

This category includes all developed land, including transportation infrastructure and human settlements of any size, unless they are already included under other categories. This should be consistent with national definitions.

**(vi) Other Land**

This category includes bare soil, rock, ice, and all land areas that do not fall into any of the other five categories. It allows the total of identified land areas to match the national area, where data are available. If data are available, countries are encouraged to classify unmanaged lands by the above land-use categories (e.g., into Unmanaged Forest Land, Unmanaged Grassland, and Unmanaged Wetlands). This will improve transparency and enhance the ability to track land-use conversions from specific types of unmanaged lands into the categories above.

**3.2.2 Strata**

The broad land-use categories listed above may be further stratified by climate or ecological zone, soil and vegetation type, etc., as necessary, to match land areas with the methods for assessing carbon stock changes and greenhouse gas emissions and removals. Examples of stratifications that are used for Tier 1 emissions and removals estimation are summarized below. Specific stratification systems vary by land use and carbon pools.

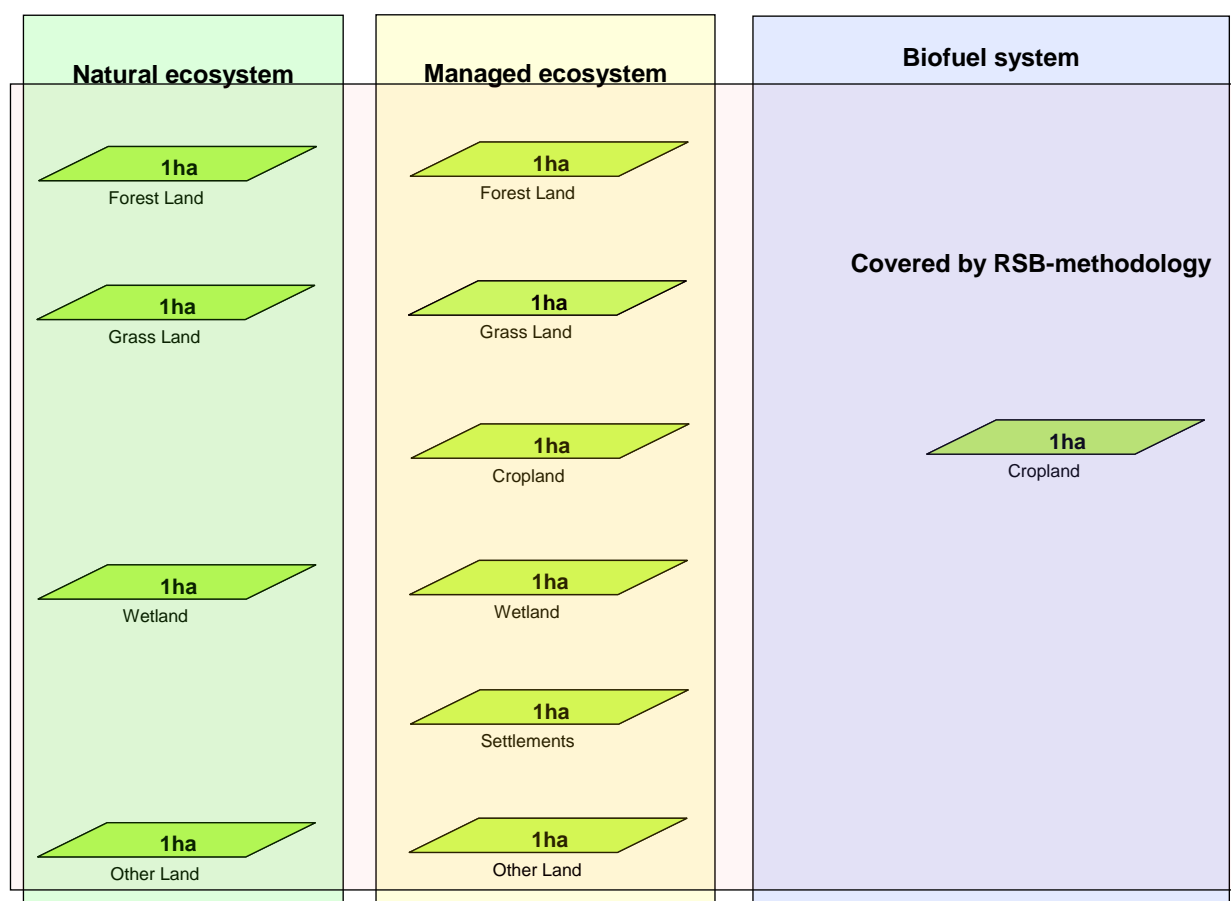
<b>Factor</b>	<b>Strata</b>
<b>Climate</b>	Boreal Cold temperate dry Cold temperate wet Warm temperate dry Warm temperate moist Tropical dry Tropical moist Tropical wet
<b>Soil</b>	High activity clay Low activity clay Sandy Spodic Volcanic Wetland Organic

<b>Biomass (Ecological zone)</b>	Tropical rainforest Tropical moist deciduous forest Tropical dry forest Tropical shrubland Tropical desert Tropical mountain systems Subtropical humid forest Subtropical dry forest Subtropical steppe Subtropical desert Subtropical mountain systems Temperate oceanic forest Temperate continental forest Temperate steppe Temperate desert Temperate mountain systems Boreal coniferous forest Boreal tundra woodland Boreal mountain systems Polar
<b>Management practice</b>	Intensive tillage/Reduced till/No-till Long term cultivated Perennial tree crop Liming High/Low/Medium Input Cropping Systems Improved Grassland Unimproved Grassland

### 3.2.3 Types of Land Use Change

Tier 1 Land Use types in IPCC 2006 are used. Consequently, land use changes comprise managed ecosystem to managed ecosystem (e.g., cropland to cropland) and unmanaged ecosystem to managed ecosystem (e.g., forest to cropland). Palm oil plantations are treated as cropland, and concretely as a perennial crop/tree crop within the cropland category.

Figure 3-1 shows the types of land use transformations covered by the RSB-methodology. All land use categories refer to IPCC 2006 (IPCC 2006).



**Figure 3-1: Land use changes, which can be calculated with the RSB Methodology. The categories are taken from the IPCC Guidelines 2006, p. 1.9. The RSB Methodology covers transformation of several natural and managed ecosystems to cropland.**

In general, in order to calculate the CO<sub>2</sub> emissions from direct LUC, the carbon content of the implemented biofuel system (cropland) is subtracted from the carbon content of the land use at the reference date (01.01.2009). If a managed ecosystem is transformed to a biofuel system (a cropland), the carbon content of the baseline land use is calculated (i.e., the managed ecosystem) as that of a natural ecosystem.

The RSB methodology covers the transformation of natural ecosystems to biofuel systems as well as the transformation of managed ecosystems to biofuel systems. It covers only direct land use change emissions.

The user will be able to select the land use types that most appropriately define (a) their biofuel feedstock ("project land use type"), and (b) the "baseline land use type".

### 3.2.4 Baseline and Project Land Use Type

The land use boundary comprises the total area affected by biofuel operations, including planted area, ecological corridors, buffer zones, etc.

- "Baseline land use type" is the land use type at the time of the baseline date. The baseline date is January 1, 2009 or earlier, if another sustainability standard (operational or currently under development) with an earlier cutoff date applied to the project.

- "Project land use type" is as follows:
  - o Annual crops: land use type at the time of maturity (after 1 year);
  - o Perennial crops (life span more than a year): land use type at the time of evaluation (actual value).

### **3.2.5 Carbon pools taken into account**

In order to determine the difference between the carbon content of the natural and the managed ecosystem three kind of carbon pools are taken into account:

- (i) above ground biomass (AGB) and below ground biomass (BGB)
- (ii) dead organic matter (DOM) and
- (iii) soil organic carbon (SOC).

This corresponds to the tier 1 methodology determined in the IPCC 2006 (IPCC 2006). In the first step the carbon content of the baseline and use at the reference data is calculated. Starting from this carbon content, the carbon content of the projected land use is derived. Both carbon contents are calculated in dependence on (i) the ecozone, (ii) the land use category, (iii) the world region and (iiii) the cultivation practice. In the third step, the difference between both, i.e. the carbon content of the land use at the reference data and the bio-fuel land use is calculated and related to the functional unit. This include, the transformation of the calculated difference in carbon content to CO<sub>2</sub> using the mol factor between C and CO<sub>2</sub> (44/12).

### **3.2.6 Accounting Period and Annualization**

Carbon emissions due to DLUC will be annualized over a 20-year period using a straight line discounting method. In other words, the accounting period refers to 20 years.

### **3.2.7 Carbon Stock (CS) Values**

Carbon stock data, including above-ground biomass (AGB), soil organic carbon (SOC), and dead organic matter (DOM), are taken from IPCC 2006 (Tier 1 and 2<sup>3</sup>), except for Peat land, in which case such factors are based on Hooijer et al. (2006). Note that IPCC Tier 1 factors are built into the online RSB Tool, but Tier 2 are not. The operator can enter CS data relevant to their operations if they have detailed knowledge of such data. Under IPCC 2006, this means using Tier 3<sup>4</sup> CS data.

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<sup>3</sup> Tier 2 uses the same methodological approach as Tier 1 but "applies emissions and stock change factors that are based on country- or region-specific data, for the most important land-use of regions..."

<sup>4</sup> Tier 3 "applies higher order methods, including models and inventory measurement systems tailored to address national circumstances, repeated over time, and driven by high-resolution activity data and disaggregated at sub-national level"

### 3.2.8 Carbon Sequestration

The original land use biomass at baseline date can be harvested instead of discarded, and hence the embedded carbon would be effectively sequestered. For example, wood can be harvested and converted into wood or products, such as furniture or wood for construction, instead of being disposed of in a landfill.

One option could be to assign a carbon sequestration credit; this could be done based on the half life<sup>5</sup> of the product. However, carbon sequestration in biomass is *not* taken into account in the methodology because it would require, for consistency's sake, to assign carbon sequestration credits to all products in the system.

### 3.2.9 Differences to the Renewable Energy Directive (RED)

The RSB methodology differs with regard to the following aspects from the RED:

1. It takes account of forgone sequestration, i.e. carbon sequestration avoided by the land transformation.
2. It provides the possibility to take account of the GHG emissions associated with slashing and burning of the land use at reference date.
3. It considers N<sub>2</sub>O emissions associated with a loss of soil organic carbon.

For all other aspects RSB methodology uses the same assumptions and default values than the RED.

## 3.3 Calculation of Carbon Stocks

### 3.3.1 Central Equation

**Equation 3-1:** Equation for the computation of the annual CO<sub>2</sub> emissions from LUC in g CO<sub>2</sub> per kg crop (source: adapted from (IPCC 2006))

$$\Delta CO_{2LUC\_kgcrop} = \left[ \frac{\left\{ (\Delta C_B - C_{SOILS}) * \left( \frac{44}{12} \right) * 1000 \right\} + L_{fire}}{(Y_{PLUC} * t)} \right] * 1000$$

Where

$\Delta CO_{2LUC\_kgcrop}$  = annual CO<sub>2</sub> emissions from LUC in g CO<sub>2</sub> per kg crop at farm gate.

$\Delta C_B$  = change in carbon stocks in biomass on land converted to other land-use category, in tonne C ha<sup>-1</sup> (use Equation 3-2 to determine  $\Delta C_B$  ).

$C_{SOILS}$  = change in carbon stock in soil organic carbon, in tonne C ha<sup>-1</sup>.

<sup>5</sup> RFS (2009), Table 2.4-28. Half-life for Forest Products in End Uses, p.366



$\left(\frac{-44}{12}\right)$  = Transformation of carbon to CO<sub>2</sub>.

$L_{fire}$  = amount of greenhouse gas emissions from fire, tonne of all GHG in kg CO<sub>2</sub> equiv. ha<sup>-1</sup>. Use Equation 3-4.

$Y_{PLUC}$  = annual yield of the projected land use, in kg ha<sup>-1</sup> fresh mass.

t = accounting period, 20 years

### 3.3.2 Calculation of carbon losses / gains from the difference in vegetation

#### 3.3.2.1 Equations

In order to calculate the change in carbon stocks in biomass Equation 3-2 subtracts the net carbon accumulation by the projected land use from the carbon stored in the land use at the reference date. All terms in the equation refer to the given accounting period of 20 years, e.g. the decrease in biomass carbon stocks due to losses from harvesting reflect the amount of carbon harvested over 20 years.

**Equation 3-2:** Calculation of greenhouse gas emissions from biomass (source: adapted from (IPCC 2006), p. 2.20.)

$$\Delta C_B = \left[ AGB_{Total} + BGB_{Total} + DOM_{Total} + C_{Foregone} \right] - B_{fire} - \left[ (C_{GTotal} - C_L) \right]$$

Where:

$\Delta C_B$  = change in carbon stocks in biomass on land converted to other land-use category, in tonne C.

$AGB_{Total}$  = total carbon content of AGB per ha-1 in tons C. Determine AGB value of the former land use by means of the respective land use type and Table 2 -10.

$BGB_{Total}$  = total carbon content of below ground biomass (BGB) per ha-1 in tons C. Determine BGB value of the former land use by means of the respective land use type and Table 2 -10.

$DOM_{Total}$  = total carbon content of dead organic matter (DOM) per ha-1 in tons C. Only relevant if the former land use was forest land. Use Equation 3-3.

$C_{Foregone}$  = annual carbon sequestration avoided by the land use change, i.e. foregone sequestration in tonne C ha-1. Use Table 3-10.

$B_{fire}$  = biomass carbon losses due to fire in tonne C per ha-1. Use Equation 3-5.

$C_L$  = decrease in biomass carbon stocks due to losses from harvesting on the projected land use over the given accounting period in tonne C ha-1. See Equation 3-7.

$C_{GTotal}$  = gross increase in carbon stocks in biomass due to growth on the projected land use over the given accounting period, in tonne C ha<sup>-1</sup>. See Equation 3-6.

Dead organic matter (DOM) consists of dead wood and litter. IPCC 2006 (IPCC 2006) only provides default carbon values for litter in natural forests. Table 3-9 shows the available default values.

**Equation 3-3:** Annual change in carbon stocks in dead wood and litter due to land conversion (source: adapted from IPCC (2006).

$$DOM_{Total} = (C_{DW} + C_{LT})$$

Where:

$DOM_{Total}$  = Total dead organic matter in a forest in tonne C yr<sup>-1</sup>.

$C_{DW}$  = dead wood stock, tonne C ha<sup>-1</sup>.

$C_{LT}$  = litter stock, tonne C ha<sup>-1</sup>. See Table 3-9 for default values.

The RSB does consider the greenhouse gas emissions caused by fires on the land use at reference date. The calculation in the brackets is done for each GHG separately, e.g., CH<sub>4</sub>, N<sub>2</sub>O, etc.

**Equation 3-4:** Calculation of greenhouse gas emissions from fire (source: adapted from IPCC (2006).

$$L_{fire} = \sum_i If_i * \left\{ \left[ (AGB_{Total} + DOM_{Total}) * C_f \right] * (G_{ef} * 10^{-3}) \right\}_i$$

Where:

$L_{fire}$  = Global Warming Potential (GWP) induced by fires, in kg CO<sub>2</sub> equiv. per ha<sup>-1</sup>;

$If$  = impact factor of the fuel in terms of CO<sub>2</sub> equiv.; Use Table 3-14.

$AGB_{Total}$  = carbon content of above ground biomass. Determine AGB value of the land use at reference date by means of the respective land use type and AGB values listed in Tables in this Chapter.

$DOM_{Total}$  = carbon content of dead organic matter. Only relevant if land use at reference date is forest land.

$C_f$  = combustion factor, dimensionless. To select the appropriate default value use Table 3-15.

$G_{ef}$  = emission factor, g per kg<sup>-1</sup> dry matter burnt; Use Table 3-13 to determine the appropriate value.

i = the respective greenhouse gas, e.g. methane.

The calculation of carbon losses induced by fires is done in order to avoid double counting.

**Equation 3-5:** Calculation of carbon losses induced by fires (source: adapted from IPCC (2006)).

$$B_{fire} = [AGB_{Total} * C_f] + [DOM_{Total} * C_f]$$

**Equation 3-6:** Annual gross increase in biomass carbon stocks due to biomass increment in the projected land use (source: adapted from (IPCC 2006)).

$$C_{GTotal} = C_{Gn} + C_L$$

Where:

$C_{GTotal}$  = average gross increase in biomass carbon stocks due to biomass growth over the given accounting period, tonne C per ha-1. For annual crops  $C_{GTotal}$  is assumed to be equal to  $C_L$ , i.e.  $C_{Gn}$ , the net increase in biomass carbon stocks is zero.

$C_{Gn}$  = mean net increase in biomass carbon stocks due to biomass growth by vegetation type and climatic zone, tonne C per ha-1. For the growth rate of sugarcane, miscanthus, generic or specific perennial crops use the default values given in the Tables in this chapter. For all other croplands use zero.

$C_L$  = biomass carbon loss due to biofuel harvest over the assessed time period, ton carbon ha-1 over the accounting period.

### 3.3.2.2 Annual carbon losses on the projected land use induced by biofuel harvest

**Equation 3-7:** Annual carbon loss in biomass of biofuel removals (source: adapted from (IPCC 2006), p. 2.15).

$$C_L = t(Y_{Biofuel} * CF)$$

Where:

$C_L$  = biomass carbon loss due to biofuel harvest over the assessed time period, tonne carbon ha-1 yr-1.

$Y_{Biofuel}$  = amount of biomass harvested over the given accounting period, tonne d. m. ha-1.

$CF$  = carbon fraction of dry matter, tonne C per tonne d.m. Use

Table 3-12.

$t$  = time period, use 20 years as default.

### 3.3.3 Tables

As shown by Table 3-1, for annual crops the general assumption is that all of the AGB and BGB is harvested in the production period. In other words, the carbon harvested with the biomass is assumed to be equal to the carbon accumulated during the production period. Consequently, the mean annual net increase in biomass carbon stocks is zero.

**Table 3-1: Vegetation values for annual cropland (general).**

Climate region	RSB			RED
	AGB [tonne C per ha-1]	BGB [tonne C per ha-1]	$C_{Gn}$ [tonne C per ha-1]	CVeg [tonne C per ha-1]
All	n.a.	n.a.	0	0

For perennial crops Table 3-2, Table 3-3, Table 3-4 and Table 3-5 give default values for  $C_{Gn}$ .

**Table 3-2: Vegetation values for perennial crops (general). Only the carbon accumulation of the half production cycle is taken into account. Consequently, the sum of AGB and BGB (which reflect the carbon accumulated over 20 years) is multiplied with 0.5. Source: adapted from (Commission 2010).**

Climate region	RSB			RED
	AGB [tonne C per ha-1]	BGB [tonne C per ha-1]	$C_{Gn}$ [tonne C per ha-1]	CVeg [tonne C per ha-1]
Temperate (all moisture regimes)	63	23.3	43.2	43.2
Tropical, dry	9	3.3	6.2	6.2
Tropical, moist	21	7.8	14.4	14.4
Tropical, wet	50	18.5	34.3	34.3

**Table 3-3: Vegetation values for specific perennial crops. Values reflect literature data. The half cycle is taken into account, i.e. the amount of carbon accumulated after 10 years. Source: adapted from (Commission 2010).**

Climate region	Croptype	RSB			RED
		AGB [tonne C	BGB [tonne	$C_{Gn}$ [tonne C	CVeg [tonne

		per ha-1]	C per ha-1]	per ha-1]	C per ha-1]
All	Coconuts	n.a.	n.a.	75	75
Tropical, dry	Jatropha	n.a.	n.a.	17.5	17.5
Tropical, moist	Jojoba	n.a.	n.a.	2.4	2.4
Tropical, wet	Oil Palm	n.a.	n.a.	60	60

**Table 3-4: Vegetation values for miscanthus (specific). Due to the annual harvest AGB is not taken into account. However, BGB, i.e. carbon accumulation due to roots, is accounted for. The carbon content per kg dry mass is assumed to be 50% Source: adapted from (Commission 2010).**

Domain	Climate region	Ecological zone	Continent	RSB			RED
				AGB [tonne C per ha-1]	BGB [tonne C per ha-1]	$C_{Gn}$ [tonne C per ha-1]	CVeg [tonne C per ha-1]
Subtropical	Warm temperate dry	Subtropical dry forest	Europe	0	10	10	10
			North America	0.	14.9	14.9	14.9
		Subtropical steppe	North America	0	14.9	14.9	14.9

**Table 3-5: Vegetation values for sugar cane (source: adapted from (Commission 2010))**

Domain	Climate region	Ecological zone	Continent	RSB		RED
				AGB [tons C per hectare)	BGB [tonne C per ha-1]	CVeg [tonne C per ha-1]
Tropical	Tropical dry	Tropical dry forest	Africa	0	4.2	4.2
			Asia (continental, insular)	0	4	4
		Tropical shrub land	Asia (continental, insular)	0	4	4
	Tropical	Tropical	Africa	0	4.2	4.2

	moist	moist deciduous forest	Central and South America	0	5	5
	Tropical wet	Tropical rain forest	Asia (continental, insular)	0	4	4
			Central and South America	0	5	5
Subtropical	Warm temperate dry	Subtropical steppe	North America	0	4.8	4.8
	Warm temperate moist	Subtropical humid forest	Central and South America	0	5	5
			North America	0	4.8	4.8

**Table 3-6: Vegetation values for grassland (general). Source: adapted from (IPCC 2006; Commission 2010).**

Climate region	RSB			RED
	AGB [tonne C per ha-1]	BGB [tonne C per ha-1]	Total [tonne C per ha-1]	CVeg [tonne C per ha-1]
Boreal – Dry & Wet	0.79	3.51	4.3	4.3
Cool Temperate – Dry	0.79	2.51	3.3	3.3
Cool Temperate – Wet	1.13	5.67	6.8	6.8
Warm Temperate – Dry	0.75	2.35	3.1	3.1
Warm Temperate – Wet	1.27	5.53	6.8	6.8
Tropical – Dry	1.08	3.32	4.4	4.4
Tropical – Moist & Wet	2.91	5.19	8.1	8.1

**Table 3-7: Vegetation values for scrubland namely land with vegetation composed largely of woody plants lower than 5 meter not having clear physiognomic aspects of trees. Source: adapted from (Commission 2010).**

Domain	Continent	RSB	RED
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		<b>AGB [tonne C per ha-1]</b>	<b>BGB [tonne C per ha-1]</b>	<b>Total [tonne C per ha-1]</b>	<b>CVeg [tonne C per ha-1]</b>
Tropical	Africa	33	13	46	46
	North and South America	38	15	53	53
	Asia (continental)	28	11	39	39
	Asia (insular)	33	13	46	46
	Australia	33	13	46	46
Subtropical	Africa	33	10	43	43
	North and South America	28	12	50	50
	Asia (continental)	28	9	37	37
	Asia (insular)	33	10	43	43
	Australia	32	11	43	43
Temperate	Global	5	2	7	7

**Table 3-8: Vegetation values for forest land – excluding forest plantations – having between 10% and 30% canopy cover. Values are calculated using 20% of the values of the AGB + BGB values of mature forest outlined by the IPCC (without DOM). Values are rounded Source: adapted from (Commission 2010).**

Domain	Ecological zone	Continent	RSB (IPCC 2006)			RED
			AGB [tonne C per ha-1]	BGB [tonne C per ha-1]	Total [tonne C per ha-1]	CVeg [tonne C per ha-1]
Tropical	Tropical rain forest	Africa	29	11	40	40
		North and South	28	10	39	39
		Asia (continental)	26	10	36	36
		Asia (insular)	33	12	45	45
	Tropical moist forest	Africa	24	6	30	30
		North and South	21	5	26	26
		Asia (continental)	17	4	21	21

	Tropical dry forest	Asia (insular)	27	7	34	34
		Africa	11	3	14	14
		North and South	20	6	25	25
		Asia (continental)	12	3	16	16
	Tropical mountain systems	Asia (insular)	15	4	19	19
		Africa	21	8	13	13
		North and South	17	1	17	17
		Asia (continental)	27	12	16	16
Subtropical	Subtropical humid forest	Asia (insular)	13	13	26	26
		North and South	20	7	26	26
		Asia (continental)	12	9	22	22
	Subtropical dry forest	Asia (insular)	15	20	35	35
		Africa	8	9	17	17
		North and South	8	18	26	26
		Asia (continental)	6	10	16	16
		Asia (insular)	7	13	20	20
	Subtropical steppe	Asia (insular)	7	2	9	9
		Asia (continental)	6	1	7	7
		North and South	8	2	10	10
		Africa	8	2	9	9
Temperate	Temperate oceanic forest	Asia (insular)	7	2	9	9
		North and South	12	3	16	16
		North and South	5	1	6	6
		Asia, Europe ( $\leq 20$ )	9	3	12	12
	Temperate continental forest	Asia, Europe ( $\geq 20$ )	12	3	16	16
		North and South	5	1	6	6
		North and South	5	1	6	6
		Asia, Europe ( $\leq 20$ )	9	3	12	12
	Temperate mountain systems	Asia, Europe ( $\geq 20$ )	12	3	16	16
		North and South	5	1	6	6
		North and South	5	1	6	6
		Asia, Europe ( $\leq 20$ )	9	3	12	12
Boreal	Boreal coniferous forest	Asia, Europe, North America	8	2	12	12
	Boreal tundra woodland	Asia, Europe, North	0	0	0	0
		Asia, Europe, North	2	0	2	2
	Boreal mountain system	Asia, Europe, North	1	0	2	2
		Asia, Europe, North	5	1	6	6



**Table 3-9: Vegetation values for forest land – excluding forest plantations – having more than 30% canopy cover. Calculated on the basis of (IPCC 2006) using a carbon content of 0.47 kg C per kg d.m. DOM only includes litter, i.e. if specific values for the dead wood stock must be added separately.**

Domain	Ecological zone	Continent	RSB				RED
			AGB [tonne C per ha-1]	BGB [tonne C per ha-1]	DOM [tonne C per ha-1]	Total [tonne C per ha-1]	CVeg [tonne C per ha-1]
Tropical	Tropical rain forest	Africa	146	54	5	205	205
		North and	141	52	5	198	198
		Asia (continen-	132	49	5	185	185
		Asia (insular)	165	61	5	231	231
	Tropical moist for- est	Africa	122	29	5	157	157
		North and	103	25	5	133	133
		Asia (continen-	85	20	5	110	110
		Asia (insular)	236	33	5	174	174
	Tropical dry forest	Africa	56	16	5	77	77
		North and	99	28	5	132	132
		Asia (continen-	61	17	5	83	83
		Asia (insular)	75	21	5	101	101
	Tropical mountain systems	Africa	56	15	5	77	77
		North and	71	19	5	95	95
		Asia (continen-	66	18	5	89	89
		Asia (insular)	99	27	5	131	131
Subtropical	Subtropical humid for- est	North and	103	25	4	132	132
		Asia (continen-	85	20	4	109	109
		Asia (insular)	136	33	4	173	173
	Subtropical dry forest	Africa	66	18	4	88	88
		North and	99	28	4	130	130
		Asia (continen-	61	17	4	82	82
		Asia (insular)	75	21	4	100	100
	Subtropical steppe	Africa	33	9	4	46	46
		North and	38	12	4	54	54
		Asia (continen-	28	9	4	41	41
		Asia (insular)	33	11	4	48	48
Temperate	Temperate oceanic forest	Europe	56	15	13	85	84
		North America	310	84	13	407	406
		New Zealand	169	46	13	228	227
		South America	85	23	13	120	120

	Temperate continental forest	Asia, Europe	9	3	16	28	28
		Asia, Europe	56	15	16	88	88
		North and	28	8	16	52	52
		North and	61	16	16	94	94
	Temperate mountain systems	Asia, Europe	47	13	16	76	76
		Asia, Europe	61	16	16	94	94
		North and	24	6	16	46	46
		North and	61	16	16	94	94
Boreal	Boreal co-	Asia, Europe,	24	6	25	54	54
	Boreal tundra	Asia, Europe,	2	0	25	27	27
		Asia, Europe,	9	2	25	37	37
	Boreal mountain	Asia, Europe,	7	2	25	34	34
		Asia, Europe,	24	6	25	54	54

**Table 3-10: Foregone sequestration caused by deforestation of forest. Values are calculated on the basis of Table 4.9 (IPCC 2006) using a carbon content of 0.47 kg C per kg d.m.**

<i>Domain</i>	<i>Ecological zone</i>	<i>Continent</i>	<i>Maturity</i>	<i>Foregone sequestration [tonne C per ha-1]</i>
Tropical	Tropical rain forest	Africa	<= 20 y	94
		Africa	> 20 y	29
		North America	n.a.	89
		South America	<= 20 y	109
		South America	> 20 y	29
		Asia (continental)	<= 20 y	66
		Asia (continental)	> 20 y	21
		Asia (insular)	<= 20 y	122
		Asia (insular)	> 20 y	32
	Tropical moist forest	Africa	<= 20 y	47
		Africa	> 20 y	12
		North and South America	<= 20 y	66
		North and South America	> 20 y	19
		Asia (continental)	<= 20 y	85
		Asia (continental)	> 20 y	19
		Asia (insular)	<= 20 y	103
		Asia (insular)	> 20 y	28
	Tropical dry forest	Africa	<= 20 y	23
		Africa	> 20 y	17
		North and South America	<= 20 y	38

		North and South America	> 20 y	9
		Asia (continental)	<= 20 y	56
		Asia (continental)	> 20 y	14
		Asia (insular)	<= 20 y	66
		Asia (insular)	> 20 y	19
	Tropical shrub-land	Africa	<= 20 y	4
		Africa	> 20 y	8
		North and South America	<= 20 y	38
		North and South America	> 20 y	9
		Asia (continental)	<= 20 y	47
		Asia (continental)	> 20 y	12
		Asia (insular)	<= 20 y	19
		Asia (insular)	> 20 y	9
	Tropical mountain systems	Africa	<= 20 y	33
		Africa	> 20 y	12
		North and South America	<= 20 y	32
		North and South America	> 20 y	8
		Asia (continental)	<= 20 y	28
		Asia (continental)	> 20 y	7
		Asia (insular)	<= 20 y	71
		Asia (insular)	> 20 y	19
Subtropical	Subtropical humid forest	North and South America	<= 20 y	66
		North and South America	> 20 y	19
		Asia (continental)	<= 20 y	85
		Asia (continental)	> 20 y	19
		Asia (insular)	<= 20 y	103
		Asia (insular)	> 20 y	28
	Subtropical dry forest	Africa	<= 20 y	23
		Africa	> 20 y	17
		North and South America	<= 20 y	38
		North and South America	> 20 y	9
		Asia (continental)	<= 20 y	56
		Asia (continental)	> 20 y	14
		Asia (insular)	<= 20 y	66
		Asia (insular)	> 20 y	19
	Subtropical mountain system	Africa	<= 20 y	33
		Africa	> 20 y	12
		North and South America	<= 20 y	32
		North and South America	> 20 y	8
		Asia (continental)	<= 20 y	28
		Asia (continental)	> 20 y	7

Temperate	Temperate oceanic forest	Asia (insular)	<= 20 y	81
		Asia (insular)	> 20 y	19
		Europe	n.a.	22
		North America	n.a.	141
		New Zealand	n.a.	33
		South America	n.a.	53
	Temperate continental forest	Asia, Europe (<=20 y)	<= 20 y	38
		Asia, Europe (<=20 y)	> 20 y	38
		North and South America	<= 20 y	38
		North and South America	> 20 y	38
		North and South America	<= 20 y	38
	Temperate	Asia, Europe, North America	n.a.	28
Boreal	Boreal coniferous	Asia, Europe, North America	n.a.	10
	Boreal tundra	Asia, Europe, North America	n.a.	4
	Boreal mountain system	Asia, Europe, North America	<= 20 y	12
		Asia, Europe, North America	> 20 y	10

**Table 3-11: Vegetation values for forest plantations. The half cycle is used to assess the carbon accumulation within the accounting period, i.e. the total carbon accumulation is divided by two. Source: adapted from (IPCC 2006) and (Commission 2010).**

Domain	Ecological zone	Continent	RSB			RED
			AGB [tonne C per ha-1]	BGB [tonne C per ha-1]	Total [tonne C per ha-1]	CVeg [tonne C per ha-1]
Tropical	Tropical rain forest	Africa broadleaf > 20 y	141	34	87	87
		Africa broadleaf = < 20 y	47	11	29	29
		Africa Pinus sp. > 20 y	94	23	58	58
		Africa Pinus sp. = < 20 y	28	7	17	17
		Americas Eucalyptus sp.	94	23	58	58
		Americas Pinus sp.	141	34	87	87
		Americas Tectona grandis	113	27	70	70
		Americas other broadleaf	71	17	44	44
		Asia broadleaf	103	25	64	64
		Asia other	61	15	38	38
Tropical	Tropical moist deciduous	Africa broadleaf > 20 y	71	17	44	44
		Africa broadleaf = < 20 y	38	9	23	23
		Africa Pinus sp. > 20 y	56	14	35	35

	forest	Africa Pinus sp. = <20 y	19	5	12	12
		Americas Eucalyptus sp.	42	10	26	26
		Americas Pinus sp.	127	30	79	79
		Americas Tectona grandis	56	14	35	35
		Americas other broadleaf	47	11	29	29
		Asia broadleaf	85	20	52	52
		Asia other	47	11	29	29
Tropical	Tropical dry forest	Africa broadleaf > 20 y	33	9	8721	8721
		Africa broadleaf = <20 y	14	4	9	9
		Africa Pinus sp. > 20 y	28	8	18	18
		Africa Pinus sp. = <20 y	9	3	6	6
		Americas Eucalyptus sp.	42	12	27	27
		Americas Pinus sp.	52	14	33	33
		Americas Tectona grandis	42	12	27	27
		Americas other broadleaf	28	8	18	18
		Asia broadleaf	42	12	27	27
		Asia other	28	8	18	18
Tropical	Tropical shrubland	Africa broadleaf	9	3	6	6
		Africa Pinus sp. > 20 y	9	3	6	6
		Africa Pinus sp. = <20 y	7	2	4	4
		Americas Eucalyptus sp.	28	8	18	18
		Americas Pinus sp.	28	8	18	18
		Americas Tectona grandis	24	6	15	15
		Americas other broadleaf	14	4	9	9
		Asia broadleaf	19	5	12	12
		Asia other	14	4	9	9
Tropical	Tropical mountain systems	Africa broadleaf > 20 y	49	12	31	31
		Africa broadleaf = > 20 y	33	8	20	20
		Africa Pinus sp. = <20 y	31	7	19	19
		Africa Pinus sp. = <20 y	12	3	7	7
		Americas Eucalyptus sp.	35	8	22	22
		Americas Pinus sp.	54	13	29	29
		Americas Tectona grandis	38	9	23	23
		Americas other broadleaf	26	6	16	16
		Asia broadleaf	45	11	28	28
		Asia other	25	6	15	15
Subtropical	Subtropical humid forest	Americas Eucalyptus sp.	66	18	42	42
		Americas Pinus sp.	127	36	81	81
		Americas Tectona grandis	56	16	36	36
		Americas other broadleaf	47	13	30	30
		Asia broadleaf	85	24	54	54

		Asia other	47	13	30	30
Subtropical	Subtropical dry forest	Africa broadleaf>20 y	33	9	21	21
		Africa broadleaf =<20 y	14	5	9	9
		Africa Pinus sp. >20 y	28	9	19	19
		Africa Pinus sp. =<20 y	9	3	6	6
		Americas Eucalyptus sp.	52	17	34	34
		Americas Pinus sp.	52	17	34	34
		Americas Tectona grandis	42	14	28	28
		Americas other broadleaf	28	9	19	19
		Asia broadleaf	42	14	28	28
		Asia other	28	9	19	19
Subtropical	Subtropical steppe	Africa broadleaf	9	3	6	6
		Africa Pinus sp. >20 y	9	3	6	6
		Africa Pinus sp. =<20 y	7	2	5	5
		Americas Eucalyptus sp.	28	9	19	19
		Americas Pinus sp.	28	9	19	19
		Americas Tectona grandis	24	8	16	16
		Americas other broadleaf	14	5	9	9
		Asia broadleaf > 20 y	38	12	25	25
		Asia broadleaf =< 20 y	5	2	3	3
		Asia coniferous > 20 y	9	3	6	6
		Asia coniferous =< 20 y	52	17	34	34
Subtropical	Subtropical mountain systems	Africa broadleaf>20 y	49	12	31	31
		Africa broadleaf =<20 y	33	8	20	20
		Africa Pinus sp. >20 y	31	7	19	19
		Africa Pinus sp. =<20 y	12	3	7	7
		Americas Eucalyptus sp.	35	8	22	22
		Americas Pinus sp.	54	13	34	34
		Americas Tectona grandis	38	9	23	23
		Americas other broadleaf	26	6	16	16
		Asia broadleaf	45	11	28	28
		Asia other	25	6	15	15
Temperate	Temperate oceanic forest	Asia, Europe, broadleaf>20	94	25	60	60
		Asia, Europe, broadleaf	14	4	9	9
		Asia, Europe, coniferous	94	25	60	60
		Asia, Europe, coniferous	19	5	12	12
		North America	82	22	52	52
		New Zealand	118	32	75	75
		South America	49	13	31	31
Temperate	Temperate	Asia, Europe, broadleaf>20	94	25	60	60

	continental forest and mountain systems	Asia, Europe, broadleaf	7	2	4	4
		Asia, Europe, coniferous	82	22	52	52
		Asia, Europe, coniferous	13	3	7	7
		North America	82	22	52	52
		South America	49	13	31	31
Boreal	Boreal coniferous forest and	Asia, Europe > 20 y	19	5	12	12
		Asia, Europe = < 20 y	2	1	1	1
		North America	21	5	13	13
Boreal	Boreal tundra woodland	Asia, Europe > 20 y	12	3	7	7
		Asia, Europe = < 20 y	2	1	1	1
		North America	12	3	7	7

**Table 3-12: Default crop parameters. Carbon fraction of the respective crops can be used to determine  $C_L$ , the biomass carbon loss due to biofuel harvest. Only relevant if no default data for  $C_{Gn}$  (the mean net increase in biomass carbon stocks due to biomass growth) is available. Source: Ecoinvent (Jungbluth, Chudacoff et al. 2007)**

Crop	Carbon fraction [kg C / kg crop fresh mass]	Moisture	Cultivation time [month]
Rape seed	0.732	6%	10.83
Soybeans	0.374	11%	6
Sugar beets	0.088	77%	7
Sugar cane	0.123	n.a.	10.8
Sweet sorghum stem	0.115	73%	4.01
Jatropha seed	0.575	5%	12
Potatoes	0.087	78%	5.67
Palm fruit bunches	0.313	47%	12

**Table 3-13: Emission factors (g kg dry matter burnt) for various types of burning. Source: adapted from (IPCC 2006).**

Category	CO <sub>2</sub>	CO	CH <sub>4</sub>	N <sub>2</sub> O	NO <sub>x</sub>
Savannah and grassland	1613	65	2.3	0.21	2.9

Agricultural residues	1515	92	2.7	0.07	2.5
Tropical forest	1569	107	6.8	0.2	1.6
Extra tropical forest	1569	107	4.7	0.26	3.0
Biofuel burning	1550	78	6.1	0.06	1.1

**Table 3-14: Impact factor (Global Warming Potential) for prominent greenhouse gases according to ReCiPe (Goedkoop, Heijungs et al. 2009).**

Category	CO <sub>2</sub>	CO	CH <sub>4</sub>	N <sub>2</sub> O	NO <sub>x</sub>
Savannah and grassland	1	0	24	298	0

**Table 3-15: Combustion factor values (proportion of pre-fire fuel biomass consumed) for fires in a range of vegetation types. Source: adapted from (IPCC 2006).**

Vegetation type	Subcategory	Combustion factor
Primary tropical forest (slash and burn)	Primary tropical forest	0.32
	Primary open tropical forest	0.45
	Primary tropical moist forest	0.50
	Primary tropical dry forest	-
All primary tropical forests		0.36
Secondary tropical forest (slash and burn)	Young secondary tropical forest (3-5 yrs)	0.46
	Intermediate secondary tropical forest (6-10 yrs)	0.6
	Advanced secondary tropical forest (14-17 yrs)	0.5
All secondary tropical forests		0.55
All tertiary tropical forest		0.59
Boreal forest	Wildfire (general)	0.40



	Crown fire	0.43
	Surface fire	0.15
	Post logging slash burn	0.33
	Land clearing fire	0.59
All boreal forest		0.34
Eucalyptus forests	Wildfire	-
	Prescribed fire – (surface)	0.61
	Post logging slash burn	0.68
	Felled and burned (land clearing fire)	0.49
All Eucalyptus forest		0.63
Other temperate forests	Post logging slash burn	0.62
	Felled and burned (land-clearing fire)	0.51
All “other” temperate forests		0.45
Shrublands	Shrubland (general)	0.95
	Callina heath	0.71
	Fynbos	0.61
All shrublands		0.72
Savannah woodlands (mid/late dry season burns)	Savannah woodland	0.72
	Savannah parkland	0.82
	Tropical savannah	0.73
	Other savannah woodlands	0.68
All savannah woodlands (mid/late dry season burns)		0.74
Other vegetation types	Peatland	0.50
	Tropical wetlands	0.70
Agricultural residues	Wheat residues	0.90

	Maize residues	0.80
	Rice residues	0.80
	Sugarcane	0.80

### 3.3.4 Calculation of carbon losses / gains from soils

#### 3.3.4.1 Equations

**Equation 3-8:** Annual change in carbon stocks in soil organic carbon (source: adapted from IPCC (2006).

$$C_{Soils} = [\Delta C_{Mineral} + L_{N_2O\_mineral} - (L_{Organic} + L_{N_2O\_organic})]$$

Where

$C_{Soils}$  = change in carbon stocks in soils, tonne C per ha-1 in 30 cm depth.

$\Delta C_{Mineral}$  = change in organic carbon stocks in mineral soils, tonne C per ha-1, use Equation 3-9.

$L_{N_2O\_mineral}$  = loss of carbon stemming from N<sub>2</sub>O emission, in tons C per ha-1, use Equation 3-10.

$L_{Organic}$  = annual loss of carbon stocks from drained organic soils, tonne C per ha-1 yr-1. For peat land the emission given by Hooijer are applied (Hooijer, Silvius et al. 2006), i.e. 469 tonne C per hectare (23.45 tonne C per hectare multiplied with 20 years, the accounting period). For all other organic soils no default data is available.

$L_{N_2O\_organic}$  = annual loss of N<sub>2</sub>O emission from organic soils expressed in tonne C per ha-1 yr-1, use Equation 3-11.

**Equation 3-9:** Annual change in organic carbon stocks in mineral soils (source: adapted from IPCC (2006).

$$\Delta C_{Mineral} = [(SOC_{(0-T)} - SOC_{0\ projected\_nochange}) - (SOC_{(0-T)} - SOC_{0\ projected\_biofuel})]$$

$$SOC = SOC_{REF_{c,s,i}} * F_{LU_{c,s,i}} * F_{MG_{s,s,i}} * F_{I_{c,s,i}}$$

Where:

$\Delta C_{Mineral}$  = annual change in carbon stocks in mineral soils, tonne C.

$SOC_{(0-T)}$  = soil organic carbon stock at the beginning of the inventory time period, tonne C ha-1. Use the ecozone, the land use, the soil type and the soil characteristic to determine SOC(0-T) from Table 3-16.

$SOC_0$  = soil organic carbon stock in the last year of the time period, tonne C ha-1.

$SOC_{0projected\_unchanged}$  = soil organic carbon stock in the last year of the time period in tonne C ha<sup>-1</sup>, if no land use change would have occurred (Note: equivalent to  $SOC_{REF_{c,s,i}}$  if the reference land use is Forest land).

$SOC_{0projected\_biofuel}$  = soil organic carbon stock in the last year of the time period in tonne C ha<sup>-1</sup>, if the land use change to the biofuel system has occurred.

$c$  = represents the climate zones,  $s$  the soil types, and  $i$  the set of management systems that are present.

$SOC_{REF_{c,s,i}}$  = the reference soil organic carbon stock, tonne C ha<sup>-1</sup>, i.e. equivalent to SOC(0-T). See Table 3-16.

$F_{LU_{c,s,i}}$  = stock change factor for land-use systems or sub-system for a particular land-use, dimensionless. Use Table 3-18, Table 3-19, Table 3-20, Table 3-21, Table 3-22 and Table 3-23 to determine the LU factor for cropland, grassland and forest land, respectively.

$F_{MG_{s,s,i}}$  = stock change factor for management regime, dimensionless. Use Table 3-18, Table 3-19, Table 3-20, Table 3-21, Table 3-22 and Table 3-23 to determine the LU factor for cropland, grassland and forest land, respectively.

$F_{I_{c,s,i}}$  = stock change factor for input of organic matter, dimensionless. Use Table 3-18, Table 3-19, Table 3-20, Table 3-21, Table 3-22 and Table 3-23 to determine the LU factor for cropland, grassland and forest land, respectively.

**Equation 3-10:** Carbon emissions associated with N mineralized in mineral soils as a results of loss of soil c through change in lad use or management (source: adapted from (IPCC 2006)).

$$L_{N_2O\_mineral} = \frac{If * \left[ Ef1 * (\Delta C_{Mineral} * \frac{1}{R}) \right]}{\left( \frac{44}{12} \right)}$$

Where:

$L_{N_2O\_mineral}$  = N<sub>2</sub>O emission expressed in tons C per ha<sup>-1</sup>.

$If$  = impact factor of N<sub>2</sub>O in terms of CO<sub>2</sub> equiv., use 298 as a default (Goedkoop, Heijungs et al. 2009).

$Ef1$  = emission factor N mineralised from mineral soil as a result of loss of soil carbon in kg N<sub>2</sub>O–N (kg N)–1. Use 0.01 as default.

$\Delta C_{Mineral}$  = annual change in carbon stocks in mineral soils, tonne C. Use  $\Delta C_{Mineral}$  from Equation 3-9.

R = C:N ratio of the soil organic matter. Determine R according to the land use at ref. date. If land use at ref. was forest or grassland set R =15, otherwise set R = 10.

$\frac{44}{12}$  = transformation factor from CO<sub>2</sub> to C.

**Equation 3-11:** Carbon emissions associated with N emitted by organic soils (source: adapted from (IPCC 2006)).

$$L_{N_2O\_organic} = \frac{If * \left( Ef2 * \frac{44}{28} \right)}{\left( \frac{44}{12} \right)}$$

Where:

$L_{N_2O\_organic}$  = N<sub>2</sub>O emission expressed in tons C per ha-1 y-1.

*If* = impact factor of N<sub>2</sub>O in terms of CO<sub>2</sub> equiv., use 298 as a default (Goedkoop, Heijungs et al. 2009).

*Ef2* = emission factor for N emitted by managed organic soils, in kg N<sub>2</sub>O–N (kg N)<sup>-1</sup>. Use the ecozone and the projected land use to determine *Ef2* from Table 3-17.

$\frac{44}{28}$  = transformation factor from N to N<sub>2</sub>O.

### 3.3.4.2 Tables

**Table 3-16: SOC<sub>REF</sub>, i.e. standard soil organic carbon content in the 0-30 centimetre topsoil layer (source: (IPCC 2006))**

Climate Region	High activity clay soil	Low activity clay soil	Sandy soil	Spodic soil	Volcanic soils	Wetland soils
Boreal	68	0	10	117	20	146
Cold temperate, dry	50	33	34		20	87
Cold temperate, moist	95	85	71	115	130	87
Warm temperate, dry	38	24	19		70	88

Warm temperate, moist	88	63	34		80	88
Tropical, dry	38	35	31		50	86
Tropical, moist	65	47	39		70	86
Tropical, wet	44	60	66		130	86
Tropical, montane	88	63	34		80	86

**Table 3-17: Default emission factors to estimate direct N<sub>2</sub>O emissions from managed soils (source: (IPCC 2006)).**

Climate Region	Soil type	Default value [kg N <sub>2</sub> O-N ha <sup>-1</sup> ]
Temperate	Organic crop and grassland soils	8
Temperate / Boreal	Organic nutrient rich forest soils	0.6
	Organic nutrient poor forest soils	0.1
Tropical	Organic crop and grassland soils	16
	Organic forest soils	8

**Table 3-18: Factors for cropland (FLU<sub>C</sub>) and for perennial crops (FLU<sub>P</sub>), namely multi-annual crops whose stem is usually not annually harvested such as short rotation coppice and oil palm (source: adapted from (IPCC 2006))**

Climate region	Land use	Management	Input	FLU <sub>C</sub>	FLU <sub>P</sub>	FMG	FI
Temperate / Boreal, dry	Cultivated	Full-tillage	Low	0.8	1	1	0.95
			Medium	0.8	1	1	1
			High with manure	0.8	1	1	1.37
			High without ma-	0.8	1	1	1.04
		Reduced tillage	Low	0.8	1	1.02	0.95
			Medium	0.8	1	1.02	1
			High with manure	0.8	1	1.02	1.37
			High without ma-	0.8	1	1.02	1.04
		No tillage	Low	0.8	1	1.1	0.95
			Medium	0.8	1	1.1	1
			High with manure	0.8	1	1.1	1.37
			High without ma-	0.8	1	1.1	1.04
Temperate / Boreal,	Cultivated	Full-tillage	Low	0.69	1	1	0.92

moist/wet			Medium	0.69	1	1	1
			High with manure	0.69	1	1	1.44
			High without ma-	0.69	1	1	1.11
		Reduced till- age	Low	0.69	1	1.08	0.92
			Medium	0.69	1	1.08	1
			High with manure	0.69	1	1.08	1.44
			High without ma-	0.69	1	1.08	1.11
		No tillage	Low	0.69	1	1.15	0.92
			Medium	0.69	1	1.15	1
			High with manure	0.69	1	1.15	1.44
			High without ma-	0.69	1	1.15	1.11
Tropical, dry	Cultivated	Full-tillage	Low	0.58	1	1	0.95
			Medium	0.58	1	1	1
			High with manure	0.58	1	1	1.37
			High without ma-	0.58	1	1	1.04
		Reduced till- age	Low	0.58	1	1.09	0.95
			Medium	0.58	1	1.09	1
			High with manure	0.58	1	1.09	1.37
			High without ma-	0.58	1	1.09	1.04
		No tillage	Low	0.58	1	1.17	0.95
			Medium	0.58	1	1.17	1
			High with manure	0.58	1	1.17	1.37
			High without ma-	0.58	1	1.17	1.04
Tropical, moist / wet	Cultivated	Full-tillage	Low	0.48	1	1	0.92
			Medium	0.48	1	1	1
			High with manure	0.48	1	1	1.44
			High without ma-	0.48	1	1	1.11
		Reduced till- age	Low	0.48	1	1.15	0.92
			Medium	0.48	1	1.15	1
			High with manure	0.48	1	1.15	1.44
			High without ma-	0.48	1	1.15	1.11
		No tillage	Low	0.48	1	1.2	0.92
			Medium	0.48	1		1
			High with manure	0.48	1	1.22	1.44
			High without ma-	0.48	1	1.22	1.11
Tropical, montane	Cultivated	Full-tillage	Low	0.64	1	1	0.92
			Medium	0.64	1	1	1
			High with manure	0.64	1	1	1.44
			High without ma-	0.64	1	1	1.11
		Reduced till-	Low	0.64	1	1.09	0.92
			Medium	0.64	1	1.09	1

		age	High with manure	0.64	1	1.09	1.44
			High without ma-	0.64	1	1.09	1.11
		No tillage	Low	0.64	1	1.16	0.92
			Medium	0.64	1	1.16	1
			High with manure	0.64	1	1.16	1.44
			High without ma-	0.64	1	1.16	1.11

**Table 3-19: Guidance on management and input for cropland and perennial crops (source: adapted from (IPCC 2006))**

Management / Input	Guidance
Full-tillage	Substantial soil disturbance with full inversion and/or frequent (within year) tillage operations. At planting time, little (e.g. <30%) of the surface is covered by residues.
Reduced tillage	Primary and/or secondary tillage but with reduced soil disturbance (usually shallow and without full soil inversion) and normally leaves surface with <30% coverage by residues at planting.
No till	Direct seeding without primary tillage, with only minimal soil disturbance in the seeding zone. Herbicides are typically used for weed control.
Low	Low residue return occurs when there is due to removal of residues (via collection or burning), frequent bare-fallowing, production of crops yielding low residues (e.g. vegetables, tobacco, cotton), no mineral fertilization or nitrogen-fixing crops.
Medium	Representative for annual cropping with cereals where all crop residues are returned to the field. If residues are removed then supplemental organic matter (e.g. manure) is added. Also requires mineral fertilization or nitrogen-fixing crop in rotation.
High with manure	Represents significantly higher carbon input over medium carbon input cropping systems due to an additional practice of regular addition of animal manure.
High without manure	Represents significantly greater crop residues inputs over medium carbon input cropping systems due to additional practices, such as production of high residue yielding crops, use of green manures, cover crops, improved vegetated fallows, irrigation, frequent use of perennial grasses in annual crop rotations, but without manure applied (see row above).

**Table 3-20: Factors for grassland, including savannahs (source: adapted from (IPCC 2006))**

Climate region	Land use	Management (FMG)	Input (FI)	FLU	FMG	FI
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Temperate / Bo- real, dry	Grassland	Improved	Medium	1	1.14	1
			High	1	1.14	1.11
		Nominally managed	Medium	1	1	1
		Moderately degraded	Medium	1	0.95	1
		Severely degraded	Medium	1	0.7	1
Temperate / Bo- real, moist / wet	Grassland	Improved	Medium	1	1.14	1
			High	1	1.14	1.11
		Nominally managed	Medium	1	1	1
		Moderately degraded	Medium	1	0.95	1
		Severely degraded	Medium	1	0.7	1
Tropical, dry	Grassland	Improved	Medium	1	1.17	1
			High	1	1.17	1.11
		Nominally managed	Medium	1	1	1
		Moderately degraded	Medium	1	0.97	1
		Severely degraded	Medium	1	0.7	1
Tropical, moist / wet	Grassland	Improved	Medium	1	1.17	1
			High	1	1.17	1.11
		Nominally managed	Medium	1	1	1
		Moderately degraded	Medium	1	0.97	1
		Severely degraded	Medium	1	0.7	1
Tropical Mon- tane, dry	Grassland	Improved	Medium	1	1.16	1
			High	1	1.16	1.11
		Nominally managed	Medium	1	1	1
		Moderately degraded	Medium	1	0.96	1
		Severely degraded	Medium	1	0.7	1

**Table 3-21: Guidance on management and input for grassland (source: adapted from (IPCC 2006))**

Management / Input	Guidance
Improved	Represents grassland which is sustainably managed with moderate grazing pressure and that receive at least one improvement (e.g. fertilization, species improvement, irrigation).
Nominally managed	Represents non-degraded and sustainably managed grassland, but without significant management improvements.
Moderately degraded	Represents overgrazed or moderately degraded grassland, with somewhat reduced productivity (relative to the native or nominally managed grassland) and receiving no management inputs.
Severely degraded	Implies major long term loss of productivity and vegetation cover, due to severe



	mechanical damage to the vegetation and/or severe soil erosion.
Medium	Applies where no additional management inputs have been used.
High	Applies to improved grassland where one or more additional management inputs/improvements have been used (beyond that is required to be classified as improved grassland)

**Table 3-22: Factors for forests (source: adapted from (Commission 2010))**

Climate region	Land use (FLU)	Management (FMG)	Input (FI)	FLU	FMG	FI
All	Native forest (non de-	n/a*	n/a	1		
All	Managed forest	All	All	1	1	1
Tropical, moist / dry	Shifting cultivation – shortened fallow	n/a	n/a	0.64		
	Shifting cultivation – mature fallow	n/a	n/a	0.8		
Temperate/Boreal, Moist / dry	Shifting cultivation – shortened fallow	n/a	n/a	1		
	Shifting cultivation – mature fallow	n/a	n/a	1		

**Table 3-23: Guidance on management and input for forest land(source: adapted from (IPCC 2006))**

Management / Input	Guidance
Native forest (non degraded)	Represents native or long-term, non-degraded and sustainably managed forest.
Shifting cultivation	Permanent shifting of cultivation, where tropical forest or woodland is cleared for planting of annual crops for a short time (e.g. 3-5 years) period and then abandoned to regrowth.
Mature fallow	Represents situations where the forest vegetation recovers to a mature or near mature state prior to being cleared again for cropland use.
Shortened fallow	Represents situations where the forest vegetation recovery is not attained prior to re-clearing.

## 4 Agriculture: modeling of ammonia emissions

### 4.1 Ammonia (NH<sub>3</sub>) computation from mineral fertilizers

NH<sub>3</sub> from mineral fertilizers

$$\text{NH}_{3, \text{ mineral}} [\text{kg NH}_3/\text{ha}] = \text{Quantity}_{\text{N, mineral fertilizerX}} * \text{NH}_3\text{-N fertilizerX} * 17/14$$

Quantity<sub>N, mineral fertilizerX</sub> [kg /ha]: Entry quantity N from a specific fertilizer

NH<sub>3</sub>-N fertilizerX [kg NH<sub>3</sub>/kg fertilizer]: emission factor from Table 4-1

17/14: conversion factor from NH<sub>3</sub>-N to NH<sub>3</sub>.

**Table 4-1: NH<sub>3</sub>-emissions from mineral fertilizers (% N emitted in form of NH<sub>3</sub>).**

Type of fertiliser	Emission factor for NH <sub>3</sub> -N
ammonium nitrate, calcium ammonium nitrate	2 %
ammonium sulphate	8 %
urea	15 %
multinutrient fertilisers (NPK-, NP-, NK-fertilisers)	4 %
urea ammonium nitrate	8.5 % <sup>*)</sup>
ammonia, liquid	3 %

<sup>\*)</sup> The average of ammonium nitrate and urea was taken, since no emission factor is given by Asman (1992).

### 4.2 Ammonia (NH<sub>3</sub>) computation from organic fertilizers

#### NH<sub>3</sub> from organic fertilizer application

Here we follow the model Agrammon ([www.agrammon.ch](http://www.agrammon.ch)). The model structure and technical parameters can be found in Agrammon Group (2009a, b).

The overall formula is the following.

$$\text{NH}_3\text{-N} = \text{TAN} * (\text{er} + \text{c\_app}) * \text{cx}$$

NH<sub>3</sub>-N = nitrogen emissions in form of NH<sub>3</sub> (kg N/ha)

TAN = Total ammoniacal nitrogen; this is considered equal to the soluble nitrogen content (Agrammon Group 2009b) and is calculated as the product of amount of farm manure (kg/ha) and the corresponding soluble nitrogen content (kg N/kg manure) according to Flisch et al. (2009) (kg N/ha) (Table 4-2)

er = emission rate; this is a fix emission rate for each type of farm manure (% of TAN) (Table 4-3)

c\_app = correction factor that influences the emission rate; it refers to the amount of manure per application and its degree of dilution; applies only for liquid manure. We use here standard values as in the ecoinvent database

cx = correction factor x; this refers to various parameters of the crop production system; for the basic system assumed in Agrammon cx = 1; cx < 1 has a reducing effect on NH<sub>3</sub>-emissions, cx > 1 an increasing effect.

#### Formula for liquid organic fertilizer:

$$\text{NH}_3\text{-N} = \text{TAN} * (\text{er} + \text{c\_app}) * \text{c}_x$$

TAN: see Table 4-2

er : see Table 4-3

$$\text{C\_app} = -0.029$$

$$\text{c}_x = 0.97 * 0.96$$

#### Formula for solid organic fertilizer:

$$\text{NH}_3\text{-N} = \text{TAN} * (\text{er}) * \text{c}_x$$

$\text{c}_x = 0.88$  for cattle/pig,  $0.82$  for poultry.

**Table 4-2: TAN Values**

Animal category	Manure type	Unit	N soluble
Cattle	liquid manure	kg/m <sup>3</sup>	2.3
	low-excrement liquid manure	kg/m <sup>3</sup>	3.2
	stackable manure	kg/t	0.8
	solid manure from loose housing	kg/t	1.3
Pigs	liquid manure	kg/m <sup>3</sup>	4.2
	solid manure	kg/t	2.3
Poultry	broiler manure	kg/t	10
	laying hen manure	kg/t	6.3
	laying hen litter	kg/t	7
	dried poultry litter	kg/t	9

**Table 4-3: Nitrogen emission rates (er) of different animal categories and manure types**

Animal category	manure type	er (% TAN)	$\text{c}_x$	$\text{c\_app}$
Cattle	liquid	50	$0.97 * 0.96$	-0.029
	solid	80	0.88	-
Pigs	liquid	35	$0.97 * 0.96$	-0.029
	solid	80	0.88	-
Poultry	solid, from growers, layers and other poultry	30	0.82	-
	solid, from broilers and turkeys	65	0.82	-

## Organic fertilizers in the RSB Tool:

### Solid organic fertilizer:

Category	Drop-down name
Cattle	cattle, stackable manure
	cattle, solid manure from loose housing
Pigs	pigs, solid manure
Poultry	poultry, broiler manure
	poultry, laying hen manure (poultry)
	poultry, laying hen litter (poultry)
	poultry, dried poultry litter

**Liquid organic fertilizer:**

Category	Drop-down name
Cattle	Cattle, liquid manure
	Cattle, low-excrement liquid manure
Pigs	Pigs, liquid manure

## 5 Agriculture: modeling of N<sub>2</sub>O and NO<sub>x</sub> emissions

### 5.1 N<sub>2</sub>O emissions

The calculation of the N<sub>2</sub>O emissions is based on the formula in Nemecek and Kägi (2007) and adopts the new IPCC guidelines from 2006 (IPCC 2006).

$$N_2O = 44/28 * (EF_1 * (N_{tot} + N_{cr}) + EF_4 * 14/17 * NH_3 + EF_5 * 14/62 * NO_{3-})$$

With:

N<sub>2</sub>O = emissions of N<sub>2</sub>O [kg N<sub>2</sub>O/ha]

EF<sub>1</sub> = 0.01 (IPCC 2006, S. 11.11)

N<sub>tot</sub> = total nitrogen input [kg N/ha]

N<sub>cr</sub> = nitrogen contained in the crop residues [kg N/ha]

EF<sub>4</sub> = 0.01 (IPCC 2006, S. 11.24)

NH<sub>3</sub> = losses of nitrogen in the form of ammonia [kg NH<sub>3</sub>/ha]; calculated according to chapter 4

14/17: conversion of kg NH<sub>3</sub> in kg NH<sub>3</sub>-N

EF<sub>5</sub> = 0.0075 (IPCC 2006, S. 11.24)

NO<sub>3-</sub> = losses of nitrogen in the form of nitrate [kg NO<sub>3-</sub>/ha]; calculated according to chapter 6.

14/62: conversion of kg NO<sub>3-</sub> in kg NO<sub>3-</sub>-N

### 5.2 NO<sub>x</sub> emissions

The calculation of the NO<sub>x</sub> emissions is based on the formula in Nemecek and Kägi (2007).

NO<sub>x</sub> = 0.21 \* N<sub>2</sub>O

N<sub>2</sub>O is calculated according to the preceding Chapter 5.1.

## 6 Agriculture: modeling of nitrate emissions

The nitrate emissions from agricultural nitrogen inputs are modeled according to the models developed in the Sustainability Quick Check for Biofuels (Faist Emmenegger, Reinhard et al. 2009).

This methodology differs from IPCC (2006) in that IPCC (2006) Tier 1 uses a factor for humid regions (0.30 kg (NH<sub>3</sub>-N and NO<sub>x</sub>-N)/kg N applied) and 0 for dryland regions.

### 6.1 Origin of model and model structure

The regression model used is described in (De Willigen 2000). This model relates the nitrate leaching to these parameters:

- Amount of fertilizer nitrogen
- Amount of nitrogen taken up by the crop
- Amount of nitrogen in soil organic matter
- Precipitations
- Percentage clay
- Layer thickness

The regression model is based on data within those ranges:

- Precipitation: 40-2000 mm
- Clay content: 3-54%
- Layer thickness: 0.25-2m

A regression equation such as in (De Willigen 2000) should be applied only for interpolation, i.e. within the ranges of the data used for the regression. We are in the range of the given data for the layer thickness (see 6.3.4). For precipitation, only one value is above the limit of the recommended values (see Table 6-1) and, for clay content, two minor soil types have lower clay contents (see 6.3.3).

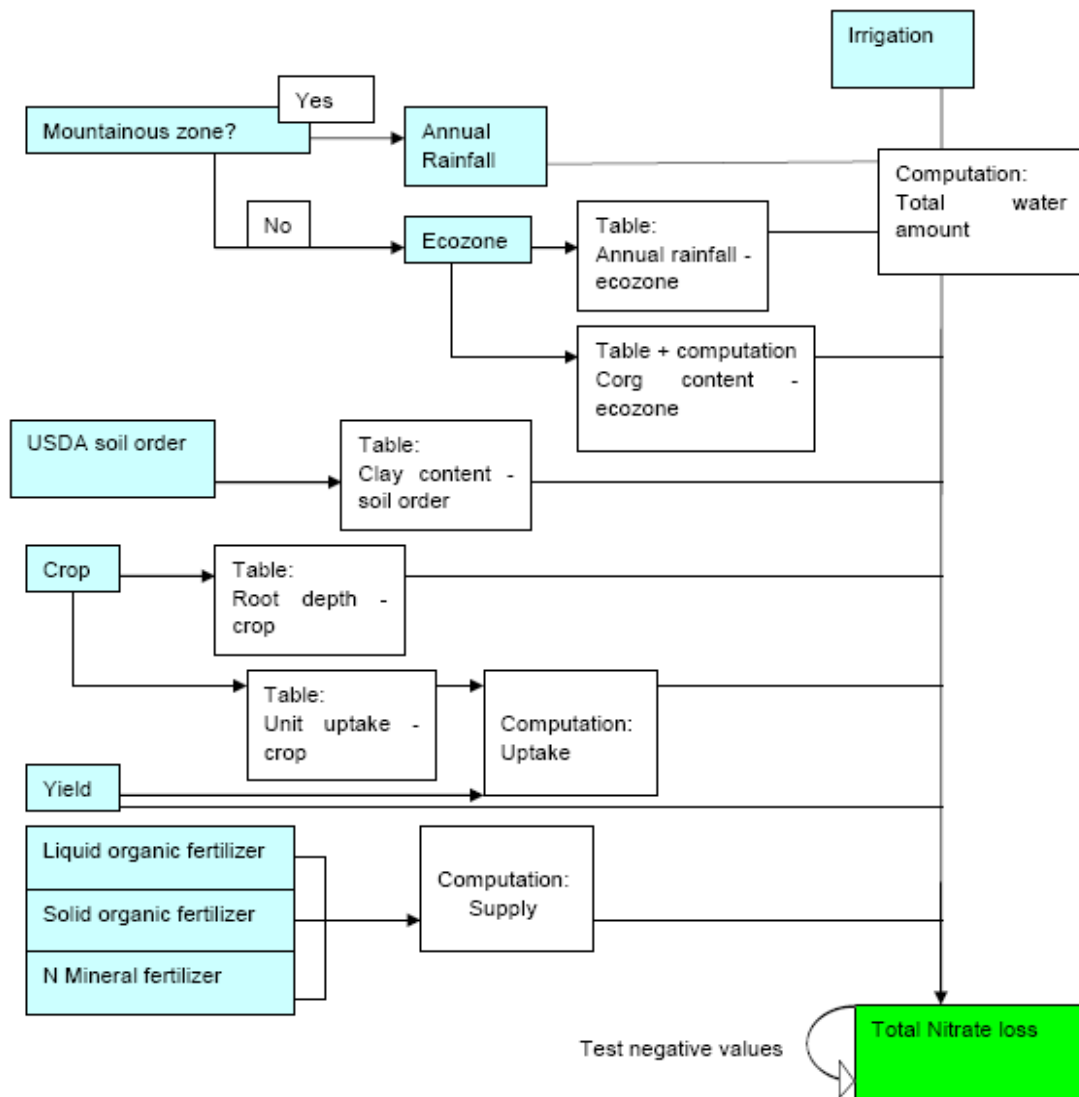
**Table 6-1: Mean annual precipitation for each ecozone**

<b>Ecozone</b>	<b>Mean annual precipitation [mm yr<sup>-1</sup>]</b>
Tar	2500
Tawa	1500
Tawb	1000
Tbsh	500
Tbwh	50
Scf	1200
Scs	700
Sbsh	400
Sbwh	200
TeDo	1500
TeDc	600
TeBsk	300
TeBWk	150
Ba	500
BB	400

These are not optimal conditions for applying this regression equation. It should however be sufficient for a quick assessment; no other simple method has been applied on a global scale.

### **6.1.1 Design of the nitrate loss model**

The nitrate loss model and the data flows can be visualized in the following chart. The light blue elements refer to the inputs that have to be typed in by the user (or default value) and the output, nitrate loss, is outlined in green.



**Figure 6-1. Structure of the nitrate model and data flows**

## 6.2 Computation

There are some small differences between the equation given in (De Willigen 2000) and in (Roy 2003):

- Root depth is used instead of layer thickness in (Roy 2003)
- Organic carbon content is used instead of the amount of nitrogen in soil organic matter in (Roy 2003)
- Nitrogen fertilizer is restricted to mineral nitrogen fertilizer in (Roy 2003)

We compute the nitrate leaching according to (De Willigen 2000) and (Roy 2003) with small adaptations:

$$N = \left[ 21.37 + \frac{P}{c * L} \left[ 0.0037 * S + 0.0000601 * N_{org} - 0.00362 * U \right] \right] \frac{1}{y} \frac{1}{1000}$$



$N$  = Nitrate loss through leaching [ $\text{kg}_N \text{ kg}_{\text{product}}^{-1}$ ]

$P$  = Annual precipitation and irrigation [ $\text{mm yr}^{-1}$ ]

$c$  = Clay content [%]

$L$  = Root depth [m]

$S$  = Nitrogen supply [ $\text{kg}_N \text{ ha}^{-1}$ ]

$N_{org}$  = Organic nitrogen content [kg/ha]

$U$  = Nitrogen uptake [ $\text{kg}_N \text{ ha}^{-1}$ ]

$y$  = Yield [ $\text{tons}_{\text{product}} \text{ ha}^{-1}$ ]

Negative values are avoided by testing them:

$$N = \begin{cases} N & \text{if } N \geq 0 \\ 0 & \text{if } N < 0 \end{cases}$$

In the equation described in (Roy 2003), the annual precipitation amounts are considered without mentioning irrigation. We consider that the water amount supplied through irrigation also contributes to the nitrate leaching and is thus added to the precipitation amounts (see equation below).

$$P \left[ \frac{\text{mm}}{\text{yr}} \right] = \text{precipitation} \left[ \frac{\text{mm}}{\text{yr}} \right] + \text{irrigation} \left[ \frac{\text{m}^3}{\text{ha} * \text{yr}} \right] * 0.1$$

Where the factor 0.1 represents the conversion from irrigation to mm/yr:

$$\frac{1\text{m}^3}{10'000\text{m}^2} * \frac{1000\text{mm}}{1\text{m}} = 0.1 \left[ \frac{\text{mm}}{\text{m}^3} \right]$$

In the same way as in (Roy 2003), the model uses the root depth (not the layer thickness) and the organic carbon content (not the amount of nitrogen in soil organic matter).

The model does not restrict the nitrogen fertilizer to the mineral fertilizer as in (Roy 2003), but we consider the nitrogen supplied through organic and mineral fertilizer.

The coefficient related to the yield is used in order to relate the nitrate loss to one kilogram of product.

Some parameter values are found in the tables or supplied by the operator: precipitation (operator), irrigation (operator), clay content (6.3.3) and root depth (6.3.4).

Some others require simple computations: nitrogen supply, organic carbon content and nitrogen uptake.

### 6.2.1 Nitrogen supply

The model considers the nitrogen supplied with the mineral fertilizers and with the liquid and solid organic fertilizers:

$$S = f + s * c_N^s + m * c_N^m$$

$S$  = Nitrogen supply [ $\text{kg}_N \text{ ha}^{-1}$ ]

$f$  = N Mineral fertilizer [ $\text{kg}_N \text{ ha}^{-1}$ ]

$s$  = Liquid organic fertilizer (slurry) [ $\text{m}^3_{\text{slurry}} \text{ ha}^{-1}$ ]

$c_N^s$  = Concentration of N in the slurry [ $\text{kg}_N \text{ m}^{-3}_{\text{slurry}}$ ]

$m$  = Solid organic fertilizer (manure) [ $\text{kg}_{\text{manure}} \text{ ha}^{-1}$ ]

$c_N^m$  = Concentration of N in the manure [ $\text{kg}_N \text{ kg}_{\text{manure}}^{-1}$ ]

The value of the applied amount of mineral fertilizer, liquid and solid organic fertilizer is supplied by the user (6.4).

The concentrations of N in slurry and manure are extracted from (Walther, Ryser et al. 2001).

## 6.2.2 Organic nitrogen content

The necessary organic nitrogen content can be calculated with the organic carbon content.

$$N_{org} \left[ \frac{\text{kg}}{\text{ha}} \right] = \left( C_{org} \left[ \frac{\%}{100} \right] * \text{soil\_volume} [\text{m}^3] * \text{bulk\_density} \left[ \frac{\text{kg}}{\text{m}^3} \right] \right) / C / N\_ratio * N_{org} / N_{tot} \_ratio$$

The mean values for the organic carbon content are given per 3000  $\text{m}^3$  of soil in Table 6-2. We have to convert it to percent (mass fraction). We need the bulk density in order to carry out this conversion. As a rough approximation, a single value is taken for all soils. For a more precise assessment, we should consider a bulk density for each soil unit.

The conversion is computed in this way:

$$C_{org} = C_{org}^{EMPA} * \frac{1}{3000} * \frac{1}{1.3} * 100$$

$C_{org}$  = organic carbon content [%]

$C_{org}^{EMPA}$  = organic carbon content given in Table 6-2 [ $\text{tons Corg } 3000\text{m}^{-3}$ ]

A bulk density of 1.3 tons of soil per cubic meter is assumed (average), based on the values found in (USDA 1999) and the values given by the American bulk density calculator<sup>6</sup>.

Soil volume= 5000  $\text{m}^3$  (1 hectar \* 50 cm thickness of upper soil)

Bulk density: 1300  $\text{kg}/\text{m}^3$  (see above)

C/N ratio: 11 ( $C_{org}/N_{tot}$ : assumption)

$N_{org}/N_{tot}$ : 0.85 (ratio of organic N to total N in soil: assumption)

<sup>6</sup> [http://www.pedosphere.com/resources/bulkdensity/worktable\\_us.cfm](http://www.pedosphere.com/resources/bulkdensity/worktable_us.cfm)

**Table 6-2: Default reference (under native vegetation) soil organic C stocks (SOC<sub>REF</sub>) for mineral soils (tons C ha<sup>-1</sup> in 0-30 cm depth). Source: (IPCC 2006)**

Climate region	HAC soils	LAC soils	Sandy soils	Spodic soils	Volcanic soils	Wetland soils
Boreal	68	n.a.	10	117	20	146
Cold temperate, dry	50	33	34	n.a.	20	87
Cold temperate, moist	95	85	71	115	130	
Warm temperate, dry	38	24	19	n.a.	70	88
Warm temperate, moist	88	63	34	n.a.	80	
Tropical, dry	38	35	31	n.a.	50	86
Tropical moist	65	47	39	n.a.	70	
Tropical, wet	44	60	66	n.a.	130	
Tropical montane	88	63	34	n.a.	80	

### 6.2.3 Nitrogen uptake

The nitrogen uptake is computed as followed:

$$U = Unit\_uptake * y$$

$$U = \text{nitrogen uptake [kg}_N \text{ ha}^{-1}\text{]}$$

$$Unit\_uptake = \text{unit uptake [kg}_N \text{ tons}_{\text{product}}^{-1}\text{]}$$

$$y = \text{Yield [tons}_{\text{product}} \text{ ha}^{-1}\text{]}$$

## 6.3 Tables

The tables contain the values of all the parameters needed in order to perform the assessment of nitrate loss and which are not supplied by the user. The input data typed in by the user are indeed used directly to compute nitrate loss but also indirectly to derive other parameters needed for this computation. The dataset of inputs is reduced as much as possible in order to ensure the use of the tool by a non-expert person.

### 6.3.1 Annual rainfall – ecozone

Annual rainfall is provided by the operator.

### 6.3.2 Organic carbon content – ecozone

A rough approximation of the organic carbon content in the soil is made in Table 6-2 for each climate region. It would be worthwhile using a more accurate organic carbon content by using more detailed data.

The values in (IPCC 2006) are given in tons of organic carbon per hectare in the first 30 cm of soil. This is equivalent to tons of organic carbon per 3000m<sup>3</sup>.

### 6.3.3 Clay content – USDA soil order

The clay content was already used in order to determine the texture class and then the erodibility factor k of each USDA soil order (see 6.4.1. The values given in (USDA 1999) are:

**Table 6-3: Clay content for each USDA soil order**

USDA soil order	clay content %
Alfisol	28
Andisol	10.4
Aridisol	17.2
Entisol	3.5
Gelisol	23.7
Histosol	2
Inceptisol	4.9
Mollisol	21.1
Oxisol	53.9
Spodosol	1.8
Ultisol	12.3
Vertisol	49.0

For the histosol, no data is available in (USDA 1999). These soils are comprised primarily of organic material. The mineral material content should be minor and therefore a low clay content of 2% is assumed. This very rough approximation could lead to important errors in the nitrate leaching computation for these soils. The risk is however quite low since these soils cover less than 1% of the global ice free land surface and since they are usually not used for agriculture<sup>7</sup>.

<sup>7</sup> <http://en.wikipedia.org/wiki/Histosols>

### 6.3.4 Root depth – crop

The FAO database crop water management (FAO) gives values for the rooting system depth for potato, sugar beet, sugar cane, sweet sorghum, soybean. There is unfortunately no data about rapeseed or palm. The FAO database ecocrop (FAO) gives one meter as standard depth for the oil palm rooting system. The Idaho University carried out a study about nitrogen removal with rapeseed and found that nitrogen was efficiently removed until a depth of three feet<sup>8</sup>, which roughly corresponds to 0.9 meters. The root depth for cassava stems from (Boeni and Osses 2010), for castor bean from (Comar, Tilley et al. 2004).

**Table 6-4: Root depth for each crop**

Crop	Root depth [m]
Camelina	1.16 <sup>9</sup>
Cassava	0.5
Castor bean	1.5
Corn	1.8 <sup>10</sup>
Jatropha	1
Palm	1
Potato	0.45
Rapeseed	0.9
Soybean	0.65
Sugar beet	1
Sugar cane	1.5
Sunflower	1.3 <sup>11</sup>
Sweet sorghum	1
Wheat	1.3 <sup>12</sup>

The root depth can greatly vary according to the soil type, the maturation of the plant, the water availability, the concurrence with other plants, etc. These values are mean values and should not be considered as an absolute reference.

<sup>8</sup> <http://www.uiweb.uidaho.edu/wq/wqfert/cis785.html>

<sup>9</sup> Personal communication, Camelina Company España, 01.06.2011

<sup>10</sup> [http://www.extension.org/pages/Corn\\_Growth\\_&\\_Development](http://www.extension.org/pages/Corn_Growth_&_Development)

<sup>11</sup> {FAO, 2010 #233}

<sup>12</sup> [http://www.fao.org/nr/water/cropinfo\\_wheat.html](http://www.fao.org/nr/water/cropinfo_wheat.html)

### 6.3.5 Unit uptake – crop

The regression equation used for calculating nitrate emissions needs the quantity of nitrogen that is taken up by the *whole plant*. The yield however refers to the main product in this project. We thus have to express the nitrogen uptake of the whole plant but expressed per ton of main product.

The FAO database ecocrop (FAO) gives values for oil palm, sweet sorghum and wheat:

- The oil palm (whole plant) takes up 6 kg nitrogen per ton of fruits
- The sweet sorghum (whole plant) takes up 50 kg nitrogen per ton of grains
- The wheat takes up 20-30 kg nitrogen per ton of wheat grains

The unit uptake of jatropha is 22 kg nitrogen per ton (Gmünder, Zah et al. 2010). We have to calculate the nitrogen uptake for the other crops, since no data has been found in (FAO). The results are:

**Table 6-5: Unit uptake for each crop**

Crop	Unit_uptake[kg N/tons]
Camelina	67 <sup>13</sup>
Cassava	1.57
Castor bean	35.3
Corn	15.3
Jatropha	22.2
Potato	3.75
Sugar beet	4.5
Sugar cane	2.3
Sunflower	37
Sweet sorghum	50
Rapeseed	44.7
Soybean	77.1
Palm	6
Wheat	25 <sup>14</sup>
	Unit uptake (kg/100 nuts)
Coconut	0.327

The calculations are described below.

#### Cassava

Information for cassava is provided below.

<sup>13</sup> Personal communication, Camelina Company España, 01.06.2011

<sup>14</sup> <http://ecocrop.fao.org/ecocrop/srv/en/cropView?id=2114>

**Table 6-6: Nutrient uptake of cassava. Taken from** (Howeler 2002)

Yield [t/ha]	Plant	[kg/ha]					
		N	P2O5	K2O	MgO	CaO	S
45	Fresh roots	62	23	197	36	17	3
	Whole plant	202	73	343	179	183	15
37	Fresh roots	67	38	122	14	22	7
	Whole plant	198	70	220	47	143	19
18	Fresh roots	32	8	41	6	7	1
	Whole plant	95	23	77	52	23	7
9	Fresh roots	13	2	5	3	4	0.2
	Whole plant	39	7	12	14	29	2
35.7	Fresh roots	55	13.2	112	-	-	-

As it can be seen from the table above, values for nutrition uptake vary considerably. For most substances, uptake increases with increasing yield. Therefore, the uptake is calculated for a yield of 21t/ha, as used in this study, by taking the average of 5 sources of N uptake fresh roots/ yield = 1.57kg N/t cassava. Multiplied with a yield of 21t, a final uptake of 33kg N/ha cassava roots results. This value is used to calculate NO<sub>3</sub> emissions to water.

#### Castor bean

**Table 6-7: Nutrition uptake (whole plant). Taken from** (Embrapa 2006)

Yield [kg/ha/year]	Uptake [kg/ha/year]		
	N	P2O5	K2O
2000	74 to 80	15 to 18	13 to 24

The average value of N uptake (77kg/ha/year) is used to calculate NO<sub>3</sub> emissions to water.

#### Coconut

(Magat) gives an average of 49 kg N uptake per ha, with an average of 150 trees and 100 nuts/tree (see also Table 6-8). The yield of copra is about 0.2 kg/nut (see Table 6-9).

**Table 6-8: Nutrient demand/uptake/removal of coconut-macronutrients.**

Nutrient demand/uptake/removal - Macronutrients									
Yield	Source	kg/ha							
		N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	Mg	Ca	S	Na	Cl
1.5 t copra	Copeland, 1931	93	41	138	-	17	-	-	-
25 nuts/palm	Cooke, 1950	29	9	26	-	-	-	-	-
60 nuts/palm	Nathaniel, 1969	72	39	108	-	-	-	-	-
100 nuts/palm: nuts only whole palm	Khanna and Nair, 1977	120	18	85	-	-	-	-	-
		157	28	346	-	-	-	-	-
		49	16	115	8	5	4	11	64
100 nuts/palm	Ouvier and Ochs, 1978	49	16	115	8	5	4	11	64
6.7t copra: nuts only whole palm	Ouvier and Ochs, 1978	108	39	232	15	9	9	20	125
		174	46	299	39	70	30	54	249
1 t copra	Ashgar, 1988	16.2	5	36	2	1.4	1.3	2.5	19.7

**Table 6-9 Copra yield per nut (Source: FAO / (Ohler 2000)).**

Classification	Nuts/Palm	Copra/Palm	Copra/ha	Copra/nut (Calculated)
Very bad	0-10	0-2 kg	0-300 kg	0.2
Bad	11-20	2-4	300-600	0.2
Fair	21-30	4-6	600-900	0.2
Moderate	31-50	6-10	900-1,500	0.2
Good	51-70	10-14	1,500-2,100	0.2
Very good	71-90	14-18	2,100-2,700	0.2
Excellent	> 90	> 18	> 2,700	0.2

## Corn

Following values can be found in (Eghball and Power 1999):



**Table 6-10: N uptake for corn (Eghball and Power 1999).**

Year	Grain yield	N uptake	N uptake per t crop
	t/ha	kg/ha	kg/t crop
1993	6.231	99	15.9
1994	7.49	94	12.6
1995	3.81	66	17.3
1996	5.44	84	15.4
<b>Average</b>			<b>15.3</b>

We use an average value of 15.3 kg N/t

### Potato

(Walther, Ryser et al. 2001) gives those values:

- Tubers: Nitrogen uptake=135 kg N/ha; Harvest=45 tons/ha
- Crop residues: Nitrogen uptake=25 kg N/ha; Harvest=18 tons/ha

The nitrogen uptake of the whole crop expressed per ton of tuber (main product) is obtained by calculating:

$$\frac{135}{45} \left[ \frac{\text{kgN}}{\text{ha}} \frac{\text{ha}}{t_{\text{tubers}}} \right] + \frac{25}{18} \left[ \frac{\text{kgN}}{\text{ha}} \frac{\text{ha}}{t_{\text{residues}}} \right] * \frac{18}{45} \left[ \frac{t_{\text{residues}}}{\text{ha}} \frac{\text{ha}}{t_{\text{tubers}}} \right] = 3.6 \left[ \frac{\text{kgN}}{t_{\text{tubers}}} \right]$$

The Bayerische Landesanstalt für Landwirtschaft<sup>15</sup> gives those values:

- Tubers: 3.5 kg N/t
- Crop residues: 2 kg N/t
- Proportion: 0.2 t residues/ 1 t tubers

Computing the nitrogen uptake of the whole crop expressed per ton of tuber (crop product) with these data leads to:

$$3.5 \left[ \frac{\text{kgN}}{t_{\text{tubers}}} \right] + 2 \left[ \frac{\text{kgN}}{t_{\text{residues}}} \right] * 0.2 \left[ \frac{t_{\text{residues}}}{t_{\text{tubers}}} \right] = 3.9 \left[ \frac{\text{kgN}}{t_{\text{tubers}}} \right]$$

We consider the average of these 2 values: 3.75 kg N/t tubers.

### Rapeseed

(Walther, Ryser et al. 2001) gives those data:

- Seed: Nitrogen uptake=105 kg N/ha; Harvest=3.5 t/ha
- Crop residues: Nitrogen uptake=49 kg N/ha; Harvest=6.5 t/ha

<sup>15</sup> <http://www.lfl.bayern.de/iab/duengung/mineralisch/10536/>

The nitrogen uptake of the whole crop expressed per ton of seed (crop product) is obtained by calculating:

$$\frac{105}{3.5} \left[ \frac{kgN}{ha} \frac{ha}{t_{seeds}} \right] + \frac{49}{6.5} \left[ \frac{kgN}{ha} \frac{ha}{t_{residues}} \right] * \frac{6.5}{3.5} \left[ \frac{t_{residues}}{ha} \frac{ha}{t_{seeds}} \right] = 44 \left[ \frac{kgN}{t_{seeds}} \right]$$

The Bayerische Landesanstalt für Landwirtschaft gives those values:

- Seeds: 33.5 kg N/t
- Crop residues: 7 kg N/t
- Proportion: 1.7 t residues/ 1 t seeds

Computing the nitrogen uptake of the whole crop expressed per ton of seeds (crop product) with these data leads to:

$$33.5 \left[ \frac{kgN}{t_{seeds}} \right] + 7 \left[ \frac{kgN}{t_{residues}} \right] * 1.7 \left[ \frac{t_{residues}}{t_{seeds}} \right] = 45.4 \left[ \frac{kgN}{t_{seeds}} \right]$$

The results differ only slightly and the average value is used for this study.

### Soybean

(Walther, Ryser et al. 2001) provides the following data:

- Beans: Nitrogen uptake=150 kg N/ha; Harvest=2.5 t/ha
- Crop residues: Nitrogen uptake=88 kg N/ha; Harvest=2.5 t/ha

The nitrogen uptake of the whole crop expressed per ton of beans (crop product) is obtained by calculating:

$$\frac{150}{2.5} \left[ \frac{kgN}{ha} \frac{ha}{t_{beans}} \right] + \frac{88}{2.5} \left[ \frac{kgN}{ha} \frac{ha}{t_{residues}} \right] * \frac{2.5}{2.5} \left[ \frac{t_{residues}}{ha} \frac{ha}{t_{beans}} \right] = 95.2 \left[ \frac{kgN}{t_{beans}} \right]$$

The Bayerische Landesanstalt für Landwirtschaft provides the following data:

- Beans: 44 kg N/t
- Crop residues: 15 kg N/t
- Proportion: 1 t residues/ 1 t beans

Computing the nitrogen uptake of the whole crop expressed per ton of beans (crop product) with these data leads to:

$$44 \left[ \frac{kgN}{t_{beans}} \right] + 15 \left[ \frac{kgN}{t_{residues}} \right] * 1 \left[ \frac{t_{residues}}{t_{beans}} \right] = 59 \left[ \frac{kgN}{t_{beans}} \right]$$

These two results differ substantially. We take the average in this project but, for a more detailed and accurate assessment, some further investigations should be done in order to check if this value is appropriate as a mean value for the whole world.

### Sugar beet

(Walther, Ryser et al. 2001) gives these values:

- Beet: Nitrogen uptake=137 kg N/ha; Harvest=65 t/ha
- Crop residues: Nitrogen uptake=150 kg N/ha; Harvest=50 t/ha

The nitrogen uptake of the whole crop expressed per ton of beet (crop product) is obtained by calculating:

$$\frac{137}{65} \left[ \frac{\text{kgN}}{\text{ha}} \frac{\text{ha}}{t_{\text{beets}}} \right] + \frac{150}{50} \left[ \frac{\text{kgN}}{\text{ha}} \frac{\text{ha}}{t_{\text{residues}}} \right] * \frac{50}{65} \left[ \frac{t_{\text{residues}}}{\text{ha}} \frac{\text{ha}}{t_{\text{beets}}} \right] = 4.4 \left[ \frac{\text{kgN}}{t_{\text{beets}}} \right]$$

The Bayerische Landesanstalt für Landwirtschaft gives those values:

- Beets: 1.8 kg N/t
- Crop residues: 4 kg N/t
- Proportion: 0.7 t residues/ 1 t beets

Computing the nitrogen uptake of the whole crop expressed per ton of beets (crop product) with these data leads to:

$$1.8 \left[ \frac{\text{kgN}}{t_{\text{beets}}} \right] + 4 \left[ \frac{\text{kgN}}{t_{\text{residues}}} \right] * 0.7 \left[ \frac{t_{\text{residues}}}{t_{\text{beets}}} \right] = 4.6 \left[ \frac{\text{kgN}}{t_{\text{beets}}} \right]$$

We take the average: 4.5 kg N/t beets.

### Sugar cane

Neither (Walther, Ryser et al. 2001) nor the Bayerische Landesanstalt für Landwirtschaft give some values for sugar cane, since it is not produced under European climate conditions.

Several values can be found in the literature for the nitrogen concentration in the different parts of the plant and for the ratio between the stalks and the residues (INRA, (Woytiuk 2006), (Hassuani 2005), (Kee Kwong 1987), (Rehm 1984) ). They sometimes differ greatly. We combine them in all the possible ways in order to see how the results vary. The results for different combinations of the values found in the literature vary to up to 200%! Here, we chose to use the average value of all the possible combinations: 2.3 kg nitrogen per ton of stalk.

The differences between the values indicate that the unit nitrogen uptake can vary greatly and a more detailed assessment of this parameter should be done in order to improve the results.

### Sunflower

(Merrien) gives an average N uptake of 131 kg/ha for a yield of 3.5 t/ha. We therefore assume a ratio of 37 kg/kg.

## 6.4 Inputs

The operator has to provide some information about the planned biofuel production in order to quantify the related nitrate emissions. A default value is available for some of the required inputs, but others are compulsory. The default values are presented in the next section.

The user has to be cautious regarding the units when typing in the inputs. The units are International System of Units (SI) units or derived units. All the input concerning resources are related to a surface of one hectare and to the period of cultivation.

- Duration of cultivation (see 6.4.9)

#### **6.4.1 USDA soil order**

The user finds the correct soil order related to his production zone by identifying his production zone in the soil order map. A soil order is the highest level of soil classification in the USDA classification system<sup>16</sup>. At this classification level, soils vary greatly within a given unit. Consequently, the utilization of these rough soil categories to derive other information (clay content for instance) can lead to inaccurate or wrong results. For a detailed assessment, a lower level of classification should be selected or field analyses should be carried out.

The possible answers are:

- Alfisol
- Andisol
- Aridisol
- Entisol
- Gelisol
- Histosol
- Inceptisol
- Mollisol
- Oxisol
- Spodosol
- Ultisol
- Vertisol

#### **6.4.2 Irrigation**

The irrigation has to be supplied by the operator in [ $\text{m}^3\text{ha}^{-1}$ ]. It corresponds to the water quantity supplied through irrigation to one hectare of the considered crop.

For annual crops (e.g. potato, sugar beet, sweet sorghum, rapeseed or soybean), it is the water amount supplied between sowing and harvest. For perennial crops, e.g. oil palm or sugar cane, it corresponds to the water amount supplied between two harvests. In case of perennial crops, we should consider the water and the fertilizers supplied during the first unproductive phase too. These amounts should be shared over all har-

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<sup>16</sup> [http://www.uwsp.edu/geo/faculty/ritter/glossary/S\\_U/soil\\_order.html](http://www.uwsp.edu/geo/faculty/ritter/glossary/S_U/soil_order.html)

vests. Consequently, the user has to know how much water and fertilizers he applied during this unproductive phase and he has to know how many harvests the trees will furnish before being cut. We do not consider the water and fertilizer amounts used in the first unproductive lifetime of the crop in SQCB. This is a simplification which will lead to a possible underestimation of the phosphorus emissions for perennial crops.

### **6.4.3 Ecozone**

The user finds this information by locating his production zone in the corresponding ecozone map. The ecological zones, or ecozones, are defined as zones or areas with relatively homogeneous natural vegetation formations, and coinciding roughly with the Köppen-Trewartha climatic types (FAO 2001).

The possible answers are:

- Tar: Tropical rainforest
- Tawa: Tropical moist deciduous forest
- Tawb: Tropical dry forest
- Tbsh: Tropical shrublands
- Tbwh: Tropical desert
- TM: Tropical mountain systems
- Scf: Subtropical humid forest
- Scs: Subtropical dry forest
- SbSh: Subtropical steppe
- SBWh: Subtropical desert
- SM: Subtropical mountain systems
- TeDo: Temperate oceanic forest
- TeDc: Temperate continental forest
- TeBSk: Temperate steppe
- TeBWk: Temperate desert
- TeM: Temperate mountain systems
- Ba: Boreal coniferous forest
- Bb: Boreal tundra woodland
- BM: Boreal mountain systems

### **6.4.4 Annual rainfall**

The ecozone concept is a relatively good indicator of the mean annual precipitations in flat regions.

In mountainous regions, the precipitation amount can be very different from one location to another according to the altitude, the mountainside orientation as well as other local effects. The ecozone concept is thus too rough in such regions and cannot provide information about the annual rainfall. The user has to provide the annual rainfall value for his production zone when it is located in a mountainous region (TM, SM, TeM or BM). The units are  $[\text{mm yr}^{-1}]$ .

It is usually easy to find such information by consulting the regional or national meteorological office.

#### 6.4.5 Liquid organic fertilizer

The liquid organic fertilizer (slurry) amount has to be supplied by the user in  $[\text{m}^3_{\text{slurry}} \text{ ha}^{-1}]$ . It is the amount of slurry applied per hectare to the considered crop during the growth period. The possible types of slurry and their phosphorus content are described in Table 6-11. A dilution factor of 40:60 (slurry:water) is assumed if the user does not enter his dilution factor.

**Table 6-11: Types of slurry and nitrogen content**

Type of slurry		Nitrogen content
		$\text{kg/m}^3$
beef and dairy cattle	liquid	2.3
pigs	liquid	3.8
average liquid manure	liquid	3

The growth period is intended to be the period between sowing and harvest for annual crops (potato, sugar beet, sweet sorghum, rapeseed and soybean). The growth period for perennial crops (sugar cane and oil palm) is considered as the time period between two consecutive harvests. As mentioned for the irrigation, we should also take into account the slurry amount applied during the unproductive phase at the beginning of growth for the perennial crops and share this amount between all the harvests of the crop life.

#### 6.4.6 Solid organic fertilizer

The solid organic fertilizer (manure) amount has to be supplied by the user in  $[\text{kg}_{\text{manure}} \text{ ha}^{-1}]$ . It is the amount of manure applied per hectare to the considered crop during the growth period. The possible types of manure and their nitrogen content are described in Table 6-12.

**Table 6-12: Types of manure and nitrogen content**

Type of manure		N-content
		kg/t
beef and dairy cattle	solid	1.3
pigs	solid	2.3
hens (from deep pit)	solid	5
hens (from belts)	solid	3.6
broilers	solid	8
average solid manure	solid	<b>1.5</b>

The same remark as done in the previous section (liquid organic fertilizer) can be done here about the growth period.

#### 6.4.7 N mineral fertilizer

The N mineral fertilizer amount has to be supplied by the user in  $[\text{kg}_\text{N} \text{ ha}^{-1}]$ . It is the quantity of N mineral fertilizer applied per hectare to the considered crop during the growth period. The user types in detailed information about the N mineral fertilizers used. The possible N mineral fertilizers which can be selected by the user are shown in Table 2-1.

The growth period is intended to be the period between sowing and harvest for annual crops (potato, sugar beet, sweet sorghum, rapeseed and soybean). The growth period for perennial crops (sugar cane and oil palm) is considered as the time period between two consecutive harvests. We also take into account the N mineral fertilizer amount applied during the unproductive phase at the beginning of growth for the perennial crops and share this amount between all the harvests of the crop life.

#### 6.4.8 Yield

The yield of product has to be supplied by the user in  $[\text{tons} \text{ ha}^{-1}]$ . For perennial crops, the values represent the yield of one year on one hectare.

This quantity represents the amount of main product harvested per hectare. It is not the amount of whole crop (main product + co-products + residues) harvested per hectare. For potato, we consider the harvested amount of tubers per hectare for instance and, for soybean, the harvested amount of beans per hectare.

#### 6.4.9 Duration of cultivation

The duration of the cultivation is needed for the calculation of nitrate emissions, which is designed for a certain cultivation period. If the operator performs two cultivation periods in one year, the data should be provided accordingly.

The default values are extracted from (Nemecek, A. Heil et al. 2004) for the "conventional" crops: 5 months for potato, 6.3 months for sugar beet, 10.6 months for rapeseed and 4.5 months for soybean. For the exotic

crops, we use the FAO database ecocrop (FAO). For the sweet sorghum, it indicates that grains reach maturity between 90 and 120 days. We take the average of 3.5 months. It considers sugar cane and oil palm as perennial crop. We should take the time period between two consecutive harvests. Since this period is variable, we take an average of 12 months for these two crops.

Default values:

- 5 months for potato
- 6.3 months for sugar beet
- 12 months for sugar cane
- 3.5 months for sweet sorghum
- 10.6 months for rapeseed
- 4.5 months for soybean
- 12 months for oil palm
- 3.5 months for spring wheat (90-130 days)
- 7 months for winter wheat (180-250 days)
- 4 months for sunflower (120-160 days)
- 12 months for jatropha
- 12 months for coconut
- 12 months for castor bean (Osses 2010)
- 10 months for cassava (Boeni and Osses 2010)
- 3 months for camelina <sup>17</sup>

## 6.5 Modelling of nitrate for RED calculations

The nitrate calculations in the BioGrace methodology follow IPCC guidelines.

$$\text{NO}_3\text{-N}[\text{kg N/ha leaching}] = (N_{\text{min\_fert}} + N_{\text{org\_fert}} + N_{\text{cr}}) * \text{Frac}_{\text{LEACH}}$$

With:

$N_{\text{min\_fert}}$ : kg N in mineral fertilizer

$N_{\text{org\_fert}}$ : kg N in organic fertilizer

$N_{\text{cr}}$ : kg N in crop residues

$\text{Frac}_{\text{LEACH}} = 0.3$ . Fraction of all N added to/mineralised in managed soils in regions where leaching/runoff occurs that is lost through leaching and runoff, kg N/(kg of N additions) (Table 11.3 in IPCC 2006)

<sup>17</sup> Personal communication, Camelina Company España, 01.06.2011



## 7 Field burning before harvest – sugarcane

The emissions of field burning before harvest related to sugar cane are calculated by multiplying each emission factor given in Table 3-13 with 0.20863 – this is the amount of dry mass burned per kg sugar cane moist harvested. The value is computed via Equation 3-12.

**Equation 7-12:** Amount of dry mass burned per kg sugar cane harvested ( $B_{\text{burned}}$ )

$$B_{\text{burned}} = \frac{(Y_{\text{Biofuel}} * C_{DM} * CF)}{(Y_{\text{Biofuel}})}$$

$Y_{\text{Biofuel}}$  = Sugarcane yield in kg moist mass, default yield according to ecoinvent is 66'300 kg sugarcane per hectare and year.

$C_{DM}$  = Dry mass content per kg sugarcane, default value is 0.26 kg dry mass content per kg sugarcane harvested.

$CF$  = Combustion factor, default value is 0.8 (see Table 3-12).

## 8 Modeling of fuel production and fuel refining

The calculations include the production of chemicals, the energy used for production as well as possible emissions from the process itself (e.g. methane emissions from ponds in the palm oil production).

The emissions of fuel use for electricity and heat are taken from the ecoinvent database.

The GHG emissions from fuel production and fuel refining are calculated as follow:

$$E_{\text{Processing}} \left[ \frac{\text{kgCO}_2}{\text{yr}} \right] = \frac{E_{\text{electricity consumption}} \left[ \frac{\text{kgCO}_2}{\text{yr}} \right] + E_{\text{heat production}} \left[ \frac{\text{kgCO}_2}{\text{yr}} \right] + E_{\text{operating material}} \left[ \frac{\text{kgCO}_2}{\text{yr}} \right] + E_{\text{effluent}} \left[ \frac{\text{kgCO}_2}{\text{yr}} \right]}{\text{product yield}_{\text{main product(crop)}} \left[ \frac{\text{kg product yield}}{\text{yr}} \right]} * \text{Allocation\_factor}$$

With

$$E_{\text{electricity consumption}} \left[ \frac{\text{kgCO}_2}{\text{yr}} \right] = \sum \text{Electricity\_type}_i \left[ \frac{\text{kWh}}{\text{yr}} \right] * EF_{\text{elec}_i} \left[ \frac{\text{kgCO}_2}{\text{kWh}} \right]$$

EF<sub>elec</sub>: emission factor of the electricity type (e.g. hydropower). The emission factors of the electricity type are taken from the ecoinvent database (Annex 4 – Ecoinvent Emission Factors).

$$E_{\text{heat consumption}} \left[ \frac{\text{kgCO}_2}{\text{yr}} \right] = \sum \text{Heat\_type}_i \left[ \frac{\text{MJ}}{\text{yr}} \right] * EF_{\text{heat}_i} \left[ \frac{\text{kgCO}_2}{\text{MJ}} \right]$$

EF<sub>heat</sub>: emission factor of the heat type (e.g. natural gas). The emission factors of the heat type are taken from the ecoinvent database (Annex 4 – Ecoinvent Emission Factors).

$$E_{\text{operation material}} \left[ \frac{\text{kgCO}_2}{\text{yr}} \right] = \sum \text{material\_type}_i [\text{kg}] * EF_{\text{mat}_i} \left[ \frac{\text{kgCO}_2}{\text{kg}} \right]$$

EF<sub>mat</sub>: emission factor of the material type (e.g. chemical). The emission factors of the production of operating materials are taken from the ecoinvent database (Annex 4 – Ecoinvent Emission Factors).

$$E_{\text{effluent}} \left[ \frac{\text{kgCO}_2}{\text{yr}} \right] = \sum \text{effluent\_type}_i \left[ \frac{\text{kg}}{\text{yr}} \right] * EF_{\text{eff}_i} \left[ \frac{\text{kgCO}_2}{\text{kg}} \right]$$

EF<sub>eff</sub>: emission factor of the effluent (e.g. hexane).

The emission factor of the effluent is taken from point 5 for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O. For other effluents, these emission factors are the climate change factors of IPCC with a timeframe of 100 years (IPCC 2007).

The actual amount of energy and material requirements are provided by the operator.

## 9 Modeling of transport and storage

The operator can enter the data (distances) for the transport of the feedstock, the biofuel and intermediary products. The carbon intensity of the transport means (including the fuel use) are taken from the ecoinvent database.

$$E_{Transport} \left[ \frac{kgCO_2}{yr} \right] = \sum Transport\_type_i [km] * transported\_amount[t] * EF\_transport_i \left[ \frac{kgCO_2}{tkm} \right] * \frac{1}{(1 - losses[\% / 100])}$$

EF<sub>transport<sub>i</sub></sub>: emission factor of the transport means (e.g. lorry 40t). The emission factors of the types of transport means are taken from the ecoinvent database (15 Annex 4 – Ecoinvent Emission Factors).

Losses: losses during transport. (in %).

$$E_{storage} \left[ \frac{kgCO_2}{yr} \right] = \sum energy\_type_i \left[ \frac{MJ}{kg} \right] * EF\_energy\_type_i \left[ \frac{kgCO_2}{MJ} \right] * \frac{1}{(1 - losses[\% / 100])}$$

EF<sub>energy\_type</sub>: emission factor of the energy type use for storage. The emission factors of the types of energy types are taken from the ecoinvent database (Annex 4 – Ecoinvent Emission Factors).

Losses: losses during transport. (in %).

## **10 Fuel Combustion Emissions**

Emissions associated with fuel combustion (i.e., use of final biofuel or fossil fuel product) are calculated based on the assumption that carbon is converted to CO<sub>2</sub>.

This assumption is highly idealized. Emissions for CH<sub>4</sub> and N<sub>2</sub>O and other additional products of combustion are not calculated. This is because emission factors for such emissions are dependent on engine performance and efficiency. In addition, such emissions have been found to be very small in comparison with lifecycle GHG emissions.

Additionally, biogenic carbon emissions are assumed to be carbon neutral, as CO<sub>2</sub> was taken up from the atmosphere to grow the biogenic material. Therefore, biogenic carbon is not assigned any CO<sub>2</sub> emissions from fuel use; only fossil fuel is assigned CO<sub>2</sub> emissions.

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## Annex 1 – Global Warming Potentials

Comparison of IPCC 2007 and ReCiPe

NAME (ReCiPe)		GWP	Name IPCC		GWP
1	1-Propanol, 3,3,3-trifluoro-2,2-bis(trifluoromethyl)-, HFE-7100	297	0		
1	Butane, 1,1,1,3,3-pentafluoro-, HFC-365mfc	794	1	Butane, 1,1,1,3,3-pentafluoro-, HFC-365mfc	794
1	Butane, nonafluoroethoxy, HFE-569sf2	59	1	Butane, nonafluoroethoxy, HFE-569sf2	59
1	Butane, perfluoro-	8860	1	Butane, nonafluoromethoxy, HFE-7100	297
1	Butane, perfluorocyclo-, PFC-318	10300	1	Butane, perfluoro-	8860
0			1	Butane, perfluorocyclo-, PFC-318	10300
1	Carbon dioxide	1	1	Carbon dioxide	1
0			1	Carbon dioxide, biogenic	0
1	Carbon dioxide, fossil	1	1	Carbon dioxide, fossil	1
0			1	Carbon dioxide, in air	0
1	Carbon dioxide, land transformation	1	1	Carbon dioxide, land transformation	1
1	Chloroform	31	1	Chloroform	756
1	Dimethyl ether	1	1	Dimethyl ether	1
1	Dinitrogen monoxide	298	1	Dinitrogen monoxide	298
1	Ethane, 1-chloro-1,1-difluoro-, HCFC-142b	2310	1	Ethane, 1-chloro-1,1-difluoro-, HCFC-142b	2310
1	Ethane, 1-chloro-2,2,2-trifluoro-(difluoromethoxy)-, HCFE-235da2	350	1	Ethane, 1-chloro-2,2,2-trifluoro-(difluoromethoxy)-, HCFE-235da2	350
1	Ethane, 1,1-dichloro-1-fluoro-, HCFC-141b	725	1	Ethane, 1,1-dichloro-1-fluoro-, HCFC-141b	725
1	Ethane, 1,1-difluoro-, HFC-152a	124	1	Ethane, 1,1-difluoro-, HFC-152a	124
1	Ethane, 1,1,1-trichloro-, HCFC-140	146	1	Ethane, 1,1,1-trichloro-, HCFC-140	146
1	Ethane, 1,1,1-trifluoro-, HFC-143a	4470	1	Ethane, 1,1,1-trifluoro-, HFC-143a	4470
1	Ethane, 1,1,1,2-tetrafluoro-, HFC-134a	1430	1	Ethane, 1,1,1,2-tetrafluoro-, HFC-134a	1430
1	Ethane, 1,1,2-trichloro-1,2,2-trifluoro-, CFC-113	6130	1	Ethane, 1,1,2-trichloro-1,2,2-trifluoro-, CFC-113	6130
1	Ethane, 1,1,2-trifluoro-, HFC-143	353	0		
1	Ethane, 1,1,2,2-tetrafluoro-, HFC-134	1100	1	Ethane, 1,1,2,2-tetrafluoro-, HFC-134	1430
0			1	Ethane, 1,1,2,2-tetrafluoromethoxy-, HFE245cb2	708
1	Ethane, 1,2-dibromotetrafluoro-, Halon 2402	1640	0		
1	Ethane, 1,2-dichloro-1,1,2,2-tetrafluoro-, CFC-114	10000	1	Ethane, 1,2-dichloro-1,1,2,2-tetrafluoro-, CFC-114	10000
1	Ethane, 1,2-difluoro-, HFC-152	53	0		
1	Ethane, 2-chloro-1,1,1,2-tetrafluoro-, HCFC-124	609	1	Ethane, 2-chloro-1,1,1,2-tetrafluoro-, HCFC-124	609
1	Ethane, 2,2-dichloro-1,1,1-trifluoro-, HCFC-123	77	1	Ethane, 2,2-dichloro-1,1,1-trifluoro-, HCFC-123	77
0			1	Ethane, 2,2,2-trifluoromethoxy-, HFE245fa2	659
1	Ethane, chloropentafluoro-, CFC-115	7370	1	Ethane, chloropentafluoro-, CFC-115	7370
1	Ethane, fluoro-, HFC-161	12	0		
1	Ethane, hexafluoro-, HFC-116	12200	1	Ethane, hexafluoro-, HFC-116	12200
1	Ethane, pentafluoro-, HFC-125	3500	1	Ethane, pentafluoro-, HFC-125	3500
1	Ether, 1,1,1-trifluoromethyl methyl-, HFE-143a	756	0		
1	Ether, 1,1,2,2-Tetrafluoroethyl 2,2,2-trifluoroethyl-, HFE-347mcc3	575	0		
1	Ether, 1,1,2,2-Tetrafluoroethyl 2,2,2-trifluoroethyl-, HFE-347mcf2	374	1	Ether, 1,1,2,2-Tetrafluoroethyl 2,2,2-trifluoroethyl-, HFE-347mcf2	575
1	Ether, 1,1,2,2-Tetrafluoroethyl methyl-, HFE-254cb2	359	1	Ether, 1,1,2,2-Tetrafluoroethyl methyl-, HFE-254cb2	359
1	Ether, 1,1,2,3,3,3-Hexafluoropropyl methyl-, HFE-356mec3	101	0		
1	Ether, 1,1,2,3,3,3-Hexafluoropropyl methyl-, HFE-356pcc3	110	0		
1	Ether, 1,1,2,3,3,3-Hexafluoropropyl methyl-, HFE-	265	0		

	NAME (ReciPE)	GWP	Name IPCC	GWP
	356pcf2			
1	Ether, 1,1,2,3,3,3-Hexafluoropropyl methyl-, HFE-356pcf3	502	0	
1	Ether, 1,2,2-trifluoroethyl trifluoromethyl-, HFE-236ea2	989	0	
1	Ether, 1,2,2-trifluoroethyl trifluoromethyl-, HFE-236fa	487	0	
1	Ether, 2,2,3,3,3-Pentafluoropropyl methyl-, HFE-365mcf3	11	0	
1	Ether, di(difluoromethyl), HFE-134	6320	0	
1	Ether, difluoromethyl 2,2,2-trifluoroethyl-, HFE-245cb2	708	0	
1	Ether, difluoromethyl 2,2,2-trifluoroethyl-, HFE-245fa1	286	0	
1	Ether, difluoromethyl 2,2,2-trifluoroethyl-, HFE-245fa2	659	0	
1	Ether, ethyl 1,1,2,2-tetrafluoroethyl-, HFE-374pc2	557	0	
1	Ether, pentafluoromethyl-, HFE-125	14900	0	
1	Hexane, perfluoro-	9300	1 Hexane, perfluoro-	9300
1	HFE-227EA	1540	0	
1	HFE-236ca12 (HG-10)	2800	1 HFE-236ca12 (HG-10)	2800
1	HFE-263fb2	11	0	
1	HFE-329mcc2	919	0	
1	HFE-338mcf2	552	0	
1	HFE-338pcc13 (HG-01)	1500	1 HFE-338pcc13 (HG-01)	1500
1	HFE-347pcf2	580	1 HFE-347pcf2	580
1	HFE-43-10pccc124 (H-Galden1040x)	1870	1 HFE-43-10pccc124 (H-Galden1040x)	1870
1	Hydrocarbons, chlorinated	10.6	0	
1	Methane	25	1 Methane	25
1	Methane, biogenic	25	1 Methane, biogenic	25
1	Methane, bromo-, Halon 1001	5	1 Methane, bromo-, Halon 1001	5
1	Methane, bromochlorodifluoro-, Halon 1211	1890	1 Methane, bromochlorodifluoro-, Halon 1211	1890
1	Methane, bromodifluoro-, Halon 1201	404	0	
1	Methane, bromotrifluoro-, Halon 1301	7140	1 Methane, bromotrifluoro-, Halon 1301	7140
1	Methane, chlorodifluoro-, HCFC-22	1810	1 Methane, chlorodifluoro-, HCFC-22	1810
1	Methane, chlorotrifluoro-, CFC-13	14400	1 Methane, chlorotrifluoro-, CFC-13	14400
1	Methane, dibromo-	1.54	0	
1	Methane, dichloro-, HCC-30	8.7	0	
1	Methane, dichloro-, HCC-30	8.7	1 Methane, dichloro-, HCC-30	8.7
1	Methane, dichlorodifluoro-, CFC-12	10900	1 Methane, dichlorodifluoro-, CFC-12	10900
1	Methane, dichlorofluoro-, HCFC-21	151	0	
1	Methane, difluoro-, HFC-32	675	1 Methane, difluoro-, HFC-32	675
1	Methane, fluoro-, HFC-41	92	0	
1	Methane, fossil	25	1 Methane, fossil	25
1	Methane, iodotrifluoro-	0.4	0	
1	Methane, monochloro-, R-40	13	1 Methane, monochloro-, R-40	13
0			1 Methane, pentafluoromethoxy-, HFE-134	6320
1	Methane, tetrachloro-, CFC-10	1400	0	
1	Methane, tetrachloro-, CFC-10	1400	1 Methane, tetrachloro-, CFC-10	1400
1	Methane, tetrafluoro-, CFC-14	7390	1 Methane, tetrafluoro-, CFC-14	7390
1	Methane, trichlorofluoro-, CFC-11	4750	1 Methane, trichlorofluoro-, CFC-11	4750
0			1 Methane, trifluoro-(difluoromethoxy)-, HFE-125	14900
1	Methane, trifluoro-, HFC-23	14800	1 Methane, trifluoro-, HFC-23	14800



NAME (ReciPE)		GWP	Name IPCC		GWP
0			1	Methane, trifluoro-methoxy-, HFE-143a	756
1	Nitrogen fluoride	17200	1	Nitrogen fluoride	17200
1	Pentane, 2,3-dihydroperfluoro-, HFC-4310mee	1640	1	Pentane, 2,3-dihydroperfluoro-, HFC-4310mee	1640
1	Pentane, perfluoro-	9160	1	Pentane, perfluoro-	9160
1	PFC-9-1-18	7500	1	PFC-9-1-18	7500
1	PFPME	10300	1	PFPME	10300
1	Propane, 1,1,1,2,2,3-hexafluoro-, HFC-236cb	1340	0		
1	Propane, 1,1,1,2,3,3-hexafluoro-, HFC-236ea	1370	0		
1	Propane, 1,1,1,2,3,3,3-heptafluoro-, HFC-227ea	3220	1	Propane, 1,1,1,2,3,3,3-heptafluoro-, HFC-227ea	3220
1	Propane, 1,1,1,3,3,3-hexafluoro-, HCFC-236fa	9810	1	Propane, 1,1,1,3,3,3-hexafluoro-, HCFC-236fa	9810
0			1	Propane, 1,1,2,2,3,3, hexafluoromethoxy- HFE-356pcc3	110
1	Propane, 1,1,2,2,3-pentafluoro-, HFC-245ca	693	0		
1	Propane, 1,1,3,3-tetrafluoro-, HFC-245fa	1030	1	Propane, 1,1,3,3-tetrafluoro-, HFC-245fa	1030
1	Propane, 1,3-dichloro-1,1,2,2,3-pentafluoro-, HCFC-225cb	595	1	Propane, 1,3-dichloro-1,1,2,2,3-pentafluoro-, HCFC-225cb	595
1	Propane, 3,3-dichloro-1,1,1,2,2-pentafluoro-, HCFC-225ca	122	1	Propane, 3,3-dichloro-1,1,1,2,2-pentafluoro-, HCFC-225ca	122
1	Propane, perfluoro-	8830	1	Propane, perfluoro-	8830
1	Sulfur hexafluoride	22800	1	Sulfur hexafluoride	22800
1	Sulphur, trifluoromethyl pentafluoride	17700	1	Sulphur, trifluoromethyl pentafluoride	17700
96			70		

## Annex 2 – Pathways

List of crops in the RSB Tool.

Crop
Camelina
Cassava
Castor bean
Corn
Jatropha
Palm
Potato
Rapeseed
Soybean
Sugar beet
Sugar cane
Sunflower
Sweet sorghum
Wheat

List of conversion technologies included in the RSB Tool.

Biofuel production technologies → Biofuel product
(Hydrolysis & ) Fermentation → Ethanol
Methyl esterification → Methyl Ester
FT Synthesis → BTL, DME, Methanol
Hydrotreatment → Hydrotreated oils & fats

## Annex 3 – Land Use Tables

### AGB

Table A3-1: Above ground biomass in forests (source: (IPCC 2006), table 4.7 p. 4.53).

Domain	Ecological zone	Continent	Above-ground biomass (tonnes d.m. ha <sup>-1</sup> )	References
Tropical	Tropical rain forest	Africa	310 (130-510)	IPCC, 2003
		North and South America	300 (120-400)	Baker <i>et al.</i> , 2004a; Hughes <i>et al.</i> , 1999
		Asia (continental)	280 (120-680)	IPCC, 2003
		Asia (insular)	350 (280-520)	IPCC, 2003
	Tropical moist deciduous forest	Africa	260 (160-430)	IPCC, 2003
		North and South America	220 (210-280)	IPCC, 2003
		Asia (continental)	180 (10-560)	IPCC, 2003
		Asia (insular)	290	IPCC, 2003
	Tropical dry forest	Africa	120 (120-130)	IPCC, 2003
		North and South America	210 (200-410)	IPCC, 2003
		Asia (continental)	130 (100-160)	IPCC, 2003
		Asia (insular)	160	IPCC, 2003
	Tropical shrubland	Africa	70 (20-200)	IPCC, 2003
		North and South America	80 (40-90)	IPCC, 2003
		Asia (continental)	60	IPCC, 2003
		Asia (insular)	70	IPCC, 2003
	Tropical mountain systems	Africa	40-190	IPCC, 2003
		North and South America	60-230	IPCC, 2003
		Asia (continental)	50-220	IPCC, 2003
		Asia (insular)	50-360	IPCC, 2003
Subtropical	Subtropical humid forest	North and South America	220 (210-280)	IPCC, 2003
		Asia (continental)	180 (10-560)	IPCC, 2003
		Asia (insular)	290	IPCC, 2003
	Subtropical dry forest	Africa	140	Sebei <i>et al.</i> , 2001
		North and South America	210 (200-410)	IPCC, 2003
		Asia (continental)	130 (100-160)	IPCC, 2003
		Asia (insular)	160	IPCC, 2003
	Subtropical steppe	Africa	70 (20-200)	IPCC, 2003
		North and South America	80 (40-90)	IPCC, 2003
		Asia (continental)	60	IPCC, 2003
		Asia (insular)	70	IPCC, 2003
	Subtropical mountain systems	Africa	50	Montès <i>et al.</i> , 2002
		North and South America	60-230	IPCC, 2003
		Asia (continental)	50-220	IPCC, 2003
		Asia (insular)	50-360	IPCC, 2003

**Table A3-2: Continued; Above ground biomass in forests (source: (IPCC 2006), table 4.7 p. 4.54).**

Domain	Ecological zone	Continent	Above-ground biomass (tonnes d.m. ha <sup>-1</sup> )	References
Temperate	Temperate oceanic forest	Europe	120	-
		North America	660 (80-1200)	Hessl <i>et al.</i> , 2004; Smithwick <i>et al.</i> , 2002
		New Zealand	360 (210-430)	Hall <i>et al.</i> , 2001
		South America	180 (90-310)	Gayoso and Schlegel, 2003; Battles <i>et al.</i> , 2002
	Temperate continental forest	Asia, Europe ( $\leq 20$ y)	20	IPCC, 2003
		Asia, Europe ( $> 20$ y)	120 (20-320)	IPCC, 2003
		North and South America ( $\leq 20$ y)	60 (10-130)	IPCC, 2003
		North and South America ( $> 20$ y)	130 (50-200)	IPCC, 2003
	Temperate mountain systems	Asia, Europe ( $\leq 20$ y)	100 (20-180)	IPCC, 2003
		Asia, Europe ( $> 20$ y)	130 (20-600)	IPCC, 2003
		North and South America ( $\leq 20$ y)	50 (20-110)	IPCC, 2003
		North and South America ( $> 20$ y)	130 (40-280)	IPCC, 2003
Boreal	Boreal coniferous forest	Asia, Europe, North America	10-90	Gower <i>et al.</i> , 2001
	Boreal tundra woodland	Asia, Europe, North America ( $\leq 20$ y)	3-4	IPCC, 2003
		Asia, Europe, North America ( $> 20$ y)	15-20	IPCC, 2003
	Boreal mountain systems	Asia, Europe, North America ( $\leq 20$ y)	12-15	IPCC, 2003
		Asia, Europe, North America ( $> 20$ y)	40-50	IPCC, 2003

## DOM

Table A3-3: Default Values for litter and dead wood (source: (IPCC 2006), table 2.2 p. 2.27).

Climate	Forest type			
	Broadleaf deciduous	Needleleaf evergreen	Broadleaf deciduous	Needleleaf evergreen
	Litter carbon stocks of mature forests		Dead wood carbon stocks of mature forests	
	(tonnes C ha <sup>-1</sup> )		(tonnes C ha <sup>-1</sup> )	
Boreal, dry	25 (10 - 58)	31 (6 - 86)	n.a. <sup>b</sup>	n.a
Boreal, moist	39 (11 - 117)	55 (7 - 123)	n.a	n.a
Cold Temperate, dry	28 (23 - 33) <sup>a</sup>	27 (17 - 42) <sup>a</sup>	n.a	n.a
Cold temperate, moist	16 (5 - 31) <sup>a</sup>	26 (10 - 48) <sup>a</sup>	n.a	n.a
Warm Temperate, dry	28.2 (23.4 - 33.0) <sup>a</sup>	20.3 (17.3 - 21.1) <sup>a</sup>	n.a	n.a
Warm temperate, moist	13 (2 - 31) <sup>a</sup>	22 (6 - 42) <sup>a</sup>	n.a	n.a
Subtropical	2.8 (2 - 3)	4.1	n.a	n.a
Tropical	2.1 (1 - 3)	5.2	n.a	n.a

## Soil organic carbon

Table A3-4: Relative stock change factors (FLU, FMG, and FI) over 20 years) for different management activities on cropland (source: (IPCC 2006), table 5.5 p. 5.17).

CROPLAND		LAND USE				TILLAGE			INPUT			
Climate	Eco_code	FLU(Long term)	FLU (Tree crop)	FLU (Set Aside)	FLU (Paddy_Rice)	FULL	REDUCED	NO	LOW	MEDIUM	HIGH (without manure)	HIGH (with manure)
Tropical wet	Tar	0.49	1	0.82	1.1	1	1.15	1.22	0.92	1	1.11	1.44
Tropical moist	Tawb	0.48	1	0.82	1.1	1	1.15	1.22	0.92	1	1.11	1.44
Tropical dry	TAWb	0.58	1	0.93	1.1	1	1.09	1.17	0.95	1	1.04	1.37
Tropical dry	TBSb	0.58	1	0.93	1.1	1	1.09	1.17	0.95	1	1.04	1.37
Tropical dry	TBWh	0.58	1	0.93	1.1	1	1.09	1.17	0.95	1	1.04	1.37
Tropical montane	Tm	0.64	1	0.88	1.1	1	1.08	1.16	0.94	1	1.08	1.41
Warm temperate moist	SCr	0.69	1	0.82	1.1	1	1.08	1.15	0.92	1	1.11	1.44
Warm temperate dry	SCs	0.8	1	0.93	1.1	1	1.02	1.1	0.95	1	1.04	1.37
Warm temperate dry	SBSh	0.8	1	0.93	1.1	1	1.02	1.1	0.95	1	1.04	1.37
Warm temperate dry	SBWh	0.8	1	0.93	1.1	1	1.02	1.1	0.95	1	1.04	1.37
Warm temperate moist or dry	SM	0.69	1	0.82	1.1	1	1.08	1.15	0.92	1	1.11	1.44
Cool temperate moist	TeDo	0.69	1	0.82	1.1	1	1.08	1.15	0.92	1	1.11	1.44
Cool temperate moist	TeDc	0.8	1	0.93	1.1	1	1.02	1.1	0.95	1	1.04	1.37
Cool temperate dry	TeBSk	0.8	1	0.93	1.1	1	1.02	1.1	0.95	1	1.04	1.37
Cool temperate dry	TeBWK	0.8	1	0.93	1.1	1	1.02	1.1	0.95	1	1.04	1.37
Cool temperate moist or dry	TeM	0.69	1	0.82	1.1	1	1.08	1.15	0.92	1	1.11	1.44
Boreal moist	Ba	0.69	1	0.82	1.1	1	1.08	1.15	0.92	1	1.11	1.44
Boreal dry	Bb	0.8	1	0.93	1.1	1	1.02	1.1	0.95	1	1.04	1.37
Boreal moist and dry	BM	0.69	1	0.82	1.1	1	1.08	1.15	0.92	1	1.11	1.44

**Table A3-5: Relative stock change factors for grassland management (source: (IPCC 2006), table 6.2 p. 6.16).**

GRASSLAND		LAND USE	MANAGEMENT				INPUT	
Temperature	Eco_code	ALL	Nominally	Moderately	Severely	Improved	MEDIUM	HIGH
Tropical wet	Tar	1	1	0.97	0.7	1.17	1	1.11
Tropical moist	Tawa	1	1	0.97	0.7	1.17	1	1.11
Tropical dry	TAWb	1	1	0.97	0.7	1.17	1	1.11
Tropical dry	TBSH	1	1	0.97	0.7	1.17	1	1.11
Tropical dry	TBWh	1	1	0.97	0.7	1.17	1	1.11
Tropical montane	TM	1	1	0.96	0.7	1.16	1	1.11
Warm temperate moist	SCf	1	1	0.95	0.7	1.14	1	1.11
Warm temperate dry	SCs	1	1	0.95	0.7	1.14	1	1.11
Warm temperate dry	SBSH	1	1	0.95	0.7	1.14	1	1.11
Warm temperate dry	SBWh	1	1	0.95	0.7	1.14	1	1.11
Warm temperate moist or dry	SM	1	1	0.95	0.7	1.14	1	1.11
Cool temperate moist	TeDo	1	1	0.95	0.7	1.14	1	1.11
Cool temperate moist	TeDc	1	1	0.95	0.7	1.14	1	1.11
Cool temperate dry	TeBSk	1	1	0.95	0.7	1.14	1	1.11
Cool temperate dry	TeBWk	1	1	0.95	0.7	1.14	1	1.11
Cool temperate moist or dry	TeM	1	1	0.95	0.7	1.14	1	1.11
Boreal moist	Ba	1	1	0.95	0.7	1.14	1	1.11
Boreal dry	Bb	1	1	0.95	0.7	1.14	1	1.11
Boreal moist and dry	BM	1	1	0.95	0.7	1.14	1	1.11

## **Annex 4 – Ecoinvent Emission Factors**

						Ecoinvent	
						IPCC2007	
						GWP100	
	Name	Category	Subcategory	Unit	Country		
3	1 dried roughage store, air dried, solar, operation	agricultural means of production	buildings	kg	CH	0.034458	
5	2 dried roughage store, cold-air dried, conventional, operation	agricultural means of production	buildings	kg	CH	0.037415	
7	3 dried roughage store, non ventilated, operation	agricultural means of production	buildings	kg	CH	0.016793	
10	4 housing system with fully-slatted floor, pig, operation	agricultural means of production	buildings	pig place	CH	59.987	
12	5 label housing system, pig, operation	agricultural means of production	buildings	pig place	CH	34.993	
14	6 loose housing system, cattle, operation	agricultural means of production	buildings	LU	CH	434.28	
18	7 slurry store and processing, operation	agricultural means of production	buildings	m3	CH	0.056035	
20	8 tied housing system, cattle, operation	agricultural means of production	buildings	LU	CH	447.11	
22	9 barley IP, at feed mill	agricultural means of production	feed	kg	CH	0.48337	
23	10 barley organic, at feed mill	agricultural means of production	feed	kg	CH	0.49807	
24	11 fava beans IP, at feed mill	agricultural means of production	feed	kg	CH	1.0599	
25	12 grain maize IP, at feed mill	agricultural means of production	feed	kg	CH	0.59052	
26	13 grain maize organic, at feed mill	agricultural means of production	feed	kg	CH	0.46923	
27	14 protein peas IP, at feed mill	agricultural means of production	feed	kg	CH	0.93472	
28	15 rye IP, at feed mill	agricultural means of production	feed	kg	CH	0.38194	
29	16 rye organic, at feed mill	agricultural means of production	feed	kg	CH	0.47607	
30	17 wheat IP, at feed mill	agricultural means of production	feed	kg	CH	0.62231	
31	18 wheat organic, at feed mill	agricultural means of production	feed	kg	CH	0.54657	
38	19 ammonium nitrate phosphate, as N, at regional storehouse	agricultural means of production	mineral fertiliser	kg	RER	5.2468	
39	20 ammonium nitrate phosphate, as P2O5, at regional storehouse	agricultural means of production	mineral fertiliser	kg	RER	1.2661	
40	21 ammonium nitrate, as N, at regional storehouse	agricultural means of production	mineral fertiliser	kg	RER	8.5521	
41	22 ammonium sulphate, as N, at regional storehouse	agricultural means of production	mineral fertiliser	kg	RER	2.6912	
42	23 calcium ammonium nitrate, as N, at regional storehouse	agricultural means of production	mineral fertiliser	kg	RER	8.6543	
43	24 calcium nitrate, as N, at regional storehouse	agricultural means of production	mineral fertiliser	kg	RER	3.8485	
44	25 diammonium phosphate, as N, at regional storehouse	agricultural means of production	mineral fertiliser	kg	RER	2.7974	
45	26 diammonium phosphate, as P2O5, at regional storehouse	agricultural means of production	mineral fertiliser	kg	RER	1.5686	
46	27 lime, algae, at regional storehouse	agricultural means of production	mineral fertiliser	kg	CH	0.20485	
47	28 lime, from carbonation, at regional storehouse	agricultural means of production	mineral fertiliser	kg	CH	0.011666	
48	29 monoammonium phosphate, as N, at regional storehouse	agricultural means of production	mineral fertiliser	kg	RER	2.8215	
49	30 monoammonium phosphate, as P2O5, at regional storehouse	agricultural means of production	mineral fertiliser	kg	RER	1.5995	
50	31 potassium chloride, as K2O, at regional storehouse	agricultural means of production	mineral fertiliser	kg	RER	0.49769	
51	32 potassium nitrate, as K2O, at regional storehouse	agricultural means of production	mineral fertiliser	kg	RER	0.86902	
52	33 potassium nitrate, as N, at regional storehouse	agricultural means of production	mineral fertiliser	kg	RER	15.975	
53	34 potassium sulphate, as K2O, at regional storehouse	agricultural means of production	mineral fertiliser	kg	RER	1.4353	
54	35 single superphosphate, as P2O5, at regional storehouse	agricultural means of production	mineral fertiliser	kg	RER	2.5888	
55	36 stone meal, at regional storehouse	agricultural means of production	mineral fertiliser	kg	CH	0.060678	
56	37 thomas meal, as P2O5, at regional storehouse	agricultural means of production	mineral fertiliser	kg	RER	0.72902	
57	38 triple superphosphate, as P2O5, at regional storehouse	agricultural means of production	mineral fertiliser	kg	RER	2.0102	
10772	39 application, digested matter from biowaste in agricultural co-digestion, covered	agricultural means of production	organic fertiliser	kg	CH	0.012372	
58	40 compost, at plant	agricultural means of production	organic fertiliser	kg	CH	0.36189	
59	41 horn meal, at regional storehouse	agricultural means of production	organic fertiliser	kg	CH	0.29298	
60	42 poultry manure, dried, at regional storehouse	agricultural means of production	organic fertiliser	kg	CH	0.10609	
61	43 vinasse, at regional storehouse	agricultural means of production	organic fertiliser	kg	CH	0.016642	
66	44 2,4-D, at regional storehouse	agricultural means of production	pesticides	kg	RER	3.3034	
67	45 2,4-D, at regional storehouse	agricultural means of production	pesticides	kg	CH	3.0638	
104	46 MCPA, at regional storehouse	agricultural means of production	pesticides	kg	RER	4.2416	
105	47 MCPA, at regional storehouse	agricultural means of production	pesticides	kg	CH	3.9638	
62	48 [sulfonyl]urea-compounds, at regional storehouse	agricultural means of production	pesticides	kg	RER	9.3059	
63	49 [sulfonyl]urea-compounds, at regional storehouse	agricultural means of production	pesticides	kg	CH	8.4053	
64	50 [thio]carbamate-compounds, at regional storehouse	agricultural means of production	pesticides	kg	RER	7.0799	
65	51 [thio]carbamate-compounds, at regional storehouse	agricultural means of production	pesticides	kg	CH	6.413	
68	52 acetamide-anilide-compounds, at regional storehouse	agricultural means of production	pesticides	kg	RER	8.2478	
69	53 acetamide-anilide-compounds, at regional storehouse	agricultural means of production	pesticides	kg	CH	7.511	
70	54 alachlor, at regional storehouse	agricultural means of production	pesticides	kg	RER	8.586	
71	55 alachlor, at regional storehouse	agricultural means of production	pesticides	kg	CH	7.7654	
72	56 atrazine, at regional storehouse	agricultural means of production	pesticides	kg	RER	5.3249	
73	57 atrazine, at regional storehouse	agricultural means of production	pesticides	kg	CH	4.9549	
74	58 benzimidazole-compounds, at regional storehouse	agricultural means of production	pesticides	kg	RER	13.213	
75	59 benzimidazole-compounds, at regional storehouse	agricultural means of production	pesticides	kg	CH	12.104	
76	60 benzo[thia]diazole-compounds, at regional storehouse	agricultural means of production	pesticides	kg	RER	13.486	
77	61 benzo[thia]diazole-compounds, at regional storehouse	agricultural means of production	pesticides	kg	CH	12.412	
78	62 benzoic-compounds, at regional storehouse	agricultural means of production	pesticides	kg	RER	6.1844	
79	63 benzoic-compounds, at regional storehouse	agricultural means of production	pesticides	kg	CH	5.491	
80	64 bipyridylium-compounds, at regional storehouse	agricultural means of production	pesticides	kg	RER	14.882	
81	65 bipyridylium-compounds, at regional storehouse	agricultural means of production	pesticides	kg	CH	14.021	
82	66 carbofuran, at regional storehouse	agricultural means of production	pesticides	kg	RER	14.159	
83	67 carbofuran, at regional storehouse	agricultural means of production	pesticides	kg	CH	13.003	
84	68 cyanazine, at regional storehouse	agricultural means of production	pesticides	kg	RER	5.591	
85	69 cyanazine, at regional storehouse	agricultural means of production	pesticides	kg	CH	5.2056	
86	70 cyclic N-compounds, at regional storehouse	agricultural means of production	pesticides	kg	RER	5.0527	
87	71 cyclic N-compounds, at regional storehouse	agricultural means of production	pesticides	kg	CH	4.5994	
88	72 dicamba, at regional storehouse	agricultural means of production	pesticides	kg	RER	8.7446	
89	73 dicamba, at regional storehouse	agricultural means of production	pesticides	kg	CH	7.8242	
90	74 dinitroaniline-compounds, at regional storehouse	agricultural means of production	pesticides	kg	RER	4.6739	
91	75 dinitroaniline-compounds, at regional storehouse	agricultural means of production	pesticides	kg	CH	4.1279	
92	76 diphenylether-compounds, at regional storehouse	agricultural means of production	pesticides	kg	RER	18.75	
93	77 diphenylether-compounds, at regional storehouse	agricultural means of production	pesticides	kg	CH	17.04	
94	78 dithiocarbamate-compounds, at regional storehouse	agricultural means of production	pesticides	kg	RER	3.0373	
95	79 dithiocarbamate-compounds, at regional storehouse	agricultural means of production	pesticides	kg	CH	2.8325	
96	80 diuron, at regional storehouse	agricultural means of production	pesticides	kg	RER	7.1142	
97	81 diuron, at regional storehouse	agricultural means of production	pesticides	kg	CH	6.2674	
98	82 glyphosate, at regional storehouse	agricultural means of production	pesticides	kg	RER	16.064	
99	83 glyphosate, at regional storehouse	agricultural means of production	pesticides	kg	CH	13.928	
100	84 linuron, at regional storehouse	agricultural means of production	pesticides	kg	RER	7.471	
101	85 linuron, at regional storehouse	agricultural means of production	pesticides	kg	CH	6.6014	
102	86 maneb, at regional storehouse	agricultural means of production	pesticides	kg	RER	3.0918	
103	87 maneb, at regional storehouse	agricultural means of production	pesticides	kg	CH	2.8268	
106	88 metolachlor, at regional storehouse	agricultural means of production	pesticides	kg	RER	8.5237	
107	89 metolachlor, at regional storehouse	agricultural means of production	pesticides	kg	CH	7.7913	
108	90 nitrile-compounds, at regional storehouse	agricultural means of production	pesticides	kg	RER	5.0223	
109	91 nitrile-compounds, at regional storehouse	agricultural means of production	pesticides	kg	CH	4.5906	
110	92 nitro-compounds, at regional storehouse	agricultural means of production	pesticides	kg	RER	2.369	
111	93 nitro-compounds, at regional storehouse	agricultural means of production	pesticides	kg	CH	2.3239	
112	94 organophosphorus-compounds, at regional storehouse	agricultural means of production	pesticides	kg	RER	7.8251	
113	95 organophosphorus-compounds, at regional storehouse	agricultural means of production	pesticides	kg	CH	6.7638	
114	96 parathion, at regional storehouse	agricultural means of production	pesticides	kg	RER	4.4182	
115	97 parathion, at regional storehouse	agricultural means of production	pesticides	kg	CH	3.8399	
116	98 pesticide unspecified, at regional storehouse	agricultural means of production	pesticides	kg	RER	7.8106	
117	99 pesticide unspecified, at regional storehouse	agricultural means of production	pesticides	kg	CH	7.0751	
118	100 phenoxy-compounds, at regional storehouse	agricultural means of production	pesticides	kg	RER	3.9748	
119	101 phenoxy-compounds, at regional storehouse	agricultural means of production	pesticides	kg	CH	3.6621	
120	102 phthalamide-compounds, at regional storehouse	agricultural means of production	pesticides	kg	RER	3.7327	
121	103 phthalamide-compounds, at regional storehouse	agricultural means of production	pesticides	kg	CH	3.2073	
122	104 propachlor, at regional storehouse	agricultural means of production	pesticides	kg	RER	8.8615	
123	105 propachlor, at regional storehouse	agricultural means of production	pesticides	kg	CH	8.0691	
124	106 pyrethroid-compounds, at regional storehouse	agricultural means of production	pesticides	kg	RER	21.902	



						Ecoinvent IPCC2007 GWP100
Name	Category	Subcategory	Unit	Country		
125	107 pyrethroid-compounds, at regional storehouse	agricultural means of production	pesticides	kg	CH	20.127
126	108 pyridazine-compounds, at regional storehouse	agricultural means of production	pesticides	kg	RER	5.0223
127	109 pyridazine-compounds, at regional storehouse	agricultural means of production	pesticides	kg	CH	4.5906
128	110 triazine-compounds, at regional storehouse	agricultural means of production	pesticides	kg	RER	7.9802
129	111 triazine-compounds, at regional storehouse	agricultural means of production	pesticides	kg	CH	7.3981
130	112 barley seed IP, at regional storehouse	agricultural means of production	seed	kg	CH	0.41217
131	113 barley seed organic, at regional storehouse	agricultural means of production	seed	kg	CH	0.47883
132	114 clover seed IP, at farm	agricultural means of production	seed	kg	CH	3.314
133	115 clover seed IP, at regional storehouse	agricultural means of production	seed	kg	CH	3.4394
6975	116 cotton seed, at regional storehouse	agricultural means of production	seed	kg	US	0.40142
134	117 grass seed IP, at farm	agricultural means of production	seed	kg	CH	1.9134
135	118 grass seed IP, at regional storehouse	agricultural means of production	seed	kg	CH	2.0388
6242	119 grass seed organic, at regional storehouse	agricultural means of production	seed	kg	CH	1.5234
136	120 maize seed IP, at farm	agricultural means of production	seed	kg	CH	1.7887
137	121 maize seed IP, at regional storehouse	agricultural means of production	seed	kg	CH	1.9049
138	122 maize seed organic, at farm	agricultural means of production	seed	kg	CH	1.249
139	123 maize seed organic, at regional storehouse	agricultural means of production	seed	kg	CH	1.3575
140	124 pea seed IP, at regional storehouse	agricultural means of production	seed	kg	CH	0.94911
141	125 pea seed organic, at regional storehouse	agricultural means of production	seed	kg	CH	0.99932
142	126 potato seed IP, at farm	agricultural means of production	seed	kg	CH	0.16292
143	127 potato seed IP, at regional storehouse	agricultural means of production	seed	kg	CH	0.21219
144	128 potato seed organic, at farm	agricultural means of production	seed	kg	CH	0.15406
145	129 potato seed organic, at regional storehouse	agricultural means of production	seed	kg	CH	0.2031
146	130 rape seed IP, at regional storehouse	agricultural means of production	seed	kg	CH	1.7231
6243	131 rape seed organic, at regional storehouse	agricultural means of production	seed	kg	CH	1.3151
6971	132 rice seed, at regional storehouse	agricultural means of production	seed	kg	US	1.9556
147	133 rye seed IP, at regional storehouse	agricultural means of production	seed	kg	CH	0.33753
148	134 rye seed organic, at regional storehouse	agricultural means of production	seed	kg	CH	0.45683
149	135 sugar beet seed IP, at regional storehouse	agricultural means of production	seed	kg	CH	1.9236
150	136 wheat seed IP, at regional storehouse	agricultural means of production	seed	kg	CH	0.5756
151	137 wheat seed organic, at regional storehouse	agricultural means of production	seed	kg	CH	0.52732
152	138 application of plant protection products, by field sprayer	agricultural means of production	work processes	ha	CH	11.056
153	139 baling	agricultural means of production	work processes	unit	CH	6.3113
154	140 chopping, maize	agricultural means of production	work processes	ha	CH	327.71
155	141 combine harvesting	agricultural means of production	work processes	ha	CH	155.33
156	142 fertilising, by broadcaster	agricultural means of production	work processes	ha	CH	25.4
157	143 fodder loading, by self-loading trailer	agricultural means of production	work processes	m3	CH	0.62784
158	144 grain drying, high temperature	agricultural means of production	work processes	kg	CH	0.58747
159	145 grain drying, low temperature	agricultural means of production	work processes	kg	CH	0.7639
160	146 grass drying	agricultural means of production	work processes	kg	CH	0.45025
161	147 harvesting, by complete harvester, beets	agricultural means of production	work processes	ha	CH	457.82
162	148 harvesting, by complete harvester, potatoes	agricultural means of production	work processes	ha	CH	257.7
163	149 haying, by rotary tedder	agricultural means of production	work processes	ha	CH	10.872
164	150 hoeing	agricultural means of production	work processes	ha	CH	20.694
165	151 irrigating	agricultural means of production	work processes	ha	CH	299.06
6967	152 irrigating	agricultural means of production	work processes	m3	US	0.35181
6978	153 irrigating	agricultural means of production	work processes	m3	CH	0.24921
166	154 loading bales	agricultural means of production	work processes	unit	CH	0.4136
167	155 maize drying	agricultural means of production	work processes	kg	CH	0.27381
168	156 milking	agricultural means of production	work processes	kg	CH	0.015766
169	157 mowing, by motor mower	agricultural means of production	work processes	ha	CH	19.079
170	158 mowing, by rotary mower	agricultural means of production	work processes	ha	CH	23.439
171	159 mulching	agricultural means of production	work processes	ha	CH	21.337
172	160 planting	agricultural means of production	work processes	ha	CH	98.896
173	161 potato grading	agricultural means of production	work processes	kg	CH	0.0012042
174	162 potato haulm cutting	agricultural means of production	work processes	ha	CH	36.419
175	163 potato planting	agricultural means of production	work processes	ha	CH	58.808
176	164 slurry spreading, by vacuum tanker	agricultural means of production	work processes	m3	CH	1.2149
177	165 solid manure loading and spreading, by hydraulic loader and spreader	agricultural means of production	work processes	kg	CH	0.0031754
178	166 sowing	agricultural means of production	work processes	ha	CH	22.899
179	167 swath, by rotary windrower	agricultural means of production	work processes	ha	CH	16.326
180	168 tillage, cultivating, chiselling	agricultural means of production	work processes	ha	CH	71.615
181	169 tillage, currying, by weeder	agricultural means of production	work processes	ha	CH	10.972
182	170 tillage, harrowing, by rotary harrow	agricultural means of production	work processes	ha	CH	62.73
183	171 tillage, harrowing, by spring tine harrow	agricultural means of production	work processes	ha	CH	24.88
184	172 tillage, hoeing and earthing-up, potatoes	agricultural means of production	work processes	ha	CH	22.182
185	173 tillage, ploughing	agricultural means of production	work processes	ha	CH	119
186	174 tillage, rolling	agricultural means of production	work processes	ha	CH	23.693
187	175 tillage, rotary cultivator	agricultural means of production	work processes	ha	CH	75.65
188	176 transport, tractor and trailer	agricultural means of production	work processes	tkm	CH	0.3121
6976	177 sheep for slaughtering, live weight, at farm	agricultural production	animal production	kg	US	2.0251
189	178 tallow, at plant	agricultural production	animal production	kg	CH	0.66209
6973	179 wool, sheep, at farm	agricultural production	animal production	kg	US	56.519
11182	180 Jatropha Seed, IP, at farm	agricultural production	plant production	#N/A	IN	0
191	181 barley grains IP, at farm	agricultural production	plant production	kg	CH	0.37908
6964	182 barley grains conventional, Barrois, at farm	agricultural production	plant production	kg	FR	0.55798
6960	183 barley grains conventional, Castilla-y-Leon, at farm	agricultural production	plant production	kg	ES	0.927
6956	184 barley grains conventional, Saxony-Anhalt, at farm	agricultural production	plant production	kg	DE	0.48642
190	185 barley grains extensive, at farm	agricultural production	plant production	kg	CH	0.46938
192	186 barley grains organic, at farm	agricultural production	plant production	kg	CH	0.44615
194	187 barley straw IP, at farm	agricultural production	plant production	kg	CH	0.090156
193	188 barley straw extensive, at farm	agricultural production	plant production	kg	CH	0.10937
195	189 barley straw organic, at farm	agricultural production	plant production	kg	CH	0.070977
6528	190 corn, at farm	agricultural production	plant production	kg	US	0.43174
6977	191 cotton fibres, at farm	agricultural production	plant production	kg	US	3.0673
10174	192 cotton fibres, ginned, at farm	agricultural production	plant production	kg	CN	3.5044
6974	193 cotton seed, at farm	agricultural production	plant production	kg	US	0.30374
10175	194 cotton seed, at farm	agricultural production	plant production	kg	CN	0.35182
196	195 fava beans IP, at farm	agricultural production	plant production	kg	CH	0.95386
197	196 fava beans organic, at farm	agricultural production	plant production	kg	CH	0.9586
198	197 fodder beets IP, at farm	agricultural production	plant production	kg	CH	0.034016
200	198 grain maize IP, at farm	agricultural production	plant production	kg	CH	0.54403
201	199 grain maize organic, at farm	agricultural production	plant production	kg	CH	0.42274
6208	200 grass from meadow intensive IP, at field	agricultural production	plant production	kg	CH	0.20266
6207	201 grass from meadow intensive, organic, at field	agricultural production	plant production	kg	CH	0.16428
6210	202 grass from natural meadow extensive IP, at field	agricultural production	plant production	kg	CH	0.092606
6209	203 grass from natural meadow extensive organic, at field	agricultural production	plant production	kg	CH	0.092142
6212	204 grass from natural meadow intensive IP, at field	agricultural production	plant production	kg	CH	0.17981
6211	205 grass from natural meadow intensive organic, at field	agricultural production	plant production	kg	CH	0.1402
6214	206 grass silage IP, at farm	agricultural production	plant production	kg	CH	0.22
6213	207 grass silage organic, at farm	agricultural production	plant production	kg	CH	0.16817
202	208 green manure IP, until April	agricultural production	plant production	ha	CH	961.09
203	209 green manure IP, until February	agricultural production	plant production	ha	CH	961.09
204	210 green manure IP, until January	agricultural production	plant production	ha	CH	961.09
205	211 green manure IP, until march	agricultural production	plant production	ha	CH	961.09
206	212 green manure organic, until April	agricultural production	plant production	ha	CH	525.6

								Ecoinvent IPCC2007 GWP100	
	Name	Category	Subcategory	Unit	Country				
207	213 green manure organic, until February	agricultural production	plant production	ha	CH			525.6	
208	214 green manure organic, until January	agricultural production	plant production	ha	CH			525.6	
209	215 green manure organic, until march	agricultural production	plant production	ha	CH			525.6	
210	216 hay extensive, at farm	agricultural production	plant production	kg	CH			0.096829	
211	217 hay intensive IP, at farm	agricultural production	plant production	kg	CH			0.22377	
212	218 hay intensive organic, at farm	agricultural production	plant production	kg	CH			0.19004	
213	219 husked nuts harvesting, at farm	agricultural production	plant production	kg	PH			0.000061483	
10178	220 jute fibres, irrigated system, at farm	agricultural production	plant production	kg	IN			0.61377	
10179	221 jute fibres, rainfed system, at farm	agricultural production	plant production	kg	IN			0.57232	
10180	222 jute stalks, from fibre production, irrigated system, at farm	agricultural production	plant production	kg	IN			0.018972	
10181	223 jute stalks, from fibre production, rainfed system, at farm	agricultural production	plant production	kg	IN			0.017691	
10184	224 kenaf fibres, at farm	agricultural production	plant production	kg	IN			0.57839	
10185	225 kenaf stalks, from fibre production, at farm	agricultural production	plant production	kg	IN			0.017878	
214	226 maize starch, at plant	agricultural production	plant production	kg	DE			1.2071	
199	227 palm fruit bunches, at farm	agricultural production	plant production	kg	MY			0.41419	
215	228 potato starch, at plant	agricultural production	plant production	kg	DE			0.71254	
216	229 potatoes IP, at farm	agricultural production	plant production	kg	CH			0.10714	
217	230 potatoes organic, at farm	agricultural production	plant production	kg	CH			0.12569	
6968	231 potatoes, at farm	agricultural production	plant production	kg	US			0.15646	
6963	232 protein peas conventional, Barrois, at farm	agricultural production	plant production	kg	FR			0.68798	
6959	233 protein peas conventional, Castilla-y-Leon, at farm	agricultural production	plant production	kg	ES			1.242	
6955	234 protein peas conventional, Saxony-Anhalt, at farm	agricultural production	plant production	kg	DE			0.6483	
218	235 protein peas, IP, at farm	agricultural production	plant production	kg	CH			0.82868	
219	236 protein peas, organic, at farm	agricultural production	plant production	kg	CH			0.89021	
221	237 rape seed IP, at farm	agricultural production	plant production	kg	CH			0.91297	
6965	238 rape seed conventional, Barrois, at farm	agricultural production	plant production	kg	FR			1.2718	
6957	239 rape seed conventional, Saxony-Anhalt, at farm	agricultural production	plant production	kg	DE			0.77531	
6576	240 rape seed conventional, at farm	agricultural production	plant production	kg	DE			1.3143	
220	241 rape seed extensive, at farm	agricultural production	plant production	kg	CH			0.94908	
6969	242 rape seed, at farm	agricultural production	plant production	kg	US			1.8867	
6215	243 rape seed, organic, at farm	agricultural production	plant production	kg	CH			0.68201	
6970	244 rice, at farm	agricultural production	plant production	kg	US			1.8969	
223	245 rye grains IP, at farm	agricultural production	plant production	kg	CH			0.30315	
6577	246 rye grains conventional, at farm	agricultural production	plant production	kg	GER			0.51167	
222	247 rye grains extensive, at farm	agricultural production	plant production	kg	CH			0.37205	
224	248 rye grains organic, at farm	agricultural production	plant production	kg	CH			0.42415	
226	249 rye straw IP, at farm	agricultural production	plant production	kg	CH			0.058577	
6578	250 rye straw conventional, at farm	agricultural production	plant production	kg	GER			0.10871	
225	251 rye straw extensive, at farm	agricultural production	plant production	kg	CH			0.06969	
227	252 rye straw organic, at farm	agricultural production	plant production	kg	CH			0.052848	
228	253 silage maize IP, at farm	agricultural production	plant production	kg	CH			0.053171	
229	254 silage maize organic, at farm	agricultural production	plant production	kg	CH			0.037607	
230	255 soy beans IP, at farm	agricultural production	plant production	kg	CH			1.3217	
231	256 soy beans organic, at farm	agricultural production	plant production	kg	CH			1.1588	
6658	257 soybeans, at farm	agricultural production	plant production	kg	BR			1.5987	
6659	258 soybeans, at farm	agricultural production	plant production	kg	US			0.38474	
232	259 straw IP, at farm	agricultural production	plant production	kg	CH			0.091682	
233	260 straw organic, at farm	agricultural production	plant production	kg	CH			0.061322	
6216	261 straw, from straw areas, at field	agricultural production	plant production	kg	CH			0.096049	
234	262 sugar beets IP, at farm	agricultural production	plant production	kg	CH			0.053634	
6258	263 sugarcane, at farm	agricultural production	plant production	kg	BR			0.020743	
235	264 sunflower IP, at farm	agricultural production	plant production	kg	CH			1.0149	
6961	265 sunflower conventional, Castilla-y-Leon, at farm	agricultural production	plant production	kg	ES			1.2383	
6711	266 sweet sorghum grains, at farm	agricultural production	plant production	kg	CN			0.29018	
6582	267 sweet sorghum stem, at farm	agricultural production	plant production	kg	CN			0.031132	
237	268 wheat grains IP, at farm	agricultural production	plant production	kg	CH			0.54122	
6966	269 wheat grains conventional, Barrois, at farm	agricultural production	plant production	kg	FR			0.62557	
6962	270 wheat grains conventional, Castilla-y-Leon, at farm	agricultural production	plant production	kg	ES			0.75129	
6958	271 wheat grains conventional, Saxony-Anhalt, at farm	agricultural production	plant production	kg	DE			0.54867	
236	272 wheat grains extensive, at farm	agricultural production	plant production	kg	CH			0.61602	
238	273 wheat grains organic, at farm	agricultural production	plant production	kg	CH			0.49465	
6972	274 wheat grains, at farm	agricultural production	plant production	kg	US			0.64509	
240	275 wheat straw IP, at farm	agricultural production	plant production	kg	CH			0.082182	
239	276 wheat straw extensive, at farm	agricultural production	plant production	kg	CH			0.092156	
241	277 wheat straw organic, at farm	agricultural production	plant production	kg	CH			0.05551	
11111	278 electricity, at cogen with biogas engine, agricultural covered, alloc. exergy	biomass	cogeneration	kWh	CH			0.15944	
11115	279 electricity, at cogen with biogas engine, agricultural, alloc. exergy	biomass	cogeneration	kWh	CH			0.36753	
6221	280 electricity, at cogen with biogas engine, allocation exergy	biomass	cogeneration	kWh	CH			0.18294	
11113	281 electricity, at cogen with ignition biogas engine, agric. covered, alloc. exergy	biomass	cogeneration	kWh	CH			0.24372	
6222	282 electricity, at cogen with ignition biogas engine, allocation exergy	biomass	cogeneration	kWh	CH			0.41893	
11117	283 electricity, at cogen, biogas agricultural mix, allocation exergy	biomass	cogeneration	kWh	CH			0.2575	
6532	284 electricity, bagasse, sugarcane, at fermentation plant	biomass	cogeneration	kWh	BR			0.024586	
6533	285 electricity, bagasse, sugarcane, at sugar refinery	biomass	cogeneration	kWh	BR			0.016977	
6534	286 electricity, bagasse, sweet sorghum, at distillery	biomass	cogeneration	kWh	CN			0.071349	
6919	287 electricity, biogas, allocation exergy, at PEM fuel cell 2kW <sub>e</sub> , future	biomass	cogeneration	kWh	CH			0.44291	
6924	288 electricity, biogas, allocation exergy, at SOFC fuel cell 125kW <sub>e</sub> , future	biomass	cogeneration	kWh	CH			0.30544	
6929	289 electricity, biogas, allocation exergy, at SOFC-GT fuel cell 180kW <sub>e</sub> , future	biomass	cogeneration	kWh	CH			0.26009	
6914	290 electricity, biogas, allocation exergy, at micro gas turbine 100kW <sub>e</sub> , future	biomass	cogeneration	kWh	CH			0.41126	
6932	291 electricity, pellets, allocation exergy, at stirling cogen unit 3kW <sub>e</sub> , future	biomass	cogeneration	kWh	CH			0.15494	
11110	292 heat, at cogen with biogas engine, agricultural covered, allocation exergy	biomass	cogeneration	MJ	CH			0.004279	
11114	293 heat, at cogen with biogas engine, agricultural, allocation exergy	biomass	cogeneration	MJ	CH			0.0096904	
6219	294 heat, at cogen with biogas engine, allocation exergy	biomass	cogeneration	MJ	CH			0.0087575	
11112	295 heat, at cogen with ignition biogas engine, agricultural covered, alloc. exergy	biomass	cogeneration	MJ	CH			0.0068309	
6220	296 heat, at cogen with ignition biogas engine, allocation exergy	biomass	cogeneration	MJ	CH			0.019944	
11116	297 heat, at cogen, biogas agricultural mix, allocation exergy	biomass	cogeneration	MJ	CH			0.0093836	
6917	298 heat, biogas, allocation exergy, at PEM fuel cell 2kW <sub>e</sub> , future	biomass	cogeneration	MJ	CH			0.013366	
6922	299 heat, biogas, allocation exergy, at SOFC fuel cell 125kW <sub>e</sub> , future	biomass	cogeneration	MJ	CH			0.014487	
6927	300 heat, biogas, allocation exergy, at SOFC-GT fuel cell 180kW <sub>e</sub> , future	biomass	cogeneration	MJ	CH			0.012362	
6912	301 heat, biogas, allocation exergy, at micro gas turbine 100kW <sub>e</sub> , future	biomass	cogeneration	MJ	CH			0.020573	
6931	302 heat, pellets, allocation exergy, at stirling cogen unit 3kW <sub>e</sub> , future	biomass	cogeneration	MJ	CH			0.0050844	
6942	303 maintenance stirling cogen unit 3kW <sub>e</sub> , wood pellets, future	biomass	cogeneration	unit	CH			44.983	
11183	304 Cake from Jatropha seed milling, IP, at oil mill	biomass	fuels	#N/A	IN			#N/A	
11186	305 Glycerin, Jatropha, IP, at esterification plant	biomass	fuels	#N/A	IN			#N/A	
11185	306 Jatropha ME, IP, at esterification plant	biomass	fuels	#N/A	IN			#N/A	
11184	307 Jatropha oil, IP, at oil mill	biomass	fuels	#N/A	IN			#N/A	
6228	308 beet chips, at fermentation plant	biomass	fuels	kg	CH			0.078422	
6166	309 biogas, from agricultural co-digestion, not covered, at storage	biomass	fuels	Nm3	CH			0.86551	
6167	310 biogas, from agricultural digestion, not covered, at storage	biomass	fuels	Nm3	CH			0.9611	
10762	311 biogas, from biowaste, at agricultural co-fermentation, covered	biomass	fuels	Nm3	CH			0.33783	
6164	312 biogas, from biowaste, at storage	biomass	fuels	Nm3	CH			0.85875	
10764	313 biogas, from fat and oil, at agricultural co-fermentation, covered	biomass	fuels	Nm3	CH			0.16094	
6217	314 biogas, from grass, digestion, at storage	biomass	fuels	Nm3	CH			0.81231	
6165	315 biogas, from sewage sludge, at storage	biomass	fuels	Nm3	CH			0.39401	
10765	316 biogas, from slurry, at agricultural co-fermentation, covered	biomass	fuels	Nm3	CH			0.80449	
6218	317 biogas, from whey, digestion, at storage	biomass	fuels	Nm3	CH			0.52043	
10766	318 biogas, mix, at agricultural co-fermentation, covered	biomass	fuels	Nm3	CH			0.34928	

						Ecoinvent IPCC2007 GWP100	
	Name	Category	Subcategory	Unit	Country		
6169	319 biogas, production mix, at storage	biomass	fuels	Nm3	CH		0.43377
6248	320 digested matter, application in agriculture	biomass	fuels	kg	CH		0.0075051
10761	321 disposal, biowaste, to agricultural co-fermentation, covered	biomass	fuels	kg	CH		0.040082
6247	322 disposal, biowaste, to anaerobic digestion	biomass	fuels	kg	CH		0.19617
10763	323 disposal, fat and oil, to agricultural co-fermentation, covered	biomass	fuels	kg	CH		0.01448
6536	324 ethanol, 95% in H2O, from corn, at distillery	biomass	fuels	kg	US		1.9091
6223	325 ethanol, 95% in H2O, from grass, at fermentation plant	biomass	fuels	kg	CH		0.53311
6537	326 ethanol, 95% in H2O, from potatoes, at distillery	biomass	fuels	kg	CH		2.0803
6538	327 ethanol, 95% in H2O, from rye, at distillery	biomass	fuels	kg	RER		2.1428
6539	328 ethanol, 95% in H2O, from sugar beet molasses, at distillery	biomass	fuels	kg	CH		0.70082
6226	329 ethanol, 95% in H2O, from sugar beets, at fermentation plant	biomass	fuels	kg	CH		0.71462
6259	330 ethanol, 95% in H2O, from sugar cane, at fermentation plant	biomass	fuels	kg	BR		0.38954
6540	331 ethanol, 95% in H2O, from sugarcane molasses, at sugar refinery	biomass	fuels	kg	BR		0.41184
6541	332 ethanol, 95% in H2O, from sweet sorghum, at distillery	biomass	fuels	kg	CN		0.59254
6224	333 ethanol, 95% in H2O, from whey, at fermentation plant	biomass	fuels	kg	CH		0.32683
6542	334 ethanol, 95% in H2O, from wood, at distillery	biomass	fuels	kg	CH		0.53902
6256	335 ethanol, 99.7% in H2O, from biomass, at distillation	biomass	fuels	kg	BR		0.39333
6543	336 ethanol, 99.7% in H2O, from biomass, at distillation	biomass	fuels	kg	US		1.9882
6544	337 ethanol, 99.7% in H2O, from biomass, at distillation	biomass	fuels	kg	RER		2.2207
6545	338 ethanol, 99.7% in H2O, from biomass, at distillation	biomass	fuels	kg	CN		0.59484
6670	339 ethanol, 99.7% in H2O, from biomass, at distillation	biomass	fuels	kg	CH		0.57488
6671	340 ethanol, 99.7% in H2O, from biomass, at service station	biomass	fuels	kg	CH		0.60846
6225	341 ethanol, 99.7% in H2O, from biomass, production BR, at service station	biomass	fuels	kg	CH		0.53099
6546	342 ethanol, 99.7% in H2O, from biomass, production CN, at service station	biomass	fuels	kg	CH		0.83022
6547	343 ethanol, 99.7% in H2O, from biomass, production RER, at service station	biomass	fuels	kg	CH		2.2996
6548	344 ethanol, 99.7% in H2O, from biomass, production US, at service station	biomass	fuels	kg	CH		2.1778
6549	345 ethyl tert-butyl ether, from bioethanol, at plant	biomass	fuels	kg	RER		1.4984
6176	346 methane, 96 vol-%, from biogas, at purification	biomass	fuels	Nm3	CH		1.3155
6160	347 methane, 96 vol-%, from biogas, from high pressure network, at service station	biomass	fuels	kg	CH		1.8028
6162	348 methane, 96 vol-%, from biogas, from low pressure network, at service station	biomass	fuels	kg	CH		2.0499
6161	349 methane, 96 vol-%, from biogas, from medium pressure network, at service station	biomass	fuels	kg	CH		1.8209
6158	350 methane, 96 vol-%, from biogas, high pressure, at consumer	biomass	fuels	MJ	CH		0.038662
6159	351 methane, 96 vol-%, from biogas, low pressure, at consumer	biomass	fuels	MJ	CH		0.042733
6163	352 methane, 96 vol-%, from biogas, production mix, at service station	biomass	fuels	kg	CH		1.8088
6553	353 methane, 96 vol-%, from synthetic gas, wood, at plant	biomass	fuels	Nm3	CH		0.40747
6099	354 methanol, from biomass, at regional storage	biomass	fuels	kg	CH		0.29693
6244	355 methanol, from synthetic gas, at plant	biomass	fuels	kg	CH		0.26361
6564	356 palm methyl ester, at esterification plant	biomass	fuels	kg	MY		1.7159
6565	357 palm methyl ester, production MY, at service station	biomass	fuels	kg	CH		1.8483
6569	358 petrol, 85% vol. ethanol, from biomass, at service station	biomass	fuels	kg	CH		1.1529
6112	359 rape methyl ester, at esterification plant	biomass	fuels	kg	CH		2.0451
6573	360 rape methyl ester, at esterification plant	biomass	fuels	kg	RER		2.6073
6111	361 rape methyl ester, at regional storage	biomass	fuels	kg	CH		2.0793
6574	362 rape methyl ester, production RER, at service station	biomass	fuels	kg	CH		2.6864
6109	363 rape oil, at oil mill	biomass	fuels	kg	CH		1.8707
6575	364 rape oil, at oil mill	biomass	fuels	kg	RER		2.7165
6110	365 rape oil, at regional storage	biomass	fuels	kg	CH		1.9049
6662	366 soybean methyl ester, at esterification plant	biomass	fuels	kg	US		1.0825
6667	367 soybean methyl ester, at esterification plant	biomass	fuels	kg	BR		3.7621
6669	368 soybean methyl ester, production BR, at service station	biomass	fuels	kg	CH		3.9265
6664	369 soybean methyl ester, production US, at service station	biomass	fuels	kg	CH		1.2593
6660	370 soybean oil, at oil mill	biomass	fuels	kg	US		0.9324
6665	371 soybean oil, at oil mill	biomass	fuels	kg	BR		3.7856
6100	372 synthetic gas, from wood, at fixed bed gasifier	biomass	fuels	Nm3	CH		0.026804
6101	373 synthetic gas, from wood, at fluidized bed gasifier	biomass	fuels	Nm3	CH		0.035584
6102	374 synthetic gas, production mix, at plant	biomass	fuels	Nm3	CH		0.031194
6592	375 vegetable oil methyl ester, at esterification plant	biomass	fuels	kg	FR		0.31572
6593	376 vegetable oil methyl ester, production FR, at service station	biomass	fuels	kg	CH		0.37913
6106	377 vegetable oil, from waste cooking oil, at plant	biomass	fuels	kg	CH		0.41179
6594	378 vegetable oil, from waste cooking oil, at plant	biomass	fuels	kg	FR		0.16809
6529	379 DDGS, from corn, at distillery	biomass	others	kg	US		0.93079
6530	380 DDGS, from potatoes, at distillery	biomass	others	kg	CH		0.66568
6531	381 DDGS, from rye, at distillery	biomass	others	kg	RER		0.77692
6526	382 bagasse, from sugarcane, at sugar refinery	biomass	others	kg	BR		0.010978
6527	383 bagasse, from sweet sorghum, at distillery	biomass	others	kg	CN		0.0062731
6264	384 grass fibres, at digestion	biomass	others	kg	CH		1.0555
6554	385 molasses, from sugar beet, at sugar refinery	biomass	others	kg	CH		0.1074
6563	386 palm kernel meal, at oil mill	biomass	others	kg	MY		0.20053
6263	387 proteins, from grass, at digestion	biomass	others	kg	CH		1.2168
6571	388 pulps, from sugar beet, at sugar refinery	biomass	others	kg	CH		0.013695
6108	389 rape meal, at oil mill	biomass	others	kg	CH		0.40019
6572	390 rape meal, at oil mill	biomass	others	kg	RER		0.57929
6661	391 soybean meal, at oil mill	biomass	others	kg	US		0.46168
6666	392 soybean meal, at oil mill	biomass	others	kg	BR		1.3663
6583	393 syrup, from sugar beet molasses, at distillery	biomass	others	kg	CH		0.28846
6595	394 vinasse, from sugarcane molasses, at sugar refinery	biomass	others	kg	BR		0
6597	395 vinasse, from sweet sorghum, at distillery	biomass	others	kg	CN		0
6535	396 electricity, wood, at distillery	biomass	power plants	kWh	CH		0.038327
6525	397 ash, bagasse, at fermentation plant	biomass	production	kg	BR		0
6173	398 biowaste, at collection point	biomass	production	kg	CH		0.013413
6240	399 grass fibres, at fermentation	biomass	production	kg	CH		0.53733
6238	400 protein concentrate, from whey, at fermentation	biomass	production	kg	CH		0.1227
6241	401 proteins, from grass, at fermentation	biomass	production	kg	CH		0.3794
6262	402 vinasse, at fermentation plant	biomass	production	kg	CH		0.020418
6596	403 vinasse, from sugarcane, at fermentation	biomass	production	kg	BR		0
6177	404 whey, at dairy	biomass	production	kg	CH		0
6239	405 yeast paste, from whey, at fermentation	biomass	production	kg	CH		1.0272
7150	406 cladding, crossbar-pole, aluminium, at plant	building components	cladding	m2	RER		153.28
7154	407 door, inner, glass-wood, at plant	building components	doors	m2	RER		48.676
7153	408 door, inner, wood, at plant	building components	doors	m2	RER		36.824
7151	409 door, outer, wood-aluminium, at plant	building components	doors	m2	RER		87.595
7152	410 door, outer, wood-glass, at plant	building components	doors	m2	RER		90.186
7140	411 glazing, double (2-IV), U<1.1 W/m2K, at plant	building components	windows	m2	RER		31.128
7141	412 glazing, double (2-IV), U<1.1 W/m2K, laminated safety glass, at plant	building components	windows	m2	RER		43.657
7142	413 glazing, triple (3-IV), U<0.5 W/m2K, at plant	building components	windows	m2	RER		56.844
7149	414 window frame, aluminium, U=1.6 W/m2K, at plant	building components	windows	m2	RER		490.53
7148	415 window frame, plastic (PVC), U=1.6 W/m2K, at plant	building components	windows	m2	RER		259.92
7146	416 window frame, wood, U=1.5 W/m2K, at plant	building components	windows	m2	RER		131.49
7147	417 window frame, wood-metal, U=1.6 W/m2K, at plant	building components	windows	m2	RER		246.99
255	418 Borax, anhydrous, powder, at plant	chemicals	inorganics	kg	RER		1.6475
243	419 aluminium hydroxide, at plant	chemicals	inorganics	kg	RER		0.66004
244	420 aluminium oxide, at plant	chemicals	inorganics	kg	RER		1.2315
245	421 aluminium sulphate, powder, at plant	chemicals	inorganics	kg	RER		0.49252
246	422 ammonia, liquid, at regional storehouse	chemicals	inorganics	kg	RER		2.0977
247	423 ammonia, liquid, at regional storehouse	chemicals	inorganics	kg	CH		2.0977
248	424 ammonia, partial oxidation, liquid, at plant	chemicals	inorganics	kg	RER		2.9013

								Ecoinvent IPCC2007 GWP100	
	Name	Category	Subcategory	Unit	Country				
249	425 ammonia, steam reforming, liquid, at plant	chemicals	inorganics	kg	RER			1.9131	
250	426 ammonium bicarbonate, at plant	chemicals	inorganics	kg	RER			1.1756	
7243	427 ammonium chloride from chlorosilane, at plant	chemicals	inorganics	kg	GLO			3.0532	
7238	428 ammonium chloride, at plant	chemicals	inorganics	kg	GLO			1.0521	
251	429 argon, crude, liquid, at plant	chemicals	inorganics	kg	RER			0.27362	
252	430 argon, liquid, at plant	chemicals	inorganics	kg	RER			0.3133	
7239	431 arsine, at plant	chemicals	inorganics	kg	GLO			6.9476	
253	432 barite, at plant	chemicals	inorganics	kg	RER			0.18874	
254	433 biocides, for paper production, unspecified, at plant	chemicals	inorganics	kg	RER			3.9966	
256	434 boric acid, anhydrous, powder, at plant	chemicals	inorganics	kg	RER			0.7118	
7240	435 boric oxide, at plant	chemicals	inorganics	kg	GLO			1.7649	
7213	436 boron carbide, at plant	chemicals	inorganics	kg	GLO			13.951	
7214	437 boron trifluoride, at plant	chemicals	inorganics	kg	GLO			3.6091	
257	438 calcium borates, at plant	chemicals	inorganics	kg	TR			0.08178	
258	439 calcium carbide, technical grade, at plant	chemicals	inorganics	kg	RER			3.7038	
259	440 calcium chloride, CaCl <sub>2</sub> , at plant	chemicals	inorganics	kg	RER			0.85342	
260	441 calcium chloride, CaCl <sub>2</sub> , at regional storage	chemicals	inorganics	kg	CH			0.89731	
6255	442 calcium chloride, from hypochlorination of allyl chloride, at plant	chemicals	inorganics	kg	RER			0.48197	
261	443 carbon black, at plant	chemicals	inorganics	kg	GLO			2.3658	
262	444 carbon dioxide liquid, at plant	chemicals	inorganics	kg	RER			0.81605	
263	445 carbon monoxide, CO, at plant	chemicals	inorganics	kg	RER			1.5539	
6949	446 cerium concentrate, 60% cerium oxide, at plant	chemicals	inorganics	kg	CN			8.309	
264	447 chemicals inorganic, at plant	chemicals	inorganics	kg	GLO			1.8585	
265	448 chlorine dioxide, at plant	chemicals	inorganics	kg	RER			6.2332	
266	449 chlorine, gaseous, diaphragm cell, at plant	chemicals	inorganics	kg	RER			0.94641	
7249	450 chlorine, gaseous, lithium chloride electrolysis, at plant	chemicals	inorganics	kg	GLO			18.712	
267	451 chlorine, gaseous, membrane cell, at plant	chemicals	inorganics	kg	RER			0.92105	
268	452 chlorine, gaseous, mercury cell, at plant	chemicals	inorganics	kg	RER			1.0895	
269	453 chlorine, liquid, production mix, at plant	chemicals	inorganics	kg	RER			1.057	
270	454 chromium oxide, flakes, at plant	chemicals	inorganics	kg	RER			7.0327	
271	455 copper carbonate, at plant	chemicals	inorganics	kg	RER			1.8804	
272	456 copper oxide, at plant	chemicals	inorganics	kg	RER			1.9447	
273	457 cryolite, at plant	chemicals	inorganics	kg	RER			2.9299	
274	458 deinking emulsion, in paper production, at plant	chemicals	inorganics	kg	RER			0.79493	
7215	459 diborane, at plant	chemicals	inorganics	kg	GLO			4.5897	
275	460 explosives, toxev, at plant	chemicals	inorganics	kg	CH			2.5263	
276	461 fluorine, liquid, at plant	chemicals	inorganics	kg	RER			11.273	
277	462 fluorspar, 97%, at plant	chemicals	inorganics	kg	GLO			0.13939	
278	463 fluosilicic acid, 22% in H <sub>2</sub> O, at plant	chemicals	inorganics	kg	RER			0.93696	
279	464 fluosilicic acid, 22% in H <sub>2</sub> O, at plant	chemicals	inorganics	kg	MA			0.97619	
280	465 fluosilicic acid, 22% in H <sub>2</sub> O, at plant	chemicals	inorganics	kg	US			0.91392	
10800	466 flux, wave soldering, at plant	chemicals	inorganics	kg	GLO			2.0367	
281	467 graphite, at plant	chemicals	inorganics	kg	RER			0.028123	
7218	468 helium, at plant	chemicals	inorganics	kg	GLO			0.93432	
6945	469 helium, gaseous, at plant	chemicals	inorganics	kg	RER			9.5041	
6639	470 hydrochloric acid from benzene chlorination, at plant	chemicals	inorganics	kg	RER			2.0567	
282	471 hydrochloric acid, 30% in H <sub>2</sub> O, at plant	chemicals	inorganics	kg	RER			0.8521	
6249	472 hydrochloric acid, 36% in H <sub>2</sub> O, from reacting propylene and chlorine, at plant	chemicals	inorganics	kg	RER			0.079395	
5887	473 hydrochloric acid, from Mannheim process, at plant	chemicals	inorganics	kg	RER			0.39346	
5907	474 hydrochloric acid, from the reaction of hydrogen with chlorine, at plant	chemicals	inorganics	kg	RER			1.3107	
6640	475 hydrogen cyanide from Sohio process, at plant	chemicals	inorganics	kg	RER			3.0466	
283	476 hydrogen fluoride, at plant	chemicals	inorganics	kg	GLO			2.6782	
284	477 hydrogen peroxide, 50% in H <sub>2</sub> O, at plant	chemicals	inorganics	kg	RER			1.1249	
7093	478 hydrogen sulphide, H <sub>2</sub> S, at plant	chemicals	inorganics	kg	RER			0.35915	
285	479 hydrogen, cracking, APME, at plant	chemicals	inorganics	kg	RER			1.7	
10076	480 hydrogen, from butanediol dehydrogenation	chemicals	inorganics	kg	GLO			2.316	
286	481 hydrogen, liquid, at plant	chemicals	inorganics	kg	RER			1.6658	
287	482 hydrogen, liquid, diaphragm cell, at plant	chemicals	inorganics	kg	RER			0.93909	
288	483 hydrogen, liquid, from chlorine electrolysis, production mix, at plant	chemicals	inorganics	kg	RER			1.0152	
289	484 hydrogen, liquid, membrane cell, at plant	chemicals	inorganics	kg	RER			0.91658	
290	485 hydrogen, liquid, mercury cell, at plant	chemicals	inorganics	kg	RER			1.086	
6947	486 ilmenite, 54% titanium dioxide, at plant	chemicals	inorganics	kg	AU			0.22289	
291	487 intral, at plant	chemicals	inorganics	kg	RER			0.031183	
292	488 iron (III) chloride, 40% in H <sub>2</sub> O, at plant	chemicals	inorganics	kg	CH			0.80224	
293	489 kaolin, at plant	chemicals	inorganics	kg	RER			0.20962	
294	490 krypton, gaseous, at plant	chemicals	inorganics	kg	RER			117.19	
295	491 krypton, gaseous, at regional storage	chemicals	inorganics	kg	CH			117.26	
6944	492 lanthanum oxide, at plant	chemicals	inorganics	kg	CN			9.3361	
10073	493 lime from lithium carbonate hydration	chemicals	inorganics	kg	GLO			1.196	
7241	494 lithium carbonate, at plant	chemicals	inorganics	kg	GLO			0.73991	
7221	495 lithium chloride, at plant	chemicals	inorganics	kg	GLO			2.4144	
7222	496 lithium hydroxide, at plant	chemicals	inorganics	kg	GLO			1.196	
7223	497 lithium manganese oxide, at plant	chemicals	inorganics	kg	GLO			0.42531	
296	498 magnesium oxide, at plant	chemicals	inorganics	kg	RER			1.0593	
297	499 magnesium sulphate, at plant	chemicals	inorganics	kg	RER			0.2969	
298	500 malusil, at plant	chemicals	inorganics	kg	RER			0.028123	
10078	501 natural gas liquids, from natural gas, helium extraction	chemicals	inorganics	kg	GLO			0.93097	
6950	502 neodymium oxide, at plant	chemicals	inorganics	kg	CN			38.557	
299	503 nitric acid, 50% in H <sub>2</sub> O, at plant	chemicals	inorganics	kg	RER			3.1742	
300	504 nitrogen, liquid, at plant	chemicals	inorganics	kg	RER			0.43353	
301	505 oxygen, liquid, at plant	chemicals	inorganics	kg	RER			0.40905	
302	506 ozone, liquid, at plant	chemicals	inorganics	kg	RER			8.0194	
7228	507 phosphane, at plant	chemicals	inorganics	kg	GLO			16.512	
305	508 phosphate rock, as P <sub>2</sub> O <sub>5</sub> , beneficiated, dry, at plant	chemicals	inorganics	kg	MA			0.22652	
306	509 phosphate rock, as P <sub>2</sub> O <sub>5</sub> , beneficiated, wet, at plant	chemicals	inorganics	kg	US			0.21354	
308	510 phosphoric acid, fertiliser grade, 70% in H <sub>2</sub> O, at plant	chemicals	inorganics	kg	GLO			0.9201	
309	511 phosphoric acid, fertiliser grade, 70% in H <sub>2</sub> O, at plant	chemicals	inorganics	kg	US			0.89747	
310	512 phosphoric acid, fertiliser grade, 70% in H <sub>2</sub> O, at plant	chemicals	inorganics	kg	MA			0.95862	
311	513 phosphoric acid, industrial grade, 85% in H <sub>2</sub> O, at plant	chemicals	inorganics	kg	RER			1.4172	
312	514 phosphorous chloride, at plant	chemicals	inorganics	kg	RER			3.3583	
313	515 phosphorus, white, liquid, at plant	chemicals	inorganics	kg	RER			9.9992	
7212	516 phosphoryl chloride, at plant	chemicals	inorganics	kg	RER			3.4701	
314	517 pigments, paper production, unspecified, at plant	chemicals	inorganics	kg	RER			0.1004	
315	518 pitch despergents, in paper production, at plant	chemicals	inorganics	kg	RER			1.0497	
316	519 portachrom, at plant	chemicals	inorganics	kg	RER			0.054638	
317	520 portafar, at plant	chemicals	inorganics	kg	RER			0.031183	
7229	521 potassium carbonate, at plant	chemicals	inorganics	kg	GLO			2.3311	
6122	522 potassium hydroxide, at regional storage	chemicals	inorganics	kg	RER			1.9049	
7230	523 potassium perchlorate, at plant	chemicals	inorganics	kg	GLO			5.0084	
6570	524 potassium sulphate, as K <sub>2</sub> O, from rape oil, at esterification plant	chemicals	inorganics	kg	RER			0.39221	
6951	525 praseodymium oxide, at plant	chemicals	inorganics	kg	CN			41.389	
6954	526 rare earth concentrate, 70% REO, from bastnasite, at beneficiation	chemicals	inorganics	kg	CN			1.3837	
6948	527 rutile, 95% titanium dioxide, at plant	chemicals	inorganics	kg	AU			1.1578	
10077	528 sales gas, from natural gas, helium extraction	chemicals	inorganics	kg	GLO			0.93103	
6952	529 samarium europium gadolinium concentrate, 94% rare earth oxide, at plant	chemicals	inorganics	kg	CN			55.589	
318	530 secondary sulphur, at refinery	chemicals	inorganics	kg	RER			0.31469	

						Ecoinvent IPCC2007 GWP100	
	Name	Category	Subcategory	Unit	Country		
319	531 secondary sulphur, at refinery	chemicals	inorganics	kg	CH		0.18285
320	532 selenium, at plant	chemicals	inorganics	kg	RER		2.6446
321	533 silicon carbide, at plant	chemicals	inorganics	kg	RER		7.1804
6873	534 silicon carbide, recycling, at plant	chemicals	inorganics	kg	RER		0.71716
322	535 silicon tetrachloride, at plant	chemicals	inorganics	kg	DE		1.7362
7210	536 silicon tetrahydride, at plant	chemicals	inorganics	kg	RER		61.499
324	537 silicone product, at plant	chemicals	inorganics	kg	RER		2.7091
325	538 soda, powder, at plant	chemicals	inorganics	kg	RER		0.44136
7231	539 sodium arsenide, at plant	chemicals	inorganics	kg	GLO		2.7359
326	540 sodium borates, at plant	chemicals	inorganics	kg	US		0.08178
7246	541 sodium carbonate from ammonium chloride production, at plant	chemicals	inorganics	kg	GLO		1.0521
327	542 sodium chlorate, powder, at plant	chemicals	inorganics	kg	RER		3.2051
328	543 sodium chloride, brine solution, at plant	chemicals	inorganics	kg	RER		0.1133
329	544 sodium chloride, powder, at plant	chemicals	inorganics	kg	RER		0.18037
330	545 sodium cyanide, at plant	chemicals	inorganics	kg	RER		5.6175
331	546 sodium dichromate, at plant	chemicals	inorganics	kg	RER		4.8166
332	547 sodium dithionite, anhydrous, at plant	chemicals	inorganics	kg	RER		3.5069
333	548 sodium hydroxide, 50% in H2O, diaphragm cell, at plant	chemicals	inorganics	kg	RER		1.2178
334	549 sodium hydroxide, 50% in H2O, membrane cell, at plant	chemicals	inorganics	kg	RER		0.99901
335	550 sodium hydroxide, 50% in H2O, mercury cell, at plant	chemicals	inorganics	kg	RER		1.0826
336	551 sodium hydroxide, 50% in H2O, production mix, at plant	chemicals	inorganics	kg	RER		1.0965
337	552 sodium hypochlorite, 15% in H2O, at plant	chemicals	inorganics	kg	RER		0.88569
7242	553 sodium perchlorate, at plant	chemicals	inorganics	kg	GLO		4.5367
7232	554 sodium persulfate, at plant	chemicals	inorganics	kg	GLO		1.2715
338	555 sodium phosphate, at plant	chemicals	inorganics	kg	RER		2.8734
339	556 sodium silicate, furnace liquor, 37% in H2O, at plant	chemicals	inorganics	kg	RER		1.0956
340	557 sodium silicate, furnace process, pieces, at plant	chemicals	inorganics	kg	RER		0.84144
341	558 sodium silicate, hydrothermal liquor, 48% in H2O, at plant	chemicals	inorganics	kg	RER		0.74636
342	559 sodium silicate, spray powder 80% at plant	chemicals	inorganics	kg	RER		1.5856
10901	560 sodium sulphat from viscose production, at plant	chemicals	inorganics	kg	GLO		0.37909
10074	561 sodium sulphate from sulfuric acid digestion of spodumene	chemicals	inorganics	kg	GLO		0.7399
5886	562 sodium sulphate, from Mannheim process, at plant	chemicals	inorganics	kg	RER		0.47168
5885	563 sodium sulphate, from natural sources, at plant	chemicals	inorganics	kg	RER		0.13227
343	564 sodium sulphate, powder, production mix, at plant	chemicals	inorganics	kg	RER		0.46355
7245	565 sodium tetrafluoroborate, at plant	chemicals	inorganics	kg	GLO		4.5929
7233	566 sodium tetrahydroborate, at plant	chemicals	inorganics	kg	GLO		4.8359
344	567 spodumene, at plant	chemicals	inorganics	kg	RER		0.031183
11164	568 stibnite ore, 70% stibnite, at mine	chemicals	inorganics	kg	CN		6.2603
346	569 sulphite, at plant	chemicals	inorganics	kg	RER		1.3889
347	570 sulphur dioxide, liquid, at plant	chemicals	inorganics	kg	RER		0.41849
348	571 sulphur hexafluoride, liquid, at plant	chemicals	inorganics	kg	RER		122.93
349	572 sulphur trioxide, at plant	chemicals	inorganics	kg	RER		0.41081
10900	573 sulphuric acid from viscose production, at plant	chemicals	inorganics	kg	GLO		0.20836
350	574 sulphuric acid, liquid, at plant	chemicals	inorganics	kg	RER		0.1237
10072	575 tetrachlorosilane, at plant	chemicals	inorganics	kg	GLO		62.277
351	576 tetrafluoroethylene film, on glass	chemicals	inorganics	kg	RER		340.59
352	577 tetrafluoroethylene, at plant	chemicals	inorganics	kg	RER		323.96
353	578 titanium dioxide at plant, sulphate process, at plant	chemicals	inorganics	kg	RER		4.995
354	579 titanium dioxide, chloride process, at plant	chemicals	inorganics	kg	RER		4.1254
355	580 titanium dioxide, production mix, at plant	chemicals	inorganics	kg	RER		4.5602
7234	581 trichloroborane, at plant	chemicals	inorganics	kg	GLO		3.1886
356	582 urea ammonium nitrate, as N, at regional storehouse	chemicals	inorganics	kg	RER		5.8412
357	583 xenon, gaseous, at plant	chemicals	inorganics	kg	RER		750.47
358	584 xenon, gaseous, at regional storage	chemicals	inorganics	kg	CH		750.54
7092	585 zinc monosulphate, ZnSO4.H2O, at plant	chemicals	inorganics	kg	RER		1.8083
7091	586 zinc oxide, at plant	chemicals	inorganics	kg	RER		2.8895
7094	587 zinc sulphide, ZnS, at plant	chemicals	inorganics	kg	RER		4.0776
6953	588 zircon, 50% zirconium, at plant	chemicals	inorganics	kg	AU		1.1222
6943	589 zirconium oxide, at plant	chemicals	inorganics	kg	AU		3.9727
6843	590 1,1-difluoroethane, HFC-152a, at plant	chemicals	organics	kg	US		5.4441
6233	591 1,1-dimethylcyclopentane, from naphtha, at plant	chemicals	organics	kg	RER		0.89927
6598	592 1-butanol, propylene hydroformylation, at plant	chemicals	organics	kg	RER		2.2752
6599	593 1-pentanol, at plant	chemicals	organics	kg	RER		4.5387
6656	594 1-propanol, at plant	chemicals	organics	kg	RER		3.8117
6230	595 2,3-dimethylbutan, from naphtha, at plant	chemicals	organics	kg	RER		0.89936
6600	596 2-butanol, at plant	chemicals	organics	kg	RER		4.0263
6601	597 2-methyl-1-butanol, at plant	chemicals	organics	kg	RER		4.5386
6602	598 2-methyl-2-butanol, at plant	chemicals	organics	kg	RER		3.2549
6231	599 2-methylpentane, from naphtha, at plant	chemicals	organics	kg	RER		0.8994
6603	600 3-methyl-1-butanol, at plant	chemicals	organics	kg	RER		4.5387
6604	601 3-methyl-1-butyl acetate, at plant	chemicals	organics	kg	RER		5.0472
6605	602 4-methyl-2-pentanone, at plant	chemicals	organics	kg	RER		4.1407
368	603 AKD sizer, in paper production, at plant	chemicals	organics	kg	RER		2.5885
396	604 DTPA, diethylenetriaminepentaacetic acid, at plant	chemicals	organics	kg	RER		4.811
397	605 EDTA, ethylenediaminetetraacetic acid, at plant	chemicals	organics	kg	RER		4.811
6651	606 N,N-dimethylformamide, at plant	chemicals	organics	kg	RER		1.8906
6652	607 N-methyl-2-pyrrolidone, at plant	chemicals	organics	kg	RER		3.9483
359	608 acetaldehyde, at plant	chemicals	organics	kg	RER		1.3684
6606	609 acetic acid from acetaldehyde, at plant	chemicals	organics	kg	RER		2.5281
6607	610 acetic acid from butane, at plant	chemicals	organics	kg	RER		1.1791
360	611 acetic acid, 98% in H2O, at plant	chemicals	organics	kg	RER		1.556
6608	612 acetic anhydride from acetaldehyde, at plant	chemicals	organics	kg	RER		2.5279
6609	613 acetic anhydride from ketene, at plant	chemicals	organics	kg	RER		3.7803
361	614 acetic anhydride, at plant	chemicals	organics	kg	RER		3.4922
362	615 acetone cyanohydrin, at plant	chemicals	organics	kg	RER		3.8767
6612	616 acetone from butane, at plant	chemicals	organics	kg	RER		1.1791
363	617 acetone, liquid, at plant	chemicals	organics	kg	RER		2.2308
6613	618 acetonitrile, at plant	chemicals	organics	kg	RER		2.1501
364	619 acetylene, at regional storehouse	chemicals	organics	kg	CH		2.2962
365	620 acrylic acid, at plant	chemicals	organics	kg	RER		2.2604
6614	621 acrylonitrile from Sohio process, at plant	chemicals	organics	kg	RER		25.379
366	622 acrylonitrile, at plant	chemicals	organics	kg	RER		3.2595
367	623 adipic acid, at plant	chemicals	organics	kg	RER		25.398
369	624 alkylbenzene, linear, at plant	chemicals	organics	kg	RER		1.9602
370	625 allyl chloride, from reacting propylene and chlorine, at plant	chemicals	organics	kg	RER		2.2805
371	626 ammonium carbonate, at plant	chemicals	organics	kg	RER		1.5532
7248	627 ammonium thiocyanate, at plant	chemicals	organics	kg	GLO		2.0417
372	628 aniline, at plant	chemicals	organics	kg	RER		4.8795
373	629 anionic resin, at plant	chemicals	organics	kg	CH		3.8467
374	630 anthraquinone, at plant	chemicals	organics	kg	RER		18.835
6615	631 benzal chloride, at plant	chemicals	organics	kg	RER		2.604
6616	632 benzaldehyde, at plant	chemicals	organics	kg	RER		4.9489
375	633 benzene, at plant	chemicals	organics	kg	RER		1.7885
6617	634 benzyl alcohol, at plant	chemicals	organics	kg	RER		4.1441
6618	635 benzyl chloride, at plant	chemicals	organics	kg	RER		2.5195
376	636 bisphenol A, powder, at plant	chemicals	organics	kg	RER		4.8728

						Ecoinvent IPCC2007 GWP100
	Name	Category	Subcategory	Unit	Country	
6619	637 butane-1,4-diol, at plant	chemicals	organics	kg	RER	4.3533
11000	638 butanes from butenes, at plant	chemicals	organics	kg	RER	4.0263
377	639 butanol, 1-, at plant	chemicals	organics	kg	RER	1.829
6620	640 butyl acetate, at plant	chemicals	organics	kg	RER	3.0412
378	641 butyl acrylate, at plant	chemicals	organics	kg	RER	3.8946
10075	642 butyrolactone	chemicals	organics	kg	GLO	3.2911
7247	643 carbon disulfide, at plant	chemicals	organics	kg	GLO	0.8393
379	644 carbon tetrachloride, at plant	chemicals	organics	kg	RER	1.6406
380	645 cationic resin, at plant	chemicals	organics	kg	CH	1.406
382	646 chemicals organic, at plant	chemicals	organics	kg	GLO	1.8981
383	647 chloroacetic acid, at plant	chemicals	organics	kg	RER	2.1508
384	648 chlorodifluoromethane, at plant	chemicals	organics	kg	NL	75.826
385	649 chloromethyl methyl ether, at plant	chemicals	organics	kg	RER	1.6496
386	650 crude coconut oil, at plant	chemicals	organics	kg	PH	0.18621
389	651 cumene, at plant	chemicals	organics	kg	RER	2.3119
6621	652 cyclohexane, at plant	chemicals	organics	kg	RER	2.3109
390	653 cyclohexanol, at plant	chemicals	organics	kg	RER	3.0906
6622	654 cyclohexanone, at plant	chemicals	organics	kg	RER	4.4046
391	655 dichloromethane, at plant	chemicals	organics	kg	RER	3.3938
6250	656 dichloropropene, from reacting propylene and chlorine, at plant	chemicals	organics	kg	RER	2.1121
392	657 diethanolamine, at plant	chemicals	organics	kg	RER	3.659
6623	658 diethyl ether, at plant	chemicals	organics	kg	RER	1.2468
393	659 diethylene glycol, at plant	chemicals	organics	kg	RER	1.0681
394	660 dimethyl ether, at plant	chemicals	organics	kg	RER	1.5203
6624	661 dimethyl sulfoxide, at plant	chemicals	organics	kg	RER	1.304
395	662 dimethyl sulphate, at plant	chemicals	organics	kg	RER	1.301
7216	663 dimethylacetamide, at plant	chemicals	organics	kg	GLO	2.3359
7217	664 dimethylamine borane, at plant	chemicals	organics	kg	GLO	2.652
6625	665 dimethylamine, at plant	chemicals	organics	kg	RER	1.2826
6626	666 dioxane, at plant	chemicals	organics	kg	RER	3.4566
7211	667 dipropylene glycol monomethyl ether, at plant	chemicals	organics	kg	RER	4.356
398	668 epichlorohydrin, from hypochlorination of allyl chloride, at plant	chemicals	organics	kg	RER	3.3708
399	669 esters of versatic acid, at plant	chemicals	organics	kg	RER	2.0372
6627	670 ethanol from ethylene, at plant	chemicals	organics	kg	RER	1.2474
6628	671 ethyl acetate from butane, at plant	chemicals	organics	kg	RER	1.1792
6629	672 ethyl acetate, at plant	chemicals	organics	kg	RER	2.8395
400	673 ethyl benzene, at plant	chemicals	organics	kg	RER	2.2295
401	674 ethylene dichloride, at plant	chemicals	organics	kg	RER	1.3045
6630	675 ethylene glycol diethyl ether, at plant	chemicals	organics	kg	RER	3.2391
6631	676 ethylene glycol dimethyl ether, at plant	chemicals	organics	kg	RER	2.2525
6632	677 ethylene glycol monoethyl ether, at plant	chemicals	organics	kg	RER	2.1057
402	678 ethylene glycol, at plant	chemicals	organics	kg	RER	1.5721
403	679 ethylene oxide, at plant	chemicals	organics	kg	RER	1.815
404	680 ethylenediamine, at plant	chemicals	organics	kg	RER	5.6121
405	681 fatty acids, from vegetarian oil, at plant	chemicals	organics	kg	RER	2.0767
406	682 fatty alcohol, from coconut oil, at plant	chemicals	organics	kg	RER	1.4132
407	683 fatty alcohol, from palm kernel oil, at plant	chemicals	organics	kg	RER	4.2847
408	684 fatty alcohol, from palm oil, at plant	chemicals	organics	kg	RER	2.5019
409	685 fatty alcohol, petrochemical, at plant	chemicals	organics	kg	RER	2.5619
410	686 formaldehyde, production mix, at plant	chemicals	organics	kg	RER	1.1076
6636	687 formic acid from butane, at plant	chemicals	organics	kg	RER	1.179
6637	688 formic acid from methyl formate, at plant	chemicals	organics	kg	RER	3.0787
6638	689 formic acid, at plant	chemicals	organics	kg	RER	2.4898
6235	690 fraction 1, from naphtha, at plant	chemicals	organics	kg	RER	0.89934
6236	691 fraction 7, from naphtha, at plant	chemicals	organics	kg	RER	0.89923
6237	692 fraction 8, from naphtha, at plant	chemicals	organics	kg	RER	0.89931
6119	693 glycerine, from epichlorohydrin, at plant	chemicals	organics	kg	RER	4.9274
6550	694 glycerine, from palm oil, at esterification plant	chemicals	organics	kg	MY	2.3365
6104	695 glycerine, from rape oil, at esterification plant	chemicals	organics	kg	CH	2.8013
6551	696 glycerine, from rape oil, at esterification plant	chemicals	organics	kg	RER	3.5501
6663	697 glycerine, from soybean oil, at esterification plant	chemicals	organics	kg	US	0.85768
6668	698 glycerine, from soybean oil, at esterification plant	chemicals	organics	kg	BR	2.9812
6552	699 glycerine, from vegetable oil, at esterification plant	chemicals	organics	kg	FR	0.42991
411	700 heat, unspecific, in chemical plant	chemicals	organics	MJ	RER	0.099681
6229	701 heptane, at plant	chemicals	organics	kg	RER	0.89935
7219	702 hexafluorethane, at plant	chemicals	organics	kg	GLO	9.9991
7220	703 hexamethyldisilazane, at plant	chemicals	organics	kg	GLO	3.0532
6120	704 hexane, at plant	chemicals	organics	kg	RER	0.89938
412	705 hydrogen cyanide, at plant	chemicals	organics	kg	RER	7.2893
6641	706 isobutanol, at plant	chemicals	organics	kg	RER	2.2751
6642	707 isobutyl acetate, at plant	chemicals	organics	kg	RER	3.4248
6643	708 isohexane, at plant	chemicals	organics	kg	RER	1.1855
413	709 isopropanol, at plant	chemicals	organics	kg	RER	1.8481
6644	710 isopropyl acetate, at plant	chemicals	organics	kg	RER	3.1483
414	711 latex, at plant	chemicals	organics	kg	RER	2.6315
416	712 lubricating oil, at plant	chemicals	organics	kg	RER	1.0503
417	713 maleic anhydride from catalytic oxidation of benzene, at plant	chemicals	organics	kg	RER	4.0036
418	714 maleic anhydride from the direct oxidation of n-butane, at plant	chemicals	organics	kg	RER	2.3686
419	715 maleic anhydride, at plant	chemicals	organics	kg	RER	2.7774
420	716 melamine, at plant	chemicals	organics	kg	RER	5.0808
422	717 methanol, at plant	chemicals	organics	kg	GLO	0.74563
423	718 methanol, at regional storage	chemicals	organics	kg	CH	0.80066
6646	719 methyl acetate, at plant	chemicals	organics	kg	RER	1.1791
7225	720 methyl acrylate, at plant	chemicals	organics	kg	GLO	3.0941
6647	721 methyl ethyl ketone from butane, at plant	chemicals	organics	kg	RER	1.1791
424	722 methyl ethyl ketone, at plant	chemicals	organics	kg	RER	1.7643
6648	723 methyl formate, at plant	chemicals	organics	kg	RER	2.7207
425	724 methyl tert-butyl ether, at plant	chemicals	organics	kg	RER	1.1473
7226	725 methyl-3-methoxypropionate, at plant	chemicals	organics	kg	GLO	3.0794
426	726 methylchloride, at plant	chemicals	organics	kg	WEU	3.0423
427	727 methylchloride, at regional storage	chemicals	organics	kg	CH	3.1633
6649	728 methylcyclohexane, at plant	chemicals	organics	kg	RER	4.7394
6234	729 methylcyclohexane, from naphtha, at plant	chemicals	organics	kg	RER	0.89935
6232	730 methylcyclopentane, from naphtha, at plant	chemicals	organics	kg	RER	0.89935
6650	731 monochlorobenzene, at plant	chemicals	organics	kg	RER	2.0567
7227	732 monochloropentafluoroethane, at plant	chemicals	organics	kg	GLO	9.9993
428	733 monoethanolamine, at plant	chemicals	organics	kg	RER	3.4405
430	734 n-olefins, at plant	chemicals	organics	kg	RER	2.1264
429	735 nitrobenzene, at plant	chemicals	organics	kg	RER	3.3107
6653	736 o-dichlorobenzene, at plant	chemicals	organics	kg	RER	2.0567
431	737 optical brighteners, in paper production, at plant	chemicals	organics	kg	RER	16.626
6654	738 p-dichlorobenzene, at plant	chemicals	organics	kg	RER	2.0565
387	739 palm kernel oil, at oil mill	chemicals	organics	kg	MY	2.9391
388	740 palm oil, at oil mill	chemicals	organics	kg	MY	1.7073
432	741 paraffin, at plant	chemicals	organics	kg	RER	0.82615
433	742 penta-erythritol, at plant	chemicals	organics	kg	RER	3.0774

						Ecoinvent IPCC2007 GWP100
	Name	Category	Subcategory	Unit	Country	
434	743 pentane, at plant	chemicals	organics	kg	RER	1.1084
435	744 phenol, at plant	chemicals	organics	kg	RER	3.867
436	745 phosgene, liquid, at plant	chemicals	organics	kg	RER	1.7129
437	746 phthalic anhydride, at plant	chemicals	organics	kg	RER	2.5495
6844	747 polyvinylfluoride film, at plant	chemicals	organics	kg	US	22.736
6840	748 polyvinylfluoride, at plant	chemicals	organics	kg	US	18.351
6842	749 polyvinylfluoride, dispersion, at plant	chemicals	organics	kg	US	21.515
6655	750 propanal, at plant	chemicals	organics	kg	RER	3.3058
438	751 propylene glycol, liquid, at plant	chemicals	organics	kg	RER	4.063
439	752 propylene oxide, liquid, at plant	chemicals	organics	kg	RER	4.4648
6017	753 refrigerant R134a, at plant	chemicals	organics	kg	RER	103.3
440	754 retention aids, in paper production, at plant	chemicals	organics	kg	RER	2.7815
441	755 rosin size, in paper production, at plant	chemicals	organics	kg	RER	1.5681
5883	756 sodium formate, reaction of formaldehyde with acetaldehyde, at plant	chemicals	organics	kg	RER	0.54274
7244	757 sodium methoxide, at plant	chemicals	organics	kg	GLO	4.8359
443	758 solvents, organic, unspecified, at plant	chemicals	organics	kg	GLO	2.3868
444	759 soya oil, at plant	chemicals	organics	kg	RER	1.8183
445	760 soya scrap, at plant	chemicals	organics	kg	RER	1.7553
446	761 steam from catalytic oxidation of benzene, at plant	chemicals	organics	kg	RER	0.068437
447	762 steam from direct oxidation of n-butane, at plant	chemicals	organics	kg	RER	0.037597
5799	763 steam from the production of formaldehyde	chemicals	organics	kg	RER	0.030737
449	764 tetrachloroethylene, at plant	chemicals	organics	kg	WEU	3.8442
450	765 tetrachloroethylene, at regional storage	chemicals	organics	kg	CH	3.963
6657	766 tetrahydrofuran, at plant	chemicals	organics	kg	RER	5.7295
451	767 toluene, liquid, at plant	chemicals	organics	kg	RER	1.4991
6016	768 trichloroethylene, at plant	chemicals	organics	kg	WEU	0.46267
452	769 trichloromethane, at plant	chemicals	organics	kg	RER	3.723
6257	770 trichloropropane, from hypochlorination of allyl chloride, at plant	chemicals	organics	kg	RER	3.1817
453	771 triethanolamine, at plant	chemicals	organics	kg	RER	3.7441
454	772 triethylene glycol, at plant	chemicals	organics	kg	RER	3.0517
6875	773 triethylene glycol, recycling, at plant	chemicals	organics	kg	RER	0.71716
7235	774 trifluoromethane, at plant	chemicals	organics	kg	GLO	9.6247
7236	775 trimethyl borate, at plant	chemicals	organics	kg	GLO	1.9739
455	776 trimethylamine, at plant	chemicals	organics	kg	RER	2.4697
456	777 urea, as N, at regional storehouse	chemicals	organics	kg	RER	3.3107
6841	778 vinyl fluoride, at plant	chemicals	organics	kg	US	10.546
457	779 xylene, at plant	chemicals	organics	kg	RER	1.6373
458	780 basalt, at mine	construction materials	additives	kg	RER	0.0074787
5723	781 bentonite, at mine	construction materials	additives	kg	DE	0.026615
459	782 bentonite, at processing	construction materials	additives	kg	DE	0.49599
460	783 calcareous marl, at plant	construction materials	additives	kg	CH	0.0023457
461	784 clay, at mine	construction materials	additives	kg	CH	0.002935
480	785 expanded clay, at plant	construction materials	additives	kg	DE	0.32713
462	786 expanded vermiculite, at plant	construction materials	additives	kg	CH	0.41979
463	787 gravel, crushed, at mine	construction materials	additives	kg	CH	0.0042831
464	788 gravel, round, at mine	construction materials	additives	kg	CH	0.0024222
465	789 gravel, unspecified, at mine	construction materials	additives	kg	CH	0.002813
6044	790 lightweight concrete block, expanded vermiculite, at plant	construction materials	additives	kg	CH	0.48272
466	791 limestone, at mine	construction materials	additives	kg	CH	0.0019315
467	792 limestone, crushed, washed	construction materials	additives	kg	CH	0.0021493
468	793 limestone, milled, loose, at plant	construction materials	additives	kg	CH	0.012972
472	794 perlite, at mine	construction materials	additives	kg	DE	0.001701
473	795 pumice, at mine	construction materials	additives	kg	DE	0.00074571
474	796 quicklime, in pieces, loose, at plant	construction materials	additives	kg	CH	0.98315
475	797 quicklime, milled, loose, at plant	construction materials	additives	kg	CH	0.98524
476	798 quicklime, milled, packed, at plant	construction materials	additives	kg	CH	0.99131
5733	799 recultivation, bentonite mine	construction materials	additives	m2	DE	479.53
477	800 recultivation, limestone mine	construction materials	additives	m2	CH	0.68478
478	801 sand, at mine	construction materials	additives	kg	CH	0.0024222
479	802 silica sand, at plant	construction materials	additives	kg	DE	0.021045
481	803 vermiculite, at mine	construction materials	additives	kg	ZA	0.0016855
482	804 anhydrite, at plant	construction materials	binder	kg	CH	0.014137
5721	805 anhydrite, burned, at plant	construction materials	binder	kg	CH	0.092287
483	806 blast furnace slag cement, at plant	construction materials	binder	kg	CH	0.44396
484	807 cement, unspecified, at plant	construction materials	binder	kg	CH	0.76
485	808 clinker, at plant	construction materials	binder	kg	CH	0.90114
486	809 lime, hydrated, loose, at plant	construction materials	binder	kg	CH	0.75712
487	810 lime, hydrated, packed, at plant	construction materials	binder	kg	CH	0.76319
488	811 lime, hydraulic, at plant	construction materials	binder	kg	CH	0.83227
489	812 portland calcareous cement, at plant	construction materials	binder	kg	CH	0.71776
490	813 portland cement, strength class Z 42.5, at plant	construction materials	binder	kg	CH	0.82075
491	814 portland cement, strength class Z 52.5, at plant	construction materials	binder	kg	CH	0.83127
492	815 portland slag sand cement, at plant	construction materials	binder	kg	CH	0.70357
493	816 stucco, at plant	construction materials	binder	kg	CH	0.073492
494	817 autoclaved aerated concrete block, at plant	construction materials	bricks	kg	CH	0.41101
495	818 brick, at plant	construction materials	bricks	kg	RER	0.23867
496	819 light clay brick, at plant	construction materials	bricks	kg	DE	0.16086
497	820 refractory, basic, packed, at plant	construction materials	bricks	kg	DE	2.3194
498	821 refractory, fireclay, packed, at plant	construction materials	bricks	kg	DE	1.1902
499	822 refractory, high aluminium oxide, packed, at plant	construction materials	bricks	kg	DE	0.89263
500	823 sand-lime brick, at plant	construction materials	bricks	kg	DE	0.13017
501	824 cement cast plaster floor, at plant	construction materials	concrete	kg	CH	0.16957
506	825 concrete block, at plant	construction materials	concrete	kg	DE	0.1211
502	826 concrete, exacting, at plant	construction materials	concrete	m3	CH	324.4
503	827 concrete, exacting, with de-icing salt contact, at plant	construction materials	concrete	m3	CH	288.41
504	828 concrete, normal, at plant	construction materials	concrete	m3	CH	261.14
505	829 concrete, sole plate and foundation, at plant	construction materials	concrete	m3	CH	159.21
510	830 lightweight concrete block, expanded clay, at plant	construction materials	concrete	kg	CH	0.39931
507	831 lightweight concrete block, expanded perlite, at plant	construction materials	concrete	kg	CH	1.0028
508	832 lightweight concrete block, polystyrene, at plant	construction materials	concrete	kg	CH	1.1284
509	833 lightweight concrete block, pumice, at plant	construction materials	concrete	kg	DE	0.21375
511	834 poor concrete, at plant	construction materials	concrete	m3	CH	121.85
512	835 ceramic tiles, at regional storage	construction materials	coverings	kg	CH	0.78148
9244	836 concrete roof tile, at plant	construction materials	coverings	kg	CH	0.20806
513	837 fibre cement corrugated slab, at plant	construction materials	coverings	kg	CH	0.67883
514	838 fibre cement facing tile, at plant	construction materials	coverings	kg	CH	1.6253
11180	839 fibre cement facing tile, large format, at plant	construction materials	coverings	kg	CH	1.8824
11181	840 fibre cement facing tile, small format, at plant	construction materials	coverings	kg	CH	1.0256
515	841 fibre cement roof slate, at plant	construction materials	coverings	kg	CH	0.72645
516	842 gypsum fibre board, at plant	construction materials	coverings	kg	CH	0.29227
517	843 gypsum plaster board, at plant	construction materials	coverings	kg	CH	0.35364
518	844 roof tile, at plant	construction materials	coverings	kg	RER	0.35797
5722	845 anhydrite rock, at mine	construction materials	others	kg	CH	0.0020338
519	846 asbestos, crysotile type, at plant	construction materials	others	kg	GLO	0.028123
523	847 dolomite, at plant	construction materials	others	kg	RER	0.028123
525	848 feldspar, at plant	construction materials	others	kg	RER	0.033656

					Ecoinvent	
					IPCC2007	
					GWP100	
	Name	Category	Subcategory	Unit	Country	
526	849 gypsum, mineral, at mine	construction materials	others	kg	CH	0.0020377
528	850 limestone, crushed, for mill	construction materials	others	kg	CH	0.0021387
529	851 limestone, milled, packed, at plant	construction materials	others	kg	CH	0.019044
9245	852 mastic asphalt, at plant	construction materials	others	kg	CH	0.20948
9238	853 natural stone plate, cut, at regional storage	construction materials	others	kg	CH	0.26423
9239	854 natural stone plate, grounded, at regional storage	construction materials	others	kg	CH	0.36022
9240	855 natural stone plate, polished, at regional storage	construction materials	others	kg	CH	0.43783
530	856 packing, cement	construction materials	others	kg	CH	0.0028808
531	857 packing, clay products	construction materials	others	kg	CH	0.0056173
532	858 packing, fibre cement products	construction materials	others	kg	CH	0.011181
533	859 packing, lime products	construction materials	others	kg	CH	0.00594
9243	860 quarry tile, at plant	construction materials	others	kg	CH	0.22624
534	861 sanitary ceramics, at regional storage	construction materials	others	kg	CH	2.3412
550	862 electronics for control units	construction processes	buildings	kg	RER	26.102
552	863 blasting	construction processes	civil engineering	kg	RER	2.6473
553	864 excavation, hydraulic digger	construction processes	civil engineering	m3	RER	0.53
554	865 excavation, skid-steer loader	construction processes	civil engineering	m3	RER	0.51896
558	866 crushing, rock	construction processes	machinery	kg	RER	0.000011997
559	867 diesel, burned in building machine	construction processes	machinery	MJ	GLO	0.09204
563	868 power sawing, with catalytic converter	construction processes	machinery	h	RER	5.5627
564	869 power sawing, without catalytic converter	construction processes	machinery	h	RER	7.5979
7407	870 cooling energy, natural gas, at cogen unit with absorption chiller 100 kW	cooling	cogeneration	MJ	CH	0.056895
6692	871 electricity mix	electricity	production mix	kWh	BR	0.21674
6693	872 electricity mix	electricity	production mix	kWh	CN	1.1483
6694	873 electricity mix	electricity	production mix	kWh	US	0.75107
6695	874 electricity mix	electricity	production mix	kWh	JP	0.54559
579	875 electricity, high voltage, production AT, at grid	electricity	production mix	kWh	AT	0.31501
580	876 electricity, high voltage, production BA, at grid	electricity	production mix	kWh	BA	0.68664
581	877 electricity, high voltage, production BE, at grid	electricity	production mix	kWh	BE	0.33238
7193	878 electricity, high voltage, production BG, at grid	electricity	production mix	kWh	BG	0.60343
7252	879 electricity, high voltage, production BR, at grid	electricity	production mix	kWh	BR	0.22882
582	880 electricity, high voltage, production CENTREL, at grid	electricity	production mix	kWh	CENTREL	0.91019
583	881 electricity, high voltage, production CH, at grid	electricity	production mix	kWh	CH	0.021642
607	882 electricity, high voltage, production CS, at grid	electricity	production mix	kWh	CS	0.92713
584	883 electricity, high voltage, production CZ, at grid	electricity	production mix	kWh	CZ	0.76988
585	884 electricity, high voltage, production DE, at grid	electricity	production mix	kWh	DE	0.6713
586	885 electricity, high voltage, production DK, at grid	electricity	production mix	kWh	DK	0.63293
587	886 electricity, high voltage, production ES, at grid	electricity	production mix	kWh	ES	0.5169
588	887 electricity, high voltage, production FI, at grid	electricity	production mix	kWh	FI	0.38855
589	888 electricity, high voltage, production FR, at grid	electricity	production mix	kWh	FR	0.090119
590	889 electricity, high voltage, production GB, at grid	electricity	production mix	kWh	GB	0.606
591	890 electricity, high voltage, production GR, at grid	electricity	production mix	kWh	GR	1.0147
592	891 electricity, high voltage, production HR, at grid	electricity	production mix	kWh	HR	0.33655
593	892 electricity, high voltage, production HU, at grid	electricity	production mix	kWh	HU	0.70096
594	893 electricity, high voltage, production IE, at grid	electricity	production mix	kWh	IE	0.78613
595	894 electricity, high voltage, production IT, at grid	electricity	production mix	kWh	IT	0.64268
596	895 electricity, high voltage, production LU, at grid	electricity	production mix	kWh	LU	0.53201
597	896 electricity, high voltage, production MK, at grid	electricity	production mix	kWh	MK	0.97606
598	897 electricity, high voltage, production NL, at grid	electricity	production mix	kWh	NL	0.69293
599	898 electricity, high voltage, production NO, at grid	electricity	production mix	kWh	NO	0.011102
600	899 electricity, high voltage, production NORDEL, at grid	electricity	production mix	kWh	NORDEL	0.16764
601	900 electricity, high voltage, production PL, at grid	electricity	production mix	kWh	PL	1.1418
602	901 electricity, high voltage, production PT, at grid	electricity	production mix	kWh	PT	0.61993
7206	902 electricity, high voltage, production RER, at grid	electricity	production mix	kWh	RER	0.49446
7201	903 electricity, high voltage, production RO, at grid	electricity	production mix	kWh	RO	0.66274
603	904 electricity, high voltage, production SE, at grid	electricity	production mix	kWh	SE	0.040639
604	905 electricity, high voltage, production SI, at grid	electricity	production mix	kWh	SI	0.49682
605	906 electricity, high voltage, production SK, at grid	electricity	production mix	kWh	SK	0.37468
606	907 electricity, high voltage, production UCTE, at grid	electricity	production mix	kWh	UCTE	0.52347
608	908 electricity, low voltage, production AT, at grid	electricity	production mix	kWh	AT	0.35471
609	909 electricity, low voltage, production BA, at grid	electricity	production mix	kWh	BA	0.94902
610	910 electricity, low voltage, production BE, at grid	electricity	production mix	kWh	BE	0.3636
7197	911 electricity, low voltage, production BG, at grid	electricity	production mix	kWh	BG	0.78698
7254	912 electricity, low voltage, production BR, at grid	electricity	production mix	kWh	BR	0.29859
611	913 electricity, low voltage, production CENTREL, at grid	electricity	production mix	kWh	CENTREL	1.0657
612	914 electricity, low voltage, production CH, at grid	electricity	production mix	kWh	CH	0.029544
636	915 electricity, low voltage, production CS, at grid	electricity	production mix	kWh	CS	1.1989
613	916 electricity, low voltage, production CZ, at grid	electricity	production mix	kWh	CZ	0.88283
614	917 electricity, low voltage, production DE, at grid	electricity	production mix	kWh	DE	0.74448
615	918 electricity, low voltage, production DK, at grid	electricity	production mix	kWh	DK	0.69093
616	919 electricity, low voltage, production ES, at grid	electricity	production mix	kWh	ES	0.60359
617	920 electricity, low voltage, production FI, at grid	electricity	production mix	kWh	FI	0.43566
618	921 electricity, low voltage, production FR, at grid	electricity	production mix	kWh	FR	0.10535
619	922 electricity, low voltage, production GB, at grid	electricity	production mix	kWh	GB	0.69933
620	923 electricity, low voltage, production GR, at grid	electricity	production mix	kWh	GR	1.1764
621	924 electricity, low voltage, production HR, at grid	electricity	production mix	kWh	HR	0.42273
622	925 electricity, low voltage, production HU, at grid	electricity	production mix	kWh	HU	0.83038
623	926 electricity, low voltage, production IE, at grid	electricity	production mix	kWh	IE	0.89774
624	927 electricity, low voltage, production IT, at grid	electricity	production mix	kWh	IT	0.71709
625	928 electricity, low voltage, production LU, at grid	electricity	production mix	kWh	LU	0.60004
626	929 electricity, low voltage, production MK, at grid	electricity	production mix	kWh	MK	1.2895
627	930 electricity, low voltage, production NL, at grid	electricity	production mix	kWh	NL	0.7427
628	931 electricity, low voltage, production NO, at grid	electricity	production mix	kWh	NO	0.017881
629	932 electricity, low voltage, production NORDEL, at grid	electricity	production mix	kWh	NORDEL	0.19062
630	933 electricity, low voltage, production PL, at grid	electricity	production mix	kWh	PL	1.3657
631	934 electricity, low voltage, production PT, at grid	electricity	production mix	kWh	PT	0.71184
7207	935 electricity, low voltage, production RER, at grid	electricity	production mix	kWh	RER	0.56186
7205	936 electricity, low voltage, production RO, at grid	electricity	production mix	kWh	RO	0.80434
632	937 electricity, low voltage, production SE, at grid	electricity	production mix	kWh	SE	0.051154
633	938 electricity, low voltage, production SI, at grid	electricity	production mix	kWh	SI	0.55789
634	939 electricity, low voltage, production SK, at grid	electricity	production mix	kWh	SK	0.41169
635	940 electricity, low voltage, production UCTE, at grid	electricity	production mix	kWh	UCTE	0.59446
637	941 electricity, medium voltage, production AT, at grid	electricity	production mix	kWh	AT	0.32033
638	942 electricity, medium voltage, production BA, at grid	electricity	production mix	kWh	BA	0.71156
639	943 electricity, medium voltage, production BE, at grid	electricity	production mix	kWh	BE	0.33697
7195	944 electricity, medium voltage, production BG, at grid	electricity	production mix	kWh	BG	0.62025
7253	945 electricity, medium voltage, production BR, at grid	electricity	production mix	kWh	BR	0.23491
640	946 electricity, medium voltage, production CENTREL, at grid	electricity	production mix	kWh	CENTREL	0.92551
641	947 electricity, medium voltage, production CH, at grid	electricity	production mix	kWh	CH	0.023319
665	948 electricity, medium voltage, production CS, at grid	electricity	production mix	kWh	CS	0.95122
642	949 electricity, medium voltage, production CZ, at grid	electricity	production mix	kWh	CZ	0.78159
643	950 electricity, medium voltage, production DE, at grid	electricity	production mix	kWh	DE	0.6796
644	951 electricity, medium voltage, production DK, at grid	electricity	production mix	kWh	DK	0.63907
645	952 electricity, medium voltage, production ES, at grid	electricity	production mix	kWh	ES	0.52627
646	953 electricity, medium voltage, production FI, at grid	electricity	production mix	kWh	FI	0.39289
647	954 electricity, medium voltage, production FR, at grid	electricity	production mix	kWh	FR	0.092339



						Ecoinvent IPCC2007 GWP100
Name	Category	Subcategory	Unit	Country		
648	955 electricity, medium voltage, production GB, at grid	electricity	kWh	GB		0.61766
649	956 electricity, medium voltage, production GR, at grid	electricity	kWh	GR		1.0306
650	957 electricity, medium voltage, production HR, at grid	electricity	kWh	HR		0.34561
651	958 electricity, medium voltage, production HU, at grid	electricity	kWh	HU		0.71394
652	959 electricity, medium voltage, production IE, at grid	electricity	kWh	IE		0.79944
653	960 electricity, medium voltage, production IT, at grid	electricity	kWh	IT		0.65106
654	961 electricity, medium voltage, production LU, at grid	electricity	kWh	LU		0.53983
655	962 electricity, medium voltage, production MK, at grid	electricity	kWh	MK		1.0064
656	963 electricity, medium voltage, production NL, at grid	electricity	kWh	NL		0.69914
657	964 electricity, medium voltage, production NO, at grid	electricity	kWh	NO		0.012678
658	965 electricity, medium voltage, production NORDEL, at grid	electricity	kWh	NORDEL		0.17066
659	966 electricity, medium voltage, production PL, at grid	electricity	kWh	PL		1.1628
660	967 electricity, medium voltage, production PT, at grid	electricity	kWh	PT		0.62983
7208	968 electricity, medium voltage, production RER, at grid	electricity	kWh	RER		0.50213
7203	969 electricity, medium voltage, production RO, at grid	electricity	kWh	RO		0.6766
661	970 electricity, medium voltage, production SE, at grid	electricity	kWh	SE		0.042542
662	971 electricity, medium voltage, production SI, at grid	electricity	kWh	SI		0.50404
663	972 electricity, medium voltage, production SK, at grid	electricity	kWh	SK		0.37977
664	973 electricity, medium voltage, production UCTE, at grid	electricity	kWh	UCTE		0.53132
666	974 electricity, production mix AT	electricity	kWh	AT		0.31009
667	975 electricity, production mix BA	electricity	kWh	BA		0.67099
668	976 electricity, production mix BE	electricity	kWh	BE		0.32773
7191	977 electricity, production mix BG	electricity	kWh	BG		0.5917
6688	978 electricity, production mix BR	electricity	kWh	BR		0.22323
669	979 electricity, production mix CENTREL	electricity	kWh	CENTREL		0.89763
670	980 electricity, production mix CH	electricity	kWh	CH		0.01948
6689	981 electricity, production mix CN	electricity	kWh	CN		1.1483
694	982 electricity, production mix CS	electricity	kWh	CS		0.91032
671	983 electricity, production mix CZ	electricity	kWh	CZ		0.75971
672	984 electricity, production mix DE	electricity	kWh	DE		0.66316
673	985 electricity, production mix DK	electricity	kWh	DK		0.62558
674	986 electricity, production mix ES	electricity	kWh	ES		0.50908
675	987 electricity, production mix FI	electricity	kWh	FI		0.38401
676	988 electricity, production mix FR	electricity	kWh	FR		0.087303
677	989 electricity, production mix GB	electricity	kWh	GB		0.59751
678	990 electricity, production mix GR	electricity	kWh	GR		1.0013
679	991 electricity, production mix HR	electricity	kWh	HR		0.3298
680	992 electricity, production mix HU	electricity	kWh	HU		0.6905
681	993 electricity, production mix IE	electricity	kWh	IE		0.77601
682	994 electricity, production mix IT	electricity	kWh	IT		0.63469
6691	995 electricity, production mix JP	electricity	kWh	JP		0.54559
683	996 electricity, production mix LU	electricity	kWh	LU		0.52484
684	997 electricity, production mix MK	electricity	kWh	MK		0.95649
685	998 electricity, production mix NL	electricity	kWh	NL		0.68568
686	999 electricity, production mix NO	electricity	kWh	NO		0.0090407
687	1000 electricity, production mix NORDEL	electricity	kWh	NORDEL		0.16412
688	1001 electricity, production mix PL	electricity	kWh	PL		1.1253
689	1002 electricity, production mix PT	electricity	kWh	PT		0.61136
7209	1003 electricity, production mix RER	electricity	kWh	RER		0.48752
7199	1004 electricity, production mix RO	electricity	kWh	RO		0.65204
690	1005 electricity, production mix SE	electricity	kWh	SE		0.038275
691	1006 electricity, production mix SI	electricity	kWh	SI		0.4901
692	1007 electricity, production mix SK	electricity	kWh	SK		0.36957
693	1008 electricity, production mix UCTE	electricity	kWh	UCTE		0.51618
6690	1009 electricity, production mix US	electricity	kWh	US		0.75551
695	1010 electricity mix	electricity	supply mix	kWh	AT	0.3894
696	1011 electricity mix	electricity	supply mix	kWh	BE	0.33032
697	1012 electricity mix	electricity	supply mix	kWh	CH	0.11206
698	1013 electricity mix	electricity	supply mix	kWh	ES	0.50074
699	1014 electricity mix	electricity	supply mix	kWh	CS	0.8726
700	1015 electricity mix	electricity	supply mix	kWh	FR	0.089443
701	1016 electricity mix	electricity	supply mix	kWh	GR	0.97426
702	1017 electricity mix	electricity	supply mix	kWh	IT	0.56733
703	1018 electricity mix	electricity	supply mix	kWh	LU	0.56026
704	1019 electricity mix	electricity	supply mix	kWh	NL	0.67005
705	1020 electricity mix	electricity	supply mix	kWh	PT	0.59615
706	1021 electricity mix	electricity	supply mix	kWh	DE	0.64059
707	1022 electricity mix	electricity	supply mix	kWh	DK	0.5613
708	1023 electricity mix	electricity	supply mix	kWh	FI	0.44077
709	1024 electricity mix	electricity	supply mix	kWh	GB	0.58459
710	1025 electricity mix	electricity	supply mix	kWh	IE	0.76527
711	1026 electricity mix	electricity	supply mix	kWh	SE	0.082753
712	1027 electricity mix	electricity	supply mix	kWh	NO	0.032233
713	1028 electricity mix	electricity	supply mix	kWh	CZ	0.7956
714	1029 electricity mix	electricity	supply mix	kWh	HU	0.62093
715	1030 electricity mix	electricity	supply mix	kWh	PL	1.1058
716	1031 electricity mix	electricity	supply mix	kWh	SK	0.45354
717	1032 electricity mix	electricity	supply mix	kWh	SI	0.4259
718	1033 electricity mix	electricity	supply mix	kWh	HR	0.46704
719	1034 electricity mix	electricity	supply mix	kWh	BA	0.66089
720	1035 electricity mix	electricity	supply mix	kWh	MK	0.94633
7190	1036 electricity mix	electricity	supply mix	kWh	BG	0.59288
7198	1037 electricity mix	electricity	supply mix	kWh	RO	0.65422
722	1038 electricity mix, SBB	electricity	supply mix	kWh	CH	0.018146
721	1039 electricity mix, aluminium industry	electricity	supply mix	kWh	GLO	0.3353
749	1040 electricity, high voltage, SBB, at grid	electricity	supply mix	kWh	CH	0.20209
5861	1041 electricity, high voltage, aluminium industry, at grid	electricity	supply mix	kWh	GLO	0.34072
723	1042 electricity, high voltage, at grid	electricity	supply mix	kWh	CH	0.11514
724	1043 electricity, high voltage, at grid	electricity	supply mix	kWh	CS	0.88879
725	1044 electricity, high voltage, at grid	electricity	supply mix	kWh	DE	0.64852
726	1045 electricity, high voltage, at grid	electricity	supply mix	kWh	AT	0.39506
727	1046 electricity, high voltage, at grid	electricity	supply mix	kWh	BE	0.335
728	1047 electricity, high voltage, at grid	electricity	supply mix	kWh	ES	0.50847
729	1048 electricity, high voltage, at grid	electricity	supply mix	kWh	FR	0.09228
730	1049 electricity, high voltage, at grid	electricity	supply mix	kWh	GR	0.98733
731	1050 electricity, high voltage, at grid	electricity	supply mix	kWh	IT	0.57469
732	1051 electricity, high voltage, at grid	electricity	supply mix	kWh	LU	0.56778
733	1052 electricity, high voltage, at grid	electricity	supply mix	kWh	NL	0.67718
734	1053 electricity, high voltage, at grid	electricity	supply mix	kWh	PT	0.60456
735	1054 electricity, high voltage, at grid	electricity	supply mix	kWh	DK	0.5681
736	1055 electricity, high voltage, at grid	electricity	supply mix	kWh	FI	0.44569
737	1056 electricity, high voltage, at grid	electricity	supply mix	kWh	GB	0.59293
738	1057 electricity, high voltage, at grid	electricity	supply mix	kWh	IE	0.77528
739	1058 electricity, high voltage, at grid	electricity	supply mix	kWh	SE	0.085574
740	1059 electricity, high voltage, at grid	electricity	supply mix	kWh	NO	0.034531
741	1060 electricity, high voltage, at grid	electricity	supply mix	kWh	CZ	0.80616

					Ecoinvent IPCC2007 GWP100	
Name	Category	Subcategory	Unit	Country		
742	1061 electricity, high voltage, at grid	electricity	supply mix	kWh	HU	0.63053
743	1062 electricity, high voltage, at grid	electricity	supply mix	kWh	PL	1.1163
744	1063 electricity, high voltage, at grid	electricity	supply mix	kWh	SK	0.45937
745	1064 electricity, high voltage, at grid	electricity	supply mix	kWh	SI	0.432
746	1065 electricity, high voltage, at grid	electricity	supply mix	kWh	HR	0.47578
747	1066 electricity, high voltage, at grid	electricity	supply mix	kWh	BA	0.67634
748	1067 electricity, high voltage, at grid	electricity	supply mix	kWh	MK	0.96571
6676	1068 electricity, high voltage, at grid	electricity	supply mix	kWh	BR	0.22222
6679	1069 electricity, high voltage, at grid	electricity	supply mix	kWh	CN	1.161
6682	1070 electricity, high voltage, at grid	electricity	supply mix	kWh	US	0.76055
6685	1071 electricity, high voltage, at grid	electricity	supply mix	kWh	JP	0.55231
7192	1072 electricity, high voltage, at grid	electricity	supply mix	kWh	BG	0.60464
7200	1073 electricity, high voltage, at grid	electricity	supply mix	kWh	RO	0.66495
750	1074 electricity, low voltage, at grid	electricity	supply mix	kWh	AT	0.44321
751	1075 electricity, low voltage, at grid	electricity	supply mix	kWh	BE	0.36641
752	1076 electricity, low voltage, at grid	electricity	supply mix	kWh	CH	0.13383
753	1077 electricity, low voltage, at grid	electricity	supply mix	kWh	ES	0.59386
754	1078 electricity, low voltage, at grid	electricity	supply mix	kWh	CS	1.1496
755	1079 electricity, low voltage, at grid	electricity	supply mix	kWh	FR	0.10775
756	1080 electricity, low voltage, at grid	electricity	supply mix	kWh	GR	1.1449
757	1081 electricity, low voltage, at grid	electricity	supply mix	kWh	IT	0.6419
758	1082 electricity, low voltage, at grid	electricity	supply mix	kWh	LU	0.63995
759	1083 electricity, low voltage, at grid	electricity	supply mix	kWh	NL	0.72596
760	1084 electricity, low voltage, at grid	electricity	supply mix	kWh	PT	0.69436
761	1085 electricity, low voltage, at grid	electricity	supply mix	kWh	DE	0.71944
762	1086 electricity, low voltage, at grid	electricity	supply mix	kWh	DK	0.6207
763	1087 electricity, low voltage, at grid	electricity	supply mix	kWh	FI	0.49893
764	1088 electricity, low voltage, at grid	electricity	supply mix	kWh	GB	0.68444
765	1089 electricity, low voltage, at grid	electricity	supply mix	kWh	IE	0.88547
766	1090 electricity, low voltage, at grid	electricity	supply mix	kWh	SE	0.10173
767	1091 electricity, low voltage, at grid	electricity	supply mix	kWh	NO	0.04419
768	1092 electricity, low voltage, at grid	electricity	supply mix	kWh	CZ	0.92413
769	1093 electricity, low voltage, at grid	electricity	supply mix	kWh	HU	0.74762
770	1094 electricity, low voltage, at grid	electricity	supply mix	kWh	PL	1.1926
771	1095 electricity, low voltage, at grid	electricity	supply mix	kWh	SK	0.50329
772	1096 electricity, low voltage, at grid	electricity	supply mix	kWh	SI	0.48595
773	1097 electricity, low voltage, at grid	electricity	supply mix	kWh	HR	0.59482
774	1098 electricity, low voltage, at grid	electricity	supply mix	kWh	BA	0.93489
775	1099 electricity, low voltage, at grid	electricity	supply mix	kWh	MK	1.2759
6677	1100 electricity, low voltage, at grid	electricity	supply mix	kWh	BR	0.29011
6680	1101 electricity, low voltage, at grid	electricity	supply mix	kWh	CN	1.5001
6683	1102 electricity, low voltage, at grid	electricity	supply mix	kWh	US	0.83738
6686	1103 electricity, low voltage, at grid	electricity	supply mix	kWh	JP	0.60398
7196	1104 electricity, low voltage, at grid	electricity	supply mix	kWh	BG	0.78854
7204	1105 electricity, low voltage, at grid	electricity	supply mix	kWh	RO	0.807
776	1106 electricity, medium voltage, aluminium industry, at grid	electricity	supply mix	kWh	GLO	0.34829
777	1107 electricity, medium voltage, at grid	electricity	supply mix	kWh	AT	0.40113
778	1108 electricity, medium voltage, at grid	electricity	supply mix	kWh	BE	0.3396
779	1109 electricity, medium voltage, at grid	electricity	supply mix	kWh	CH	0.11777
780	1110 electricity, medium voltage, at grid	electricity	supply mix	kWh	ES	0.51773
781	1111 electricity, medium voltage, at grid	electricity	supply mix	kWh	CS	0.91199
782	1112 electricity, medium voltage, at grid	electricity	supply mix	kWh	FR	0.094521
783	1113 electricity, medium voltage, at grid	electricity	supply mix	kWh	GR	1.0029
784	1114 electricity, medium voltage, at grid	electricity	supply mix	kWh	IT	0.58243
785	1115 electricity, medium voltage, at grid	electricity	supply mix	kWh	LU	0.57597
786	1116 electricity, medium voltage, at grid	electricity	supply mix	kWh	NL	0.6833
787	1117 electricity, medium voltage, at grid	electricity	supply mix	kWh	PT	0.61427
788	1118 electricity, medium voltage, at grid	electricity	supply mix	kWh	DE	0.65662
789	1119 electricity, medium voltage, at grid	electricity	supply mix	kWh	DK	0.57376
790	1120 electricity, medium voltage, at grid	electricity	supply mix	kWh	FI	0.45045
791	1121 electricity, medium voltage, at grid	electricity	supply mix	kWh	GB	0.60444
792	1122 electricity, medium voltage, at grid	electricity	supply mix	kWh	IE	0.78847
793	1123 electricity, medium voltage, at grid	electricity	supply mix	kWh	SE	0.087972
794	1124 electricity, medium voltage, at grid	electricity	supply mix	kWh	NO	0.03636
795	1125 electricity, medium voltage, at grid	electricity	supply mix	kWh	CZ	0.81831
796	1126 electricity, medium voltage, at grid	electricity	supply mix	kWh	HU	0.64245
797	1127 electricity, medium voltage, at grid	electricity	supply mix	kWh	PL	1.1248
798	1128 electricity, medium voltage, at grid	electricity	supply mix	kWh	SK	0.46507
799	1129 electricity, medium voltage, at grid	electricity	supply mix	kWh	SI	0.43859
800	1130 electricity, medium voltage, at grid	electricity	supply mix	kWh	HR	0.4876
801	1131 electricity, medium voltage, at grid	electricity	supply mix	kWh	BA	0.70092
802	1132 electricity, medium voltage, at grid	electricity	supply mix	kWh	MK	0.99573
6678	1133 electricity, medium voltage, at grid	electricity	supply mix	kWh	BR	0.22815
6681	1134 electricity, medium voltage, at grid	electricity	supply mix	kWh	CN	1.1779
6684	1135 electricity, medium voltage, at grid	electricity	supply mix	kWh	US	0.77172
6687	1136 electricity, medium voltage, at grid	electricity	supply mix	kWh	JP	0.55726
7194	1137 electricity, medium voltage, at grid	electricity	supply mix	kWh	BG	0.62148
7202	1138 electricity, medium voltage, at grid	electricity	supply mix	kWh	RO	0.67885
10160	1139 CD-ROM/DVD-ROM drive, desktop computer, at plant	electronics	component	unit	GLO	17.263
10161	1140 CD-ROM/DVD-ROM drive, laptop computer, at plant	electronics	component	unit	GLO	5.1797
10167	1141 LCD glass, at plant	electronics	component	kg	GLO	4.3804
7096	1142 backlight, LCD screen, at plant	electronics	component	kg	GLO	10.732
7017	1143 cable, connector for computer, without plugs, at plant	electronics	component	m	GLO	0.37825
7099	1144 cable, data cable in infrastructure, at plant	electronics	component	m	GLO	0.1961
7019	1145 cable, network cable, category 5, without plugs, at plant	electronics	component	m	GLO	0.46066
7059	1146 cable, printer cable, without plugs, at plant	electronics	component	m	GLO	0.38715
7116	1147 cable, ribbon cable, 20-pin, with plugs, at plant	electronics	component	kg	GLO	9.2395
7098	1148 cable, three-conductor cable, at plant	electronics	component	m	GLO	3.2922
7010	1149 capacitor, SMD type, surface-mounting, at plant	electronics	component	kg	GLO	57.643
7013	1150 capacitor, Tantalum-, through-hole mounting, at plant	electronics	component	kg	GLO	189.38
7011	1151 capacitor, electrolyte type, < 2cm height, at plant	electronics	component	kg	GLO	49.145
7012	1152 capacitor, electrolyte type, > 2cm height, at plant	electronics	component	kg	GLO	46.729
7009	1153 capacitor, film, through-hole mounting, at plant	electronics	component	kg	GLO	47.042
7014	1154 capacitor, unspecified, at plant	electronics	component	kg	GLO	77.988
7081	1155 connector, PCI bus, at plant	electronics	component	kg	GLO	38.903
7082	1156 connector, clamp connection, at plant	electronics	component	kg	GLO	8.6856
10162	1157 connector, computer, peripheral type, at plant	electronics	component	kg	GLO	6.8301
7075	1158 diode, glass-, SMD type, surface mounting, at plant	electronics	component	kg	GLO	229.84
7076	1159 diode, glass-, through-hole mounting, at plant	electronics	component	kg	GLO	229.49
7111	1160 diode, unspecified, at plant	electronics	component	kg	GLO	229.6
7062	1161 electrode, positive, LaNi5, at plant	electronics	component	kg	GLO	26.819
7061	1162 electrolyte, KOH, LiOH additive, at plant	electronics	component	kg	GLO	1.3995
7087	1163 electron gun, for CRT tube production, at plant	electronics	component	kg	GLO	5.8024
10164	1164 electronic component, active, unspecified, at plant	electronics	component	kg	GLO	735.63
10163	1165 electronic component, passive, unspecified, at plant	electronics	component	kg	GLO	49.231
7065	1166 electronic component, unspecified, at plant	electronics	component	kg	GLO	275.74

						Ecoinvent IPCC2007 GWP100
	Name	Category	Subcategory	Unit	Country	
7090	1167 ferrite, at plant	electronics	component	kg	GLO	1.5112
7086	1168 frit, for CRT tube production, at plant	electronics	component	kg	GLO	1.3573
7085	1169 funnel glass, CRT screen, at plant	electronics	component	kg	GLO	1.071
10156	1170 inductor, low value multilayer chip type, LMCI, at plant	electronics	component	kg	GLO	81.897
10155	1171 inductor, miniature RF chip type, MRFI, at plant	electronics	component	kg	GLO	52.686
7067	1172 inductor, ring core choke type, at plant	electronics	component	kg	GLO	42.102
10154	1173 inductor, unspecified, at plant	electronics	component	kg	GLO	58.894
7016	1174 integrated circuit, IC, logic type, at plant	electronics	component	kg	GLO	1012.4
7015	1175 integrated circuit, IC, memory type, at plant	electronics	component	kg	GLO	506.39
7077	1176 light emitting diode, LED, at plant	electronics	component	kg	GLO	229.49
7106	1177 panel components, at plant	electronics	component	kg	GLO	169.58
7084	1178 panel glass, CRT screen, at plant	electronics	component	kg	GLO	1.2271
7018	1179 plugs, inlet and outlet, for computer cable, at plant	electronics	component	unit	GLO	0.29545
7020	1180 plugs, inlet and outlet, for network cable, at plant	electronics	component	unit	GLO	0.046755
7060	1181 plugs, inlet and outlet, for printer cable, at plant	electronics	component	unit	GLO	0.45823
7071	1182 potentiometer, unspecified, at plant	electronics	component	kg	GLO	34.659
7117	1183 power adapter, for laptop, at plant	electronics	component	unit	GLO	3.942
7108	1184 production efforts, capacitors	electronics	component	kg	GLO	36.104
7112	1185 production efforts, diodes	electronics	component	kg	GLO	226.65
10157	1186 production efforts, inductor	electronics	component	kg	GLO	33.925
7110	1187 production efforts, resistors	electronics	component	kg	GLO	26.984
7114	1188 production efforts, transistors	electronics	component	kg	GLO	122.35
7068	1189 resistor, SMD type, surface mounting, at plant	electronics	component	kg	GLO	129.37
7069	1190 resistor, metal film type, through-hole mounting, at plant	electronics	component	kg	GLO	30.789
7070	1191 resistor, unspecified, at plant	electronics	component	kg	GLO	55.833
7109	1192 resistor, wirewound, through-hole mounting, at plant	electronics	component	kg	GLO	28.515
7074	1193 switch, toggle type, at plant	electronics	component	kg	GLO	13.872
7073	1194 transformer, high voltage use, at plant	electronics	component	kg	GLO	5.6268
7072	1195 transformer, low voltage use, at plant	electronics	component	kg	GLO	3.8096
7078	1196 transistor, SMD type, surface mounting, at plant	electronics	component	kg	GLO	145.15
7080	1197 transistor, unspecified, at plant	electronics	component	kg	GLO	144.86
7113	1198 transistor, wired, big size, through-hole mounting, at plant	electronics	component	kg	GLO	145.25
7079	1199 transistor, wired, small size, through-hole mounting, at plant	electronics	component	kg	GLO	144.18
7115	1200 wafer, fabricated, for integrated circuit, at plant	electronics	component	m2	GLO	71181
6992	1201 CRT screen, 17 inches, at plant	electronics	devices	unit	GLO	253.51
6993	1202 LCD flat screen, 17 inches, at plant	electronics	devices	unit	GLO	6392.1
6991	1203 desktop computer, without screen, at plant	electronics	devices	unit	GLO	271.59
6997	1204 keyboard, standard version, at plant	electronics	devices	unit	GLO	25.9
6994	1205 laptop computer, at plant	electronics	devices	unit	GLO	610.49
6998	1206 mouse device, optical, with cable, at plant	electronics	devices	unit	GLO	5.099
6995	1207 printer, laser jet, b/w, at plant	electronics	devices	unit	GLO	67.119
6996	1208 printer, laser jet, colour, at plant	electronics	devices	unit	GLO	67.187
10158	1209 HDD, desktop computer, at plant	electronics	module	unit	GLO	12.319
10159	1210 HDD, laptop computer, at plant	electronics	module	unit	GLO	3.4008
10142	1211 ITO powder, for target production, at plant	electronics	module	kg	RER	21.403
10146	1212 ITO, sintered target, at plant	electronics	module	kg	RER	34.144
7000	1213 LCD module, at plant	electronics	module	kg	GLO	1199.6
7105	1214 assembly, LCD module	electronics	module	kg	GLO	1176.2
10169	1215 assembly, LCD screen	electronics	module	kg	GLO	302.27
7003	1216 battery, Lilo, rechargeable, prismatic, at plant	electronics	module	kg	GLO	101.84
7001	1217 battery, NiMH, rechargeable, prismatic, at plant	electronics	module	kg	GLO	63.098
6999	1218 cathode-ray tube, CRT screen, at plant	electronics	module	kg	GLO	5.881
7063	1219 electrode, negative, LiC6, at plant	electronics	module	kg	GLO	3.5108
7066	1220 electrode, negative, Ni, at plant	electronics	module	kg	GLO	68.924
7064	1221 electrode, positive, LiMn2O4, at plant	electronics	module	kg	GLO	10.466
10806	1222 fan, at plant	electronics	module	kg	GLO	11.708
7118	1223 magnetite, at plant	electronics	module	kg	GLO	0.78844
7121	1224 mischmetal, primary, at plant	electronics	module	kg	GLO	16.997
10786	1225 mounting, surface mount technology, Pb-containing solder	electronics	module	m2	GLO	4.7121
10788	1226 mounting, surface mount technology, Pb-free solder	electronics	module	m2	GLO	5.9569
10787	1227 mounting, through-hole technology, Pb-containing solder	electronics	module	m2	GLO	81.435
10789	1228 mounting, through-hole technology, Pb-free solder	electronics	module	m2	GLO	46.585
10805	1229 power supply unit, at plant	electronics	module	unit	CN	28.794
7101	1230 printed wiring board, mixed mounted, unspec., solder mix, at plant	electronics	module	kg	GLO	154.74
10794	1231 printed wiring board, mounted, Desktop PC mainboard, Pb containing, at plant	electronics	module	kg	GLO	160.99
10796	1232 printed wiring board, mounted, Desktop PC mainboard, Pb free, at plant	electronics	module	kg	GLO	160.75
7102	1233 printed wiring board, mounted, Desktop PC mainboard, at plant	electronics	module	kg	GLO	160.82
10795	1234 printed wiring board, mounted, Laptop PC mainboard, Pb containing, at plant	electronics	module	kg	GLO	267.88
10797	1235 printed wiring board, mounted, Laptop PC mainboard, Pb free, at plant	electronics	module	kg	GLO	267.46
7103	1236 printed wiring board, mounted, Laptop PC mainboard, at plant	electronics	module	kg	GLO	267.58
10802	1237 printed wiring board, power supply unit desktop PC, Pb containing, at plant	electronics	module	kg	GLO	41.997
10803	1238 printed wiring board, power supply unit desktop PC, Pb free, at plant	electronics	module	kg	GLO	40.281
10804	1239 printed wiring board, power supply unit desktop PC, solder mix, at plant	electronics	module	kg	GLO	40.796
7008	1240 printed wiring board, surface mount, at plant	electronics	module	m2	GLO	286.64
10996	1241 printed wiring board, surface mount, lead-containing surface, at plant	electronics	module	m2	GLO	285.63
10995	1242 printed wiring board, surface mount, lead-free surface, at plant	electronics	module	m2	GLO	287.65
10780	1243 printed wiring board, surface mounted, unspec., Pb containing, at plant	electronics	module	kg	GLO	251.42
10791	1244 printed wiring board, surface mounted, unspec., Pb free, at plant	electronics	module	kg	GLO	252.18
10790	1245 printed wiring board, surface mounted, unspec., solder mix, at plant	electronics	module	kg	GLO	251.95
10781	1246 printed wiring board, through-hole mounted, unspec., Pb containing, at plant	electronics	module	kg	GLO	58.956
10792	1247 printed wiring board, through-hole mounted, unspec., Pb free, at plant	electronics	module	kg	GLO	56.92
10793	1248 printed wiring board, through-hole mounted, unspec., solder mix, at plant	electronics	module	kg	GLO	57.531
7007	1249 printed wiring board, through-hole, at plant	electronics	module	m2	GLO	104.74
10998	1250 printed wiring board, through-hole, lead-containing surface, at plant	electronics	module	m2	GLO	104.75
10997	1251 printed wiring board, through-hole, lead-free surface, at plant	electronics	module	m2	GLO	104.73
10962	1252 sputtering, ITO, for LCD	electronics	module	m3	RER	17259000
7005	1253 toner module, laser jet, b/w, at plant	electronics	module	unit	GLO	9.9409
7006	1254 toner module, laser jet, colour, at plant	electronics	module	unit	GLO	10.009
7119	1255 toner, black, powder, at plant	electronics	module	kg	GLO	5.5064
7057	1256 toner, black, used for printing	electronics	module	kg	RER	44.507
7120	1257 toner, colour, powder, at plant	electronics	module	kg	GLO	5.7688
7058	1258 toner, colour, used for printing	electronics	module	kg	RER	41.891
7022	1259 use, computer, desktop with CRT monitor, active mode	electronics	services	h	CH	0.033547
7036	1260 use, computer, desktop with CRT monitor, active mode	electronics	services	h	RER	0.10264
7025	1261 use, computer, desktop with CRT monitor, home use	electronics	services	h	CH	0.017263
7039	1262 use, computer, desktop with CRT monitor, home use	electronics	services	h	RER	0.030314
7024	1263 use, computer, desktop with CRT monitor, off mode	electronics	services	h	CH	0.014142
7038	1264 use, computer, desktop with CRT monitor, off mode	electronics	services	h	RER	0.016445
6980	1265 use, computer, desktop with CRT monitor, office use	electronics	services	h	CH	0.019035
7023	1266 use, computer, desktop with CRT monitor, standby/sleep mode	electronics	services	h	CH	0.019495
7037	1267 use, computer, desktop with CRT monitor, standby/sleep mode	electronics	services	h	RER	0.040223
7026	1268 use, computer, desktop with LCD monitor, active mode	electronics	services	h	CH	0.14164
7040	1269 use, computer, desktop with LCD monitor, active mode	electronics	services	h	RER	0.18079
7029	1270 use, computer, desktop with LCD monitor, home use	electronics	services	h	CH	0.13253
7043	1271 use, computer, desktop with LCD monitor, home use	electronics	services	h	RER	0.14039
7028	1272 use, computer, desktop with LCD monitor, off mode	electronics	services	h	CH	0.13073

						Ecoinvent IPCC2007 GWP100
Name	Category	Subcategory	Unit	Country		
7042 1273 use, computer, desktop with LCD monitor, off mode	electronics	services	h	REU		0.13234
7027 1274 use, computer, desktop with LCD monitor, sleep/standby mode	electronics	services	h	CH		0.13428
7041 1275 use, computer, desktop with LCD monitor, sleep/standby mode	electronics	services	h	REU		0.1481
7021 1276 use, computer, desktop, mix, home use	electronics	services	h	CH		0.091035
7035 1277 use, computer, desktop, mix, home use	electronics	services	h	REU		0.10076
6979 1278 use, computer, desktop, mix, office use	electronics	services	h	CH		0.092309
6985 1279 use, computer, desktop, mix, office use	electronics	services	h	REU		0.10639
6986 1280 use, computer, desktop, with CRT monitor, office use	electronics	services	h	REU		0.03818
6981 1281 use, computer, desktop, with LCD monitor, office use	electronics	services	h	CH		0.13353
6987 1282 use, computer, desktop, with LCD monitor, office use	electronics	services	h	REU		0.14476
7030 1283 use, computer, laptop, active mode	electronics	services	h	CH		0.019967
7044 1284 use, computer, laptop, active mode	electronics	services	h	REU		0.028719
7032 1285 use, computer, laptop, off mode	electronics	services	h	CH		0.017625
7046 1286 use, computer, laptop, off mode	electronics	services	h	REU		0.018316
6982 1287 use, computer, laptop, office use	electronics	services	h	CH		0.13353
6988 1288 use, computer, laptop, office use	electronics	services	h	REU		0.020824
7031 1289 use, computer, laptop, standby/sleep mode	electronics	services	h	CH		0.01796
7045 1290 use, computer, laptop, standby/sleep mode	electronics	services	h	REU		0.019803
6983 1291 use, printer, laser jet, b/w, per kg printed paper	electronics	services	kg	CH		0.18891
6989 1292 use, printer, laser jet, b/w, per kg printed paper	electronics	services	kg	REU		0.22438
7033 1293 use, printer, laser jet, b/w, printing per h	electronics	services	h	CH		0.37213
7047 1294 use, printer, laser jet, b/w, printing per h	electronics	services	h	REU		0.39065
6984 1295 use, printer, laser jet, colour, per kg printed paper	electronics	services	kg	CH		0.2027
6990 1296 use, printer, laser jet, colour, per kg printed paper	electronics	services	kg	REU		0.31786
7034 1297 use, printer, laser jet, colour, printing per h	electronics	services	h	CH		0.11887
7048 1298 use, printer, laser jet, colour, printing per h	electronics	services	h	REU		0.13739
6580 1299 sugar, from sugar beet, at sugar refinery	food industry	processing	kg	CH		0.50376
6581 1300 sugar, from sugarcane, at sugar refinery	food industry	processing	kg	BR		0.19391
803 1301 anti-reflex-coating, etching, solar glass	glass	construction	m2	DK		1.4907
805 1302 flat glass, coated, at plant	glass	construction	kg	REU		1.0925
806 1303 flat glass, uncoated, at plant	glass	construction	kg	REU		0.97934
808 1304 glass fibre, at plant	glass	construction	kg	REU		2.6346
810 1305 glass tube, borosilicate, at plant	glass	construction	kg	DE		2.4573
811 1306 solar collector glass tube, with silver mirror, at plant	glass	construction	kg	DE		6.5487
812 1307 solar glass, low-iron, at regional storage	glass	construction	kg	REU		1.0911
813 1308 tempering, flat glass	glass	construction	kg	REU		0.23372
816 1309 glass cullets, sorted, at sorting plant	glass	packaging	kg	REU		0.043857
817 1310 glass, from public collection, unsorted	glass	packaging	kg	REU		0.027001
818 1311 packaging glass, brown, at plant	glass	packaging	kg	CH		0.69109
819 1312 packaging glass, brown, at plant	glass	packaging	kg	DE		0.59731
820 1313 packaging glass, brown, at plant	glass	packaging	kg	REU		0.89338
821 1314 packaging glass, brown, at regional storage	glass	packaging	kg	CH		0.77329
822 1315 packaging glass, green, at plant	glass	packaging	kg	CH		0.54239
823 1316 packaging glass, green, at plant	glass	packaging	kg	DE		0.54048
824 1317 packaging glass, green, at plant	glass	packaging	kg	REU		0.87196
825 1318 packaging glass, green, at regional storage	glass	packaging	kg	CH		0.66609
826 1319 packaging glass, white, at plant	glass	packaging	kg	CH		0.57319
827 1320 packaging glass, white, at plant	glass	packaging	kg	DE		0.61555
828 1321 packaging glass, white, at plant	glass	packaging	kg	REU		0.88718
829 1322 packaging glass, white, at regional storage	glass	packaging	kg	CH		0.69841
5892 1323 benzene, at coke plant	hard coal	fuels	kg	DE		0.75086
5893 1324 benzene, at coke plant	hard coal	fuels	kg	GLO		0.98409
5888 1325 coke oven gas, at plant	hard coal	fuels	MJ	DE		0.018655
5889 1326 coke oven gas, at plant	hard coal	fuels	MJ	GLO		0.024449
831 1327 hard coal briquettes, at plant	hard coal	fuels	MJ	REU		0.011768
832 1328 hard coal coke, at plant	hard coal	fuels	MJ	REU		0.018899
833 1329 hard coal coke, at plant	hard coal	fuels	MJ	GLO		0.02477
834 1330 hard coal mix, at regional storage	hard coal	fuels	kg	UCTE		0.30172
835 1331 hard coal, at regional storage	hard coal	fuels	kg	WEU		0.38795
5890 1332 tar, at coke plant	hard coal	fuels	kg	DE		0.69792
5891 1333 tar, at coke plant	hard coal	fuels	kg	GLO		0.9147
844 1334 anthracite, burned in stove 5-15kW	hard coal	heating systems	MJ	REU		0.10734
846 1335 hard coal briquette, burned in stove 5-15kW	hard coal	heating systems	MJ	REU		0.11176
847 1336 hard coal coke, burned in stove 5-15kW	hard coal	heating systems	MJ	REU		0.1244
848 1337 hard coal, burned in industrial furnace 1-10MW	hard coal	heating systems	MJ	REU		0.10504
849 1338 heat, anthracite, at stove 5-15kW	hard coal	heating systems	MJ	REU		0.1535
850 1339 heat, at hard coal industrial furnace 1-10MW	hard coal	heating systems	MJ	REU		0.1313
851 1340 heat, hard coal briquette, at stove 5-15kW	hard coal	heating systems	MJ	REU		0.15981
852 1341 heat, hard coal coke, at stove 5-15kW	hard coal	heating systems	MJ	REU		0.17789
882 1342 NOx retained, in SCR	hard coal	power plants	kg	GLO		0.7503
883 1343 SOx retained, in hard coal flue gas desulphurisation	hard coal	power plants	kg	REU		0.8366
11088 1344 electricity, hard coal, at coal mine power plant	hard coal	power plants	kWh	CN		4.1125
854 1345 electricity, hard coal, at power plant	hard coal	power plants	kWh	AT		0.98277
855 1346 electricity, hard coal, at power plant	hard coal	power plants	kWh	BE		1.0823
856 1347 electricity, hard coal, at power plant	hard coal	power plants	kWh	ES		1.1017
857 1348 electricity, hard coal, at power plant	hard coal	power plants	kWh	FR		1.0735
858 1349 electricity, hard coal, at power plant	hard coal	power plants	kWh	IT		1.0308
859 1350 electricity, hard coal, at power plant	hard coal	power plants	kWh	NL		1.0843
860 1351 electricity, hard coal, at power plant	hard coal	power plants	kWh	PT		0.98823
861 1352 electricity, hard coal, at power plant	hard coal	power plants	kWh	UCTE		1.0792
862 1353 electricity, hard coal, at power plant	hard coal	power plants	kWh	DE		1.0937
863 1354 electricity, hard coal, at power plant	hard coal	power plants	kWh	NORDEL		0.9654
864 1355 electricity, hard coal, at power plant	hard coal	power plants	kWh	CZ		1.2983
865 1356 electricity, hard coal, at power plant	hard coal	power plants	kWh	HR		1.1012
866 1357 electricity, hard coal, at power plant	hard coal	power plants	kWh	PL		1.1514
867 1358 electricity, hard coal, at power plant	hard coal	power plants	kWh	SK		1.0182
6070 1359 electricity, hard coal, at power plant	hard coal	power plants	kWh	CENTREL		1.1553
7309 1360 electricity, hard coal, at power plant	hard coal	power plants	kWh	US		1.1905
11054 1361 electricity, hard coal, at power plant	hard coal	power plants	kWh	ERCOT		1.2473
11055 1362 electricity, hard coal, at power plant	hard coal	power plants	kWh	FRCC		0.99837
11056 1363 electricity, hard coal, at power plant	hard coal	power plants	kWh	MRO		1.4765
11057 1364 electricity, hard coal, at power plant	hard coal	power plants	kWh	NPCC		1.143
11058 1365 electricity, hard coal, at power plant	hard coal	power plants	kWh	RFC		1.127
11059 1366 electricity, hard coal, at power plant	hard coal	power plants	kWh	SERC		1.1583
11060 1367 electricity, hard coal, at power plant	hard coal	power plants	kWh	SPP		1.4195
11061 1368 electricity, hard coal, at power plant	hard coal	power plants	kWh	WECC		1.2436
11087 1369 electricity, hard coal, at power plant	hard coal	power plants	kWh	CN		1.4103
11090 1370 hard coal, burned in coal mine power plant	hard coal	power plants	MJ	CN		0.14583
869 1371 hard coal, burned in power plant	hard coal	power plants	MJ	AT		0.1103
870 1372 hard coal, burned in power plant	hard coal	power plants	MJ	BE		0.10823
871 1373 hard coal, burned in power plant	hard coal	power plants	MJ	ES		0.11017
872 1374 hard coal, burned in power plant	hard coal	power plants	MJ	FR		0.10524
873 1375 hard coal, burned in power plant	hard coal	power plants	MJ	IT		0.10682
874 1376 hard coal, burned in power plant	hard coal	power plants	MJ	NL		0.1063
875 1377 hard coal, burned in power plant	hard coal	power plants	MJ	PT		0.10294
876 1378 hard coal, burned in power plant	hard coal	power plants	MJ	DE		0.10937

							Ecoinvent IPCC2007 GWP100
Name	Category	Subcategory	Unit	Country			
877	1379 hard coal, burned in power plant	hard coal	power plants	MJ	CZ		0.10642
878	1380 hard coal, burned in power plant	hard coal	power plants	MJ	HR		0.10796
879	1381 hard coal, burned in power plant	hard coal	power plants	MJ	PL		0.10661
880	1382 hard coal, burned in power plant	hard coal	power plants	MJ	SK		0.10855
881	1383 hard coal, burned in power plant	hard coal	power plants	MJ	NORDEL		0.11148
11062	1384 hard coal, burned in power plant	hard coal	power plants	MJ	ERCOT		0.10661
11063	1385 hard coal, burned in power plant	hard coal	power plants	MJ	FRCC		0.104
11064	1386 hard coal, burned in power plant	hard coal	power plants	MJ	MRO		0.10699
11065	1387 hard coal, burned in power plant	hard coal	power plants	MJ	NPCC		0.10298
11066	1388 hard coal, burned in power plant	hard coal	power plants	MJ	RFC		0.10436
11067	1389 hard coal, burned in power plant	hard coal	power plants	MJ	SERC		0.1053
11068	1390 hard coal, burned in power plant	hard coal	power plants	MJ	SPP		0.10514
11069	1391 hard coal, burned in power plant	hard coal	power plants	MJ	WECC		0.1072
11089	1392 hard coal, burned in power plant	hard coal	power plants	MJ	CN		0.13963
886	1393 hard coal supply mix	hard coal	production	kg	AT		0.31637
887	1394 hard coal supply mix	hard coal	production	kg	BE		0.30631
889	1395 hard coal supply mix	hard coal	production	kg	DE		0.36047
890	1396 hard coal supply mix	hard coal	production	kg	ES		0.31773
891	1397 hard coal supply mix	hard coal	production	kg	FR		0.27705
892	1398 hard coal supply mix	hard coal	production	kg	IT		0.26464
893	1399 hard coal supply mix	hard coal	production	kg	NL		0.26611
894	1400 hard coal supply mix	hard coal	production	kg	PT		0.20054
895	1401 hard coal supply mix	hard coal	production	kg	CZ		0.27808
896	1402 hard coal supply mix	hard coal	production	kg	HR		0.31625
897	1403 hard coal supply mix	hard coal	production	kg	PL		0.28066
898	1404 hard coal supply mix	hard coal	production	kg	SK		0.32422
11094	1405 hard coal supply mix	hard coal	production	kg	CN		0.97468
11072	1406 hard coal supply mix, at regional storage	hard coal	production	kg	US		0.16971
901	1407 hard coal, at mine	hard coal	production	kg	AU		0.096425
902	1408 hard coal, at mine	hard coal	production	kg	RNA		0.10489
903	1409 hard coal, at mine	hard coal	production	kg	EEU		0.24992
904	1410 hard coal, at mine	hard coal	production	kg	ZA		0.1149
905	1411 hard coal, at mine	hard coal	production	kg	RLA		0.030399
906	1412 hard coal, at mine	hard coal	production	kg	WEU		0.3791
907	1413 hard coal, at mine	hard coal	production	kg	RU		0.29871
908	1414 hard coal, at mine	hard coal	production	kg	CPA		0.10261
11092	1415 hard coal, at mine	hard coal	production	kg	CN		0.901
909	1416 hard coal, at regional storage	hard coal	production	kg	AU		0.10816
910	1417 hard coal, at regional storage	hard coal	production	kg	EEU		0.27135
911	1418 hard coal, at regional storage	hard coal	production	kg	RLA		0.041893
912	1419 hard coal, at regional storage	hard coal	production	kg	RNA		0.14115
913	1420 hard coal, at regional storage	hard coal	production	kg	ZA		0.14171
914	1421 hard coal, at regional storage	hard coal	production	kg	RU		0.32235
915	1422 hard coal, at regional storage	hard coal	production	kg	CPA		0.11434
6011	1423 heat, air-water heat pump 10kW, at heat radiator	heat pumps	heating systems	MJ	RER		0.072285
6015	1424 heat, air-water heat pump 10kW, at heat radiator	heat pumps	heating systems	MJ	CH		0.024306
6009	1425 heat, at air-water heat pump 10kW	heat pumps	heating systems	MJ	RER		0.066973
6013	1426 heat, at air-water heat pump 10kW	heat pumps	heating systems	MJ	CH		0.021278
919	1427 heat, at heat pump 30kW, allocation electricity	heat pumps	heating systems	MJ	CH		0.060973
920	1428 heat, at heat pump 30kW, allocation energy	heat pumps	heating systems	MJ	CH		0.022454
921	1429 heat, at heat pump 30kW, allocation exergy	heat pumps	heating systems	MJ	CH		0.046528
922	1430 heat, at heat pump 30kW, allocation heat	heat pumps	heating systems	MJ	CH		0.00078713
923	1431 heat, at heat pump 30kW, allocation price	heat pumps	heating systems	MJ	CH		0.039908
6935	1432 heat, biogas, at diffusion absorption heat pump 4kW, future	heat pumps	heating systems	MJ	CH		0.034173
918	1433 heat, borehole heat exchanger, at brine-water heat pump 10kW	heat pumps	heating systems	MJ	RER		0.04813
6012	1434 heat, borehole heat exchanger, at brine-water heat pump 10kW	heat pumps	heating systems	MJ	CH		0.015333
6010	1435 heat, borehole heat exchanger, brine-water heat pump 10kW, at heat radiator	heat pumps	heating systems	MJ	RER		0.052499
6014	1436 heat, borehole heat exchanger, brine-water heat pump 10kW, at heat radiator	heat pumps	heating systems	MJ	CH		0.018063
6934	1437 heat, natural gas, at diffusion absorption heat pump 4kW, future	heat pumps	heating systems	MJ	CH		0.055769
928	1438 electricity, hydropower, at power plant	hydro power	power plants	kWh	CH		0.0044726
929	1439 electricity, hydropower, at power plant	hydro power	power plants	kWh	AT		0.0042297
930	1440 electricity, hydropower, at power plant	hydro power	power plants	kWh	BE		0.0037249
931	1441 electricity, hydropower, at power plant	hydro power	power plants	kWh	ES		0.0067157
932	1442 electricity, hydropower, at power plant	hydro power	power plants	kWh	CS		0.0052203
933	1443 electricity, hydropower, at power plant	hydro power	power plants	kWh	FR		0.0040682
934	1444 electricity, hydropower, at power plant	hydro power	power plants	kWh	GR		0.012521
935	1445 electricity, hydropower, at power plant	hydro power	power plants	kWh	IT		0.0050173
936	1446 electricity, hydropower, at power plant	hydro power	power plants	kWh	LU		0.0037249
937	1447 electricity, hydropower, at power plant	hydro power	power plants	kWh	NL		0.0037249
938	1448 electricity, hydropower, at power plant	hydro power	power plants	kWh	PT		0.0070002
939	1449 electricity, hydropower, at power plant	hydro power	power plants	kWh	DE		0.0051323
940	1450 electricity, hydropower, at power plant	hydro power	power plants	kWh	BA		0.0068036
941	1451 electricity, hydropower, at power plant	hydro power	power plants	kWh	HR		0.012345
942	1452 electricity, hydropower, at power plant	hydro power	power plants	kWh	MK		0.010938
943	1453 electricity, hydropower, at power plant	hydro power	power plants	kWh	SI		0.0037249
944	1454 electricity, hydropower, at power plant	hydro power	power plants	kWh	CZ		0.005924
945	1455 electricity, hydropower, at power plant	hydro power	power plants	kWh	HU		0.0037249
946	1456 electricity, hydropower, at power plant	hydro power	power plants	kWh	PL		0.0037249
947	1457 electricity, hydropower, at power plant	hydro power	power plants	kWh	SK		0.005924
948	1458 electricity, hydropower, at power plant	hydro power	power plants	kWh	DK		0.0037249
949	1459 electricity, hydropower, at power plant	hydro power	power plants	kWh	FI		0.031772
950	1460 electricity, hydropower, at power plant	hydro power	power plants	kWh	NO		0.0057443
951	1461 electricity, hydropower, at power plant	hydro power	power plants	kWh	SE		0.0054842
952	1462 electricity, hydropower, at power plant	hydro power	power plants	kWh	GB		0.0037249
953	1463 electricity, hydropower, at power plant	hydro power	power plants	kWh	IE		0.0037249
7187	1464 electricity, hydropower, at power plant	hydro power	power plants	kWh	JP		0.0046216
954	1465 electricity, hydropower, at pumped storage power plant	hydro power	power plants	kWh	AT		0.57069
955	1466 electricity, hydropower, at pumped storage power plant	hydro power	power plants	kWh	BE		0.49041
956	1467 electricity, hydropower, at pumped storage power plant	hydro power	power plants	kWh	ES		0.73849
957	1468 electricity, hydropower, at pumped storage power plant	hydro power	power plants	kWh	CS		1.2823
958	1469 electricity, hydropower, at pumped storage power plant	hydro power	power plants	kWh	FR		0.1377
959	1470 electricity, hydropower, at pumped storage power plant	hydro power	power plants	kWh	GR		1.4233
960	1471 electricity, hydropower, at pumped storage power plant	hydro power	power plants	kWh	IT		0.82754
961	1472 electricity, hydropower, at pumped storage power plant	hydro power	power plants	kWh	LU		0.81244
962	1473 electricity, hydropower, at pumped storage power plant	hydro power	power plants	kWh	PT		0.87589
963	1474 electricity, hydropower, at pumped storage power plant	hydro power	power plants	kWh	DE		0.93875
964	1475 electricity, hydropower, at pumped storage power plant	hydro power	power plants	kWh	CH		0.16993
965	1476 electricity, hydropower, at pumped storage power plant	hydro power	power plants	kWh	BA		0.97854
966	1477 electricity, hydropower, at pumped storage power plant	hydro power	power plants	kWh	HR		0.69174
967	1478 electricity, hydropower, at pumped storage power plant	hydro power	power plants	kWh	MK		1.3923
968	1479 electricity, hydropower, at pumped storage power plant	hydro power	power plants	kWh	SI		0.62914
969	1480 electricity, hydropower, at pumped storage power plant	hydro power	power plants	kWh	CZ		1.1642
970	1481 electricity, hydropower, at pumped storage power plant	hydro power	power plants	kWh	HU		0.91303
971	1482 electricity, hydropower, at pumped storage power plant	hydro power	power plants	kWh	PL		1.6076
972	1483 electricity, hydropower, at pumped storage power plant	hydro power	power plants	kWh	SK		0.66826
973	1484 electricity, hydropower, at pumped storage power plant	hydro power	power plants	kWh	DK		0.82375

						Ecoinvent IPCC2007 GWP100
Name	Category	Subcategory	Unit	Country		
974	1485 electricity, hydropower, at pumped storage power plant	hydro power	power plants	kWh	FI	0.64872
975	1486 electricity, hydropower, at pumped storage power plant	hydro power	power plants	kWh	NO	0.060751
976	1487 electricity, hydropower, at pumped storage power plant	hydro power	power plants	kWh	SE	0.13374
977	1488 electricity, hydropower, at pumped storage power plant	hydro power	power plants	kWh	GB	0.85926
978	1489 electricity, hydropower, at pumped storage power plant	hydro power	power plants	kWh	IE	1.12
979	1490 electricity, hydropower, at pumped storage power plant	hydro power	power plants	kWh	NL	0.97974
6700	1491 electricity, hydropower, at pumped storage power plant	hydro power	power plants	kWh	JP	0.80117
11074	1492 electricity, hydropower, at pumped storage power plant	hydro power	power plants	kWh	US	1.0989
980	1493 electricity, hydropower, at reservoir power plant	hydro power	power plants	kWh	CH	0.0052786
981	1494 electricity, hydropower, at reservoir power plant	hydro power	power plants	kWh	FI	0.041121
7189	1495 electricity, hydropower, at reservoir power plant	hydro power	power plants	kWh	BR	0.15866
982	1496 electricity, hydropower, at reservoir power plant, alpine region	hydro power	power plants	kWh	RER	0.0057443
983	1497 electricity, hydropower, at reservoir power plant, non alpine regions	hydro power	power plants	kWh	RER	0.012521
984	1498 electricity, hydropower, at run-of-river power plant	hydro power	power plants	kWh	CH	0.0035264
985	1499 electricity, hydropower, at run-of-river power plant	hydro power	power plants	kWh	RER	0.0037249
991	1500 cellulose fibre, inclusive blowing in, at plant	insulation materials	production	kg	CH	0.36597
992	1501 cork slab, at plant	insulation materials	production	kg	RER	1.1563
993	1502 expanded perlite, at plant	insulation materials	production	kg	CH	0.99713
7160	1503 foam glass, at plant	insulation materials	production	kg	RER	1.5708
994	1504 foam glass, at regional storage	insulation materials	production	kg	CH	1.157
7159	1505 foam glass, at regional storage	insulation materials	production	kg	AT	1.1967
995	1506 glass wool mat, at plant	insulation materials	production	kg	CH	1.4634
998	1507 polystyrene foam slab, at plant	insulation materials	production	kg	RER	4.2119
11160	1508 polystyrene, extruded (XPS) CO2 blown, at plant	insulation materials	production	kg	RER	3.8197
11158	1509 polystyrene, extruded (XPS), HFC-134a blown, at plant	insulation materials	production	kg	RER	30.98
11159	1510 polystyrene, extruded (XPS), HFC-152a blown, at plant	insulation materials	production	kg	RER	5.8459
7126	1511 polystyrene, extruded (XPS), at plant	insulation materials	production	kg	RER	11.116
1000	1512 rock wool, at plant	insulation materials	production	kg	CH	1.0777
1001	1513 rock wool, packed, at plant	insulation materials	production	kg	CH	1.1239
1003	1514 tube insulation, elastomere, at plant	insulation materials	production	kg	DE	4.4708
1004	1515 urea formaldehyde foam slab, hard, at plant	insulation materials	production	kg	CH	2.9122
1005	1516 urea formaldehyde foam, in situ foaming, at plant	insulation materials	production	kg	CH	3.0491
1006	1517 lignite briquettes, at plant	lignite	fuels	MJ	DE	0.03292
1007	1518 pulverised lignite, at plant	lignite	fuels	MJ	DE	0.037623
1008	1519 heat, lignite briquette, at stove 5-15kW	lignite	heating systems	MJ	RER	0.20129
1009	1520 lignite briquette, burned in stove 5-15kW	lignite	heating systems	MJ	RER	0.14076
1040	1521 SOx retained, in lignite flue gas desulphurisation	lignite	power plants	kg	GLO	0.73393
1010	1522 electricity, lignite, at power plant	lignite	power plants	kWh	AT	1.0593
1011	1523 electricity, lignite, at power plant	lignite	power plants	kWh	ES	1.0838
1012	1524 electricity, lignite, at power plant	lignite	power plants	kWh	CS	1.3395
1013	1525 electricity, lignite, at power plant	lignite	power plants	kWh	FR	1.4077
1014	1526 electricity, lignite, at power plant	lignite	power plants	kWh	GR	1.2962
1015	1527 electricity, lignite, at power plant	lignite	power plants	kWh	UCTE	1.2314
1016	1528 electricity, lignite, at power plant	lignite	power plants	kWh	DE	1.2207
1017	1529 electricity, lignite, at power plant	lignite	power plants	kWh	BA	1.3074
1018	1530 electricity, lignite, at power plant	lignite	power plants	kWh	CZ	1.1736
1019	1531 electricity, lignite, at power plant	lignite	power plants	kWh	HU	1.4005
1020	1532 electricity, lignite, at power plant	lignite	power plants	kWh	MK	1.2522
1021	1533 electricity, lignite, at power plant	lignite	power plants	kWh	PL	1.1125
1022	1534 electricity, lignite, at power plant	lignite	power plants	kWh	SI	1.1924
1023	1535 electricity, lignite, at power plant	lignite	power plants	kWh	SK	1.6912
6071	1536 electricity, lignite, at power plant	lignite	power plants	kWh	CENTREL	1.1741
1024	1537 electricity, peat, at power plant	lignite	power plants	kWh	NORDEL	1.1133
1026	1538 lignite, burned in power plant	lignite	power plants	MJ	AT	0.10854
1027	1539 lignite, burned in power plant	lignite	power plants	MJ	DE	0.11199
1028	1540 lignite, burned in power plant	lignite	power plants	MJ	ES	0.10838
1029	1541 lignite, burned in power plant	lignite	power plants	MJ	CS	0.11071
1030	1542 lignite, burned in power plant	lignite	power plants	MJ	FR	0.10998
1031	1543 lignite, burned in power plant	lignite	power plants	MJ	GR	0.12708
1032	1544 lignite, burned in power plant	lignite	power plants	MJ	BA	0.10716
1033	1545 lignite, burned in power plant	lignite	power plants	MJ	CZ	0.10867
1034	1546 lignite, burned in power plant	lignite	power plants	MJ	HU	0.10856
1035	1547 lignite, burned in power plant	lignite	power plants	MJ	MK	0.11281
1036	1548 lignite, burned in power plant	lignite	power plants	MJ	PL	0.10801
1037	1549 lignite, burned in power plant	lignite	power plants	MJ	SI	0.10743
1038	1550 lignite, burned in power plant	lignite	power plants	MJ	SK	0.10841
1039	1551 peat, burned in power plant	lignite	power plants	MJ	NORDEL	0.10809
1044	1552 lignite, at mine	lignite	production	kg	RER	0.018167
5895	1553 peat, at mine	lignite	production	kg	NORDEL	0.018167
8184	1554 compressed air, average generation, <30kW, 12 bar gauge, at compressor	mechanical engineering	compressed air generation	m3	RER	0.17702
8188	1555 compressed air, average generation, <30kW, 8 bar gauge, at compressor	mechanical engineering	compressed air generation	m3	RER	0.1473
8200	1556 compressed air, average generation, >30kW, 6 bar gauge, at compressor	mechanical engineering	compressed air generation	m3	RER	0.083394
8227	1557 compressed air, average generation, >30kW, 7 bar gauge, at compressor	mechanical engineering	compressed air generation	m3	RER	0.089339
8194	1558 compressed air, average generation, >30kW, 8 bar gauge, at compressor	mechanical engineering	compressed air generation	m3	RER	0.095284
8198	1559 compressed air, best generation, >30kW, 6 bar gauge, at compressor	mechanical engineering	compressed air generation	m3	RER	0.055077
8229	1560 compressed air, best generation, >30kW, 7 bar gauge, at compressor	mechanical engineering	compressed air generation	m3	RER	0.058881
8192	1561 compressed air, best generation, >30kW, 8 bar gauge, at compressor	mechanical engineering	compressed air generation	m3	RER	0.062805
8185	1562 compressed air, optimised generation, <30kW, 12 bar gauge, at compressor	mechanical engineering	compressed air generation	m3	RER	0.20538
8189	1563 compressed air, optimised generation, <30kW, 8 bar gauge, at compressor	mechanical engineering	compressed air generation	m3	RER	0.18042
8201	1564 compressed air, optimised generation, >30kW, 6 bar gauge, at compressor	mechanical engineering	compressed air generation	m3	RER	0.071668
8226	1565 compressed air, optimised generation, >30kW, 7 bar gauge, at compressor	mechanical engineering	compressed air generation	m3	RER	0.077018
8195	1566 compressed air, optimised generation, >30kW, 8 bar gauge, at compressor	mechanical engineering	compressed air generation	m3	RER	0.082368
8223	1567 compressed air, average generation, <30kW, 10 bar gauge, at compressor	mechanical engineering	compressed air supply	m3	RER	0.16156
8221	1568 compressed air, average installation, <30kW, 10 bar gauge, at supply network	mechanical engineering	compressed air supply	m3	RER	0.24267
8186	1569 compressed air, average installation, <30kW, 12 bar gauge, at supply network	mechanical engineering	compressed air supply	m3	RER	0.26586
8190	1570 compressed air, average installation, <30kW, 8 bar gauge, at supply network	mechanical engineering	compressed air supply	m3	RER	0.22127
8202	1571 compressed air, average installation, >30kW, 6 bar gauge, at supply network	mechanical engineering	compressed air supply	m3	RER	0.10861
8225	1572 compressed air, average installation, >30kW, 7 bar gauge, at supply network	mechanical engineering	compressed air supply	m3	RER	0.11633
8196	1573 compressed air, average installation, >30kW, 8 bar gauge, at supply network	mechanical engineering	compressed air supply	m3	RER	0.12406
8199	1574 compressed air, best installation, >30kW, 6 bar gauge, at supply network	mechanical engineering	compressed air supply	m3	RER	0.060778
8228	1575 compressed air, best installation, >30kW, 7 bar gauge, at supply network	mechanical engineering	compressed air supply	m3	RER	0.064963
8193	1576 compressed air, best installation, >30kW, 8 bar gauge, at supply network	mechanical engineering	compressed air supply	m3	RER	0.069279
8222	1577 compressed air, optimised generation, <30kW, 10 bar gauge, at compressor	mechanical engineering	compressed air supply	m3	RER	0.19231
8220	1578 compressed air, optimised installation, <30kW, 10 bar gauge, at supply network	mechanical engineering	compressed air supply	m3	RER	0.20225
8187	1579 compressed air, optimised installation, <30kW, 12 bar gauge, at supply network	mechanical engineering	compressed air supply	m3	RER	0.21598
8191	1580 compressed air, optimised installation, <30kW, 8 bar gauge, at supply network	mechanical engineering	compressed air supply	m3	RER	0.18976
8203	1581 compressed air, optimised installation, >30kW, 6 bar gauge, at supply network	mechanical engineering	compressed air supply	m3	RER	0.082611
8224	1582 compressed air, optimised installation, >30kW, 7 bar gauge, at supply network	mechanical engineering	compressed air supply	m3	RER	0.088764
8197	1583 compressed air, optimised installation, >30kW, 8 bar gauge, at supply network	mechanical engineering	compressed air supply	m3	RER	0.094916
8304	1584 cold impact extrusion, aluminium, 1 stroke	metals	chipless shaping	kg	RER	0.91893
8305	1585 cold impact extrusion, aluminium, 2 strokes	metals	chipless shaping	kg	RER	1.2661
8306	1586 cold impact extrusion, aluminium, 3 strokes	metals	chipless shaping	kg	RER	1.6132
8307	1587 cold impact extrusion, aluminium, 4 strokes	metals	chipless shaping	kg	RER	1.9599
8308	1588 cold impact extrusion, aluminium, 5 strokes	metals	chipless shaping	kg	RER	2.3069
8286	1589 cold impact extrusion, steel, 1 stroke	metals	chipless shaping	kg	RER	0.8805
8287	1590 cold impact extrusion, steel, 2 strokes	metals	chipless shaping	kg	RER	0.98272

						Ecoinvent IPCC2007 GWP100
Name	Category	Subcategory	Unit	Country		
8288 1591 cold impact extrusion, steel, 3 strokes	metals	chipless shaping	kg	RER		1.0849
8289 1592 cold impact extrusion, steel, 4 strokes	metals	chipless shaping	kg	RER		1.1867
8290 1593 cold impact extrusion, steel, 5 strokes	metals	chipless shaping	kg	RER		1.2888
8328 1594 deep drawing, steel, 10000 kN press, automode operation	metals	chipless shaping	kg	RER		0.3159
8324 1595 deep drawing, steel, 10000 kN press, single stroke operation	metals	chipless shaping	kg	RER		0.43688
8329 1596 deep drawing, steel, 3500 kN press, automode operation	metals	chipless shaping	kg	RER		0.31482
8325 1597 deep drawing, steel, 3500 kN press, single stroke operation	metals	chipless shaping	kg	RER		0.36339
8327 1598 deep drawing, steel, 38000 kN press, automode operation	metals	chipless shaping	kg	RER		0.31634
8323 1599 deep drawing, steel, 38000 kN press, single stroke operation	metals	chipless shaping	kg	RER		0.46654
8330 1600 deep drawing, steel, 650 kN press, automode operation	metals	chipless shaping	kg	RER		0.31439
8326 1601 deep drawing, steel, 650 kN press, single stroke operation	metals	chipless shaping	kg	RER		0.33429
8309 1602 deformation stroke, cold impact extrusion, aluminium	metals	chipless shaping	kg	RER		0.31328
8291 1603 deformation stroke, cold impact extrusion, steel	metals	chipless shaping	kg	RER		0.068362
8303 1604 deformation stroke, hot impact extrusion, steel	metals	chipless shaping	kg	RER		0.087979
8297 1605 deformation stroke, warm impact extrusion, steel	metals	chipless shaping	kg	RER		0.088574
8205 1606 heat treatment, cold impact extrusion, aluminium	metals	chipless shaping	kg	RER		0.13923
8206 1607 heat treatment, cold impact extrusion, steel	metals	chipless shaping	kg	RER		0.17677
8204 1608 heat treatment, hot impact extrusion, steel	metals	chipless shaping	kg	RER		0.016926
8298 1609 hot impact extrusion, steel, 1 stroke	metals	chipless shaping	kg	RER		1.0457
8299 1610 hot impact extrusion, steel, 2 strokes	metals	chipless shaping	kg	RER		1.1675
8300 1611 hot impact extrusion, steel, 3 strokes	metals	chipless shaping	kg	RER		1.2894
8301 1612 hot impact extrusion, steel, 4 strokes	metals	chipless shaping	kg	RER		1.4107
8302 1613 hot impact extrusion, steel, 5 strokes	metals	chipless shaping	kg	RER		1.5324
10124 1614 laser machining, metal, with CO2-laser, 2000W power	metals	chipless shaping	h	RER		24.903
10125 1615 laser machining, metal, with CO2-laser, 2700W power	metals	chipless shaping	h	RER		30.848
10126 1616 laser machining, metal, with CO2-laser, 3200W power	metals	chipless shaping	h	RER		32.631
10127 1617 laser machining, metal, with CO2-laser, 4000W power	metals	chipless shaping	h	RER		39.764
10128 1618 laser machining, metal, with CO2-laser, 5000W power	metals	chipless shaping	h	RER		43.971
10129 1619 laser machining, metal, with CO2-laser, 6000W power	metals	chipless shaping	h	RER		46.349
10134 1620 laser machining, metal, with YAG-laser, 120W power	metals	chipless shaping	h	RER		6.208
10135 1621 laser machining, metal, with YAG-laser, 200W power	metals	chipless shaping	h	RER		8.3794
10130 1622 laser machining, metal, with YAG-laser, 30W power	metals	chipless shaping	h	RER		3.882
10136 1623 laser machining, metal, with YAG-laser, 330W power	metals	chipless shaping	h	RER		14.134
10131 1624 laser machining, metal, with YAG-laser, 40W power	metals	chipless shaping	h	RER		3.882
10137 1625 laser machining, metal, with YAG-laser, 500W power	metals	chipless shaping	h	RER		14.134
10132 1626 laser machining, metal, with YAG-laser, 50W power	metals	chipless shaping	h	RER		4.2702
10133 1627 laser machining, metal, with YAG-laser, 60W power	metals	chipless shaping	h	RER		4.6741
8209 1628 surface treatment, cold impact extrusion, aluminium	metals	chipless shaping	kg	RER		0.1183
8210 1629 surface treatment, cold impact extrusion, steel	metals	chipless shaping	kg	RER		0.28725
8292 1630 warm impact extrusion, steel, 1 stroke	metals	chipless shaping	kg	RER		0.85341
8293 1631 warm impact extrusion, steel, 2 strokes	metals	chipless shaping	kg	RER		0.97584
8294 1632 warm impact extrusion, steel, 3 strokes	metals	chipless shaping	kg	RER		1.0983
8295 1633 warm impact extrusion, steel, 4 strokes	metals	chipless shaping	kg	RER		1.2202
8296 1634 warm impact extrusion, steel, 5 strokes	metals	chipless shaping	kg	RER		1.3425
8207 1635 warming, hot impact extrusion, steel	metals	chipless shaping	kg	RER		0.59267
8208 1636 warming, warm impact extrusion, steel	metals	chipless shaping	kg	RER		0.41671
8320 1637 drilling, CNC, aluminium	metals	chipping	kg	RER		10.335
8322 1638 drilling, CNC, brass	metals	chipping	kg	RER		4.0444
8321 1639 drilling, CNC, cast iron	metals	chipping	kg	RER		3.1637
8319 1640 drilling, CNC, chromium steel	metals	chipping	kg	RER		6.5257
8318 1641 drilling, CNC, steel	metals	chipping	kg	RER		3.6258
8315 1642 drilling, conventional, aluminium	metals	chipping	kg	RER		10.08
8317 1643 drilling, conventional, brass	metals	chipping	kg	RER		3.8558
8316 1644 drilling, conventional, cast iron	metals	chipping	kg	RER		2.9337
8314 1645 drilling, conventional, chromium steel	metals	chipping	kg	RER		6.0647
8313 1646 drilling, conventional, steel	metals	chipping	kg	RER		3.2474
8268 1647 milling, aluminium, average	metals	chipping	kg	RER		10.411
8271 1648 milling, aluminium, dressing	metals	chipping	kg	RER		13.819
8269 1649 milling, aluminium, large parts	metals	chipping	kg	RER		10.293
8270 1650 milling, aluminium, small parts	metals	chipping	kg	RER		11.204
8264 1651 milling, cast iron, average	metals	chipping	kg	RER		3.153
8267 1652 milling, cast iron, dressing	metals	chipping	kg	RER		4.575
8265 1653 milling, cast iron, large parts	metals	chipping	kg	RER		3.1042
8266 1654 milling, cast iron, small parts	metals	chipping	kg	RER		3.4847
8214 1655 milling, chromium steel, average	metals	chipping	kg	RER		6.4788
8211 1656 milling, chromium steel, dressing	metals	chipping	kg	RER		12.917
8213 1657 milling, chromium steel, large parts	metals	chipping	kg	RER		6.2576
8212 1658 milling, chromium steel, small parts	metals	chipping	kg	RER		7.9768
8260 1659 milling, steel, average	metals	chipping	kg	RER		3.586
8263 1660 milling, steel, dressing	metals	chipping	kg	RER		8.1312
8261 1661 milling, steel, large parts	metals	chipping	kg	RER		3.4297
8262 1662 milling, steel, small parts	metals	chipping	kg	RER		4.6477
8251 1663 turning, aluminium, CNC, average	metals	chipping	kg	RER		11.287
8253 1664 turning, aluminium, CNC, primarily dressing	metals	chipping	kg	RER		12.155
8252 1665 turning, aluminium, CNC, primarily roughing	metals	chipping	kg	RER		10.414
8248 1666 turning, aluminium, conventional, average	metals	chipping	kg	RER		10.242
8250 1667 turning, aluminium, conventional, primarily dressing	metals	chipping	kg	RER		10.369
8249 1668 turning, aluminium, conventional, primarily roughing	metals	chipping	kg	RER		10.115
8257 1669 turning, brass, CNC, average	metals	chipping	kg	RER		4.5976
8259 1670 turning, brass, CNC, primarily dressing	metals	chipping	kg	RER		5.072
8258 1671 turning, brass, CNC, primarily roughing	metals	chipping	kg	RER		4.1244
8254 1672 turning, brass, conventional, average	metals	chipping	kg	RER		3.9564
8256 1673 turning, brass, conventional, primarily dressing	metals	chipping	kg	RER		4.0254
8255 1674 turning, brass, conventional, primarily roughing	metals	chipping	kg	RER		3.8873
8245 1675 turning, cast iron, CNC, average	metals	chipping	kg	RER		3.7487
8247 1676 turning, cast iron, CNC, primarily dressing	metals	chipping	kg	RER		4.2956
8246 1677 turning, cast iron, CNC, primarily roughing	metals	chipping	kg	RER		3.2006
8242 1678 turning, cast iron, conventional, average	metals	chipping	kg	RER		3.0308
8244 1679 turning, cast iron, conventional, primarily dressing	metals	chipping	kg	RER		3.1111
8243 1680 turning, cast iron, conventional, primarily roughing	metals	chipping	kg	RER		2.9513
8239 1681 turning, chromium steel, CNC, average	metals	chipping	kg	RER		7.5726
8241 1682 turning, chromium steel, CNC, primarily dressing	metals	chipping	kg	RER		8.7674
8240 1683 turning, chromium steel, CNC, primarily roughing	metals	chipping	kg	RER		6.3753
8236 1684 turning, chromium steel, conventional, average	metals	chipping	kg	RER		6.2002
8238 1685 turning, chromium steel, conventional, primarily dressing	metals	chipping	kg	RER		6.3738
8237 1686 turning, chromium steel, conventional, primarily roughing	metals	chipping	kg	RER		6.0261
8233 1687 turning, steel, CNC, average	metals	chipping	kg	RER		4.3624
8235 1688 turning, steel, CNC, primarily dressing	metals	chipping	kg	RER		5.2065
8234 1689 turning, steel, CNC, primarily roughing	metals	chipping	kg	RER		3.5135
8230 1690 turning, steel, conventional, average	metals	chipping	kg	RER		3.3414
8232 1691 turning, steel, conventional, primarily dressing	metals	chipping	kg	RER		3.4644
8231 1692 turning, steel, conventional, primarily roughing	metals	chipping	kg	RER		3.2177
1112 1693 MG-silicon, at plant	metals	extraction	kg	NO		5.0176
1118 1694 Molybdenum concentrate, main product	metals	extraction	kg	GLO		2.6139
1045 1695 aluminium alloy, AlMg3, at plant	metals	extraction	kg	RER		5.931
1048 1696 aluminium fluoride, at plant	metals	extraction	kg	RER		1.1764

						Ecoinvent IPCC2007 GWP100
Name	Category	Subcategory	Unit	Country		
1052 1697 aluminium scrap, new, at plant	metals	extraction	kg	RER		0.020515
1053 1698 aluminium scrap, old, at plant	metals	extraction	kg	RER		0.25243
1054 1699 aluminium, primary, at plant	metals	extraction	kg	RER		12.376
1055 1700 aluminium, primary, liquid, at plant	metals	extraction	kg	RER		12.222
1056 1701 aluminium, production mix, at plant	metals	extraction	kg	RER		8.6494
1057 1702 aluminium, production mix, cast alloy, at plant	metals	extraction	kg	RER		3.1271
1058 1703 aluminium, production mix, wrought alloy, at plant	metals	extraction	kg	RER		11.18
1059 1704 aluminium, secondary, from new scrap, at plant	metals	extraction	kg	RER		0.41924
1060 1705 aluminium, secondary, from old scrap, at plant	metals	extraction	kg	RER		1.3785
10148 1706 anode slime, silver and tellurium containing, primary copper production	metals	extraction	kg	GLO		3.8356
1061 1707 anode, aluminium electrolysis	metals	extraction	kg	RER		1.0003
11162 1708 antimony, at refinery	metals	extraction	kg	CN		12.916
1063 1709 bauxite, at mine	metals	extraction	kg	GLO		0.0079576
1066 1710 brass, at plant	metals	extraction	kg	CH		2.4581
1067 1711 brazing solder, cadmium free, at plant	metals	extraction	kg	RER		2.594
1068 1712 bronze, at plant	metals	extraction	kg	CH		2.7789
6905 1713 cadmium chloride, semiconductor-grade, at plant	metals	extraction	kg	US		2.9531
10145 1714 cadmium sludge, from zinc electrolysis, at plant	metals	extraction	kg	GLO		0
6904 1715 cadmium sulphide, semiconductor-grade, at plant	metals	extraction	kg	US		4.1176
6906 1716 cadmium telluride, semiconductor-grade, at plant	metals	extraction	kg	US		15.777
7163 1717 cadmium, primary, at plant	metals	extraction	kg	GLO		0.79924
6902 1718 cadmium, semiconductor-grade, at plant	metals	extraction	kg	US		3.8574
1069 1719 cast iron, at plant	metals	extraction	kg	RER		1.5153
1070 1720 cathode, aluminium electrolysis	metals	extraction	kg	RER		2.4732
10147 1721 cathode, copper, primary copper production	metals	extraction	kg	GLO		3.1502
1071 1722 chromite, ore concentrate, at beneficiation	metals	extraction	kg	GLO		0.026383
1072 1723 chromium steel 18/8, at plant	metals	extraction	kg	RER		4.5307
1073 1724 chromium, at regional storage	metals	extraction	kg	RER		26.767
5836 1725 cobalt, at plant	metals	extraction	kg	GLO		8.3067
1076 1726 copper concentrate, at beneficiation	metals	extraction	kg	GLO		0.49399
1077 1727 copper concentrate, at beneficiation	metals	extraction	kg	RNA		0.86035
1078 1728 copper concentrate, at beneficiation	metals	extraction	kg	RLA		0.45524
1079 1729 copper concentrate, at beneficiation	metals	extraction	kg	RER		0.19335
1080 1730 copper concentrate, at beneficiation	metals	extraction	kg	RAS		0.86788
1081 1731 copper concentrate, at beneficiation	metals	extraction	kg	ID		0.40532
1082 1732 copper concentrate, couple production Mo	metals	extraction	kg	GLO		0.45047
10149 1733 copper telluride cement, from copper production	metals	extraction	kg	GLO		0.57092
1093 1734 copper, SX-EW, at refinery	metals	extraction	kg	GLO		5.2409
1074 1735 copper, at regional storage	metals	extraction	kg	RER		1.8926
1075 1736 copper, blister-copper, at primary smelter	metals	extraction	kg	RER		1.5959
10101 1737 copper, from combined metal production, at beneficiation	metals	extraction	kg	SE		0.98857
10100 1738 copper, from combined metal production, at refinery	metals	extraction	kg	SE		1.9337
1083 1739 copper, from imported concentrates, at refinery	metals	extraction	kg	DE		1.0539
1084 1740 copper, primary, at refinery	metals	extraction	kg	GLO		3.1564
1085 1741 copper, primary, at refinery	metals	extraction	kg	RNA		4.8737
1086 1742 copper, primary, at refinery	metals	extraction	kg	RLA		3.2392
1087 1743 copper, primary, at refinery	metals	extraction	kg	RER		1.8545
1088 1744 copper, primary, at refinery	metals	extraction	kg	RAS		4.7946
1139 1745 copper, primary, at refinery	metals	extraction	kg	ID		2.8783
1089 1746 copper, primary, couple production nickel	metals	extraction	kg	GLO		5.0559
1090 1747 copper, primary, from platinum group metal production	metals	extraction	kg	ZA		2.1782
1091 1748 copper, primary, from platinum group metal production	metals	extraction	kg	RU		1.9974
1092 1749 copper, secondary, at refinery	metals	extraction	kg	RER		1.7939
8140 1750 copper, secondary, from electronic and electric scrap recycling, at refinery	metals	extraction	kg	SE		0.10399
1095 1751 ferrochromium, high-carbon, 68% Cr, at plant	metals	extraction	kg	GLO		1.9195
1096 1752 ferrochromium, high-carbon, 68% Cr, at regional storage	metals	extraction	kg	RER		2.1035
1097 1753 ferromanganese, high-coal, 74.5% Mn, at regional storage	metals	extraction	kg	RER		0.97573
1098 1754 ferronickel, 25% Ni, at plant	metals	extraction	kg	GLO		9.2421
6907 1755 gallium, in Bayer liquor from aluminium production, at plant	metals	extraction	kg	GLO		0
6908 1756 gallium, semiconductor-grade, at plant	metals	extraction	kg	GLO		205.21
6909 1757 gallium, semiconductor-grade, at regional storage	metals	extraction	kg	RER		209.98
10110 1758 gold, at refinery	metals	extraction	kg	CA		10835
10111 1759 gold, at refinery	metals	extraction	kg	US		17658
10112 1760 gold, at refinery	metals	extraction	kg	ZA		12741
10113 1761 gold, at refinery	metals	extraction	kg	TZ		14766
10114 1762 gold, at refinery	metals	extraction	kg	AU		14985
10121 1763 gold, at regional storage	metals	extraction	kg	RER		13170
10108 1764 gold, from combined gold-silver production, at refinery	metals	extraction	kg	PG		35762
10109 1765 gold, from combined gold-silver production, at refinery	metals	extraction	kg	CL		44190
10115 1766 gold, from combined gold-silver production, at refinery	metals	extraction	kg	PE		6787.1
10088 1767 gold, from combined metal production, at beneficiation	metals	extraction	kg	SE		3677.1
10107 1768 gold, from combined metal production, at refinery	metals	extraction	kg	SE		9092.5
10120 1769 gold, primary, at refinery	metals	extraction	kg	GLO		18695
8142 1770 gold, secondary, at precious metal refinery	metals	extraction	kg	SE		851.41
7164 1771 indium, at regional storage	metals	extraction	kg	RER		153.99
1099 1772 iron ore, 46% Fe, at mine	metals	extraction	kg	GLO		0.0047695
1100 1773 iron ore, 65% Fe, at beneficiation	metals	extraction	kg	GLO		0.017853
1101 1774 iron scrap, at plant	metals	extraction	kg	RER		0.041334
1102 1775 iron sulphate, at plant	metals	extraction	kg	RER		0.16752
6946 1776 iron-nickel-chromium alloy, at plant	metals	extraction	kg	RER		4.6264
10144 1777 leaching residues, indium rich, from zinc circuit, at smelter	metals	extraction	kg	GLO		0.013947
1104 1778 lead concentrate, at beneficiation	metals	extraction	kg	GLO		0.29437
1103 1779 lead, at regional storage	metals	extraction	kg	RER		1.0523
10103 1780 lead, from combined metal production, at beneficiation	metals	extraction	kg	SE		0.27116
10102 1781 lead, from combined metal production, at refinery	metals	extraction	kg	SE		0.51425
10777 1782 lead, primary, at plant	metals	extraction	kg	GLO		2.1129
10150 1783 lead, secondary, at plant	metals	extraction	kg	RER		0.65353
8138 1784 lead, secondary, from electronic and electric scrap recycling, at plant	metals	extraction	kg	SE		0.034705
7224 1785 lithium, at plant	metals	extraction	kg	GLO		18.713
1106 1786 magnesium, at plant	metals	extraction	kg	RER		73.761
1107 1787 magnesium-alloy, AZ91, at plant	metals	extraction	kg	RER		67.642
1108 1788 magnesium-alloy, AZ91, diecasting, at plant	metals	extraction	kg	RER		137.1
1110 1789 manganese concentrate, at beneficiation	metals	extraction	kg	GLO		0.014838
1109 1790 manganese, at regional storage	metals	extraction	kg	RER		2.5926
1111 1791 mercury, liquid, at plant	metals	extraction	kg	GLO		12.144
8139 1792 metal values from electric waste, in blister-copper, at converter	metals	extraction	kg	SE		1.087
1115 1793 molybdenite, at plant	metals	extraction	kg	GLO		2.8117
1117 1794 molybdenum concentrate, couple production Cu	metals	extraction	kg	GLO		2.9556
5856 1795 molybdenum concentrate, couple production Cu	metals	extraction	kg	RNA		5.1475
5857 1796 molybdenum concentrate, couple production Cu	metals	extraction	kg	RLA		2.7237
5858 1797 molybdenum concentrate, couple production Cu	metals	extraction	kg	RER		1.1568
5859 1798 molybdenum concentrate, couple production Cu	metals	extraction	kg	RAS		5.1926
5860 1799 molybdenum concentrate, couple production Cu	metals	extraction	kg	ID		2.4251
1116 1800 molybdenum, at regional storage	metals	extraction	kg	RER		7.674
1121 1801 nickel, 99.5%, at plant	metals	extraction	kg	GLO		10.869
1124 1802 nickel, primary, from platinum group metal production	metals	extraction	kg	ZA		7.3608



						Ecoinvent IPCC2007 GWP100
Name	Category	Subcategory	Unit	Country		
1125	1803 nickel, primary, from platinum group metal production	metals	extraction	kg	RU	6.6851
8149	1804 nickel, secondary, from electronic and electric scrap recycling, at refinery	metals	extraction	kg	SE	1.6958
1127	1805 palladium, at regional storage	metals	extraction	kg	REZ	9731.7
1128	1806 palladium, primary, at refinery	metals	extraction	kg	ZA	10647
1129	1807 palladium, primary, at refinery	metals	extraction	kg	RU	9729.4
8143	1808 palladium, secondary, at precious metal refinery	metals	extraction	kg	SE	445.96
1130	1809 palladium, secondary, at refinery	metals	extraction	kg	REZ	756.78
10143	1810 parkes process crust, from desilverising of lead	metals	extraction	kg	GLO	8.9295
1131	1811 pellets, iron, at plant	metals	extraction	kg	GLO	0.08609
1132	1812 pig iron, at plant	metals	extraction	kg	GLO	1.5612
1133	1813 platinum, at regional storage	metals	extraction	kg	REZ	14820
1134	1814 platinum, primary, at refinery	metals	extraction	kg	ZA	15835
1135	1815 platinum, primary, at refinery	metals	extraction	kg	RU	14478
1136	1816 platinum, secondary, at refinery	metals	extraction	kg	REZ	756.64
8141	1817 precious metals from electric waste, in anode slime, at refinery	metals	extraction	kg	SE	59.071
1137	1818 recultivation, bauxite mine	metals	extraction	m2	GLO	12.057
1138	1819 recultivation, iron mine	metals	extraction	m2	GLO	549.55
1141	1820 reinforcing steel, at plant	metals	extraction	kg	REZ	1.481
10964	1821 resource correction, CuMo, copper, negative	metals	extraction	kg	GLO	0
10963	1822 resource correction, CuMo, copper, positive	metals	extraction	kg	GLO	0
10972	1823 resource correction, PbZn, cadmium, negative	metals	extraction	kg	GLO	0
10971	1824 resource correction, PbZn, cadmium, positive	metals	extraction	kg	GLO	0
10974	1825 resource correction, PbZn, indium, negative	metals	extraction	kg	GLO	0
10973	1826 resource correction, PbZn, indium, positive	metals	extraction	kg	GLO	0
10968	1827 resource correction, PbZn, lead, negative	metals	extraction	kg	GLO	0
10967	1828 resource correction, PbZn, lead, positive	metals	extraction	kg	GLO	0
10966	1829 resource correction, PbZn, silver, negative	metals	extraction	kg	GLO	0
10965	1830 resource correction, PbZn, silver, positive	metals	extraction	kg	GLO	0
10970	1831 resource correction, PbZn, zinc, negative	metals	extraction	kg	GLO	0
10969	1832 resource correction, PbZn, zinc, positive	metals	extraction	kg	GLO	0
1142	1833 rhodium, at regional storage	metals	extraction	kg	REZ	29001
1143	1834 rhodium, primary, at refinery	metals	extraction	kg	ZA	34685
1144	1835 rhodium, primary, at refinery	metals	extraction	kg	RU	31712
1145	1836 rhodium, secondary, at refinery	metals	extraction	kg	REZ	762.67
10153	1837 silver, at regional storage	metals	extraction	kg	REZ	100.46
10116	1838 silver, from combined gold-silver production, at refinery	metals	extraction	kg	PE	111.95
10117	1839 silver, from combined gold-silver production, at refinery	metals	extraction	kg	CL	757.32
10118	1840 silver, from combined gold-silver production, at refinery	metals	extraction	kg	PG	863.64
10122	1841 silver, from combined gold-silver production, at refinery	metals	extraction	kg	GLO	439.16
10097	1842 silver, from combined metal production, at beneficiation	metals	extraction	kg	SE	62.745
10768	1843 silver, from combined metal production, at refinery	metals	extraction	kg	SE	155.52
10151	1844 silver, from copper production, at refinery	metals	extraction	kg	GLO	20.206
10152	1845 silver, from lead production, at refinery	metals	extraction	kg	GLO	55.082
8144	1846 silver, secondary, at precious metal refinery	metals	extraction	kg	SE	14.586
1147	1847 sinter, iron, at plant	metals	extraction	kg	GLO	0.38981
1148	1848 soft solder, Sn97Cu3, at plant	metals	extraction	kg	REZ	15.97
10782	1849 solder, bar, Sn63Pb37, for electronics industry, at plant	metals	extraction	kg	GLO	11.437
10784	1850 solder, bar, Sn95.5Ag3.9Cu0.6, for electronics industry, at plant	metals	extraction	kg	GLO	20.601
10783	1851 solder, paste, Sn63Pb37, for electronics industry, at plant	metals	extraction	kg	GLO	17.218
10785	1852 solder, paste, Sn95.5Ag3.9Cu0.6, for electronics industry, at plant	metals	extraction	kg	GLO	26.331
1149	1853 steel, converter, chromium steel 18/8, at plant	metals	extraction	kg	REZ	4.4768
1150	1854 steel, converter, low-alloyed, at plant	metals	extraction	kg	REZ	2.092
1151	1855 steel, converter, unalloyed, at plant	metals	extraction	kg	REZ	1.6579
1152	1856 steel, electric, chromium steel 18/8, at plant	metals	extraction	kg	REZ	3.8665
1153	1857 steel, electric, un- and low-alloyed, at plant	metals	extraction	kg	REZ	0.42364
1154	1858 steel, low-alloyed, at plant	metals	extraction	kg	REZ	1.7545
8054	1859 tantalum, powder, capacitor-grade, at regional storage	metals	extraction	kg	GLO	260.25
6903	1860 tellurium, semiconductor-grade, at plant	metals	extraction	kg	GLO	7.518
7125	1861 tin plated chromium steel sheet, 2 mm, at plant	metals	extraction	m2	REZ	82.713
1155	1862 tin, at regional storage	metals	extraction	kg	REZ	17.146
7124	1863 titanium zinc plate, without pre-weathering, at plant	metals	extraction	kg	DE	5.1146
10234	1864 zinc, from Imperial smelting furnace	metals	extraction	kg	GLO	2.7359
1157	1865 zinc concentrate, at beneficiation	metals	extraction	kg	GLO	0.45089
10099	1866 zinc, from combined metal production, at beneficiation	metals	extraction	kg	SE	0.41459
10098	1867 zinc, from combined metal production, at refinery	metals	extraction	kg	SE	0.81078
1156	1868 zinc, primary, at regional storage	metals	extraction	kg	REZ	3.3764
8312	1869 aluminium product manufacturing, average metal working	metals	general manufacturing	kg	REZ	3.369
8311	1870 chromium steel product manufacturing, average metal working	metals	general manufacturing	kg	REZ	2.4341
8339	1871 copper product manufacturing, average metal working	metals	general manufacturing	kg	REZ	1.8352
10123	1872 degreasing, metal part in alkaline bath	metals	general manufacturing	m2	REZ	5.0125
8215	1873 metal product manufacturing, average metal working	metals	general manufacturing	kg	REZ	1.8708
10141	1874 metal working factory operation, average heat energy	metals	general manufacturing	kg	REZ	0.26724
8335	1875 metal working factory operation, heat energy from hard coal	metals	general manufacturing	kg	REZ	0.30857
8337	1876 metal working factory operation, heat energy from heavy fuel oil	metals	general manufacturing	kg	REZ	0.28916
8336	1877 metal working factory operation, heat energy from light fuel oil	metals	general manufacturing	kg	REZ	0.28436
8338	1878 metal working factory operation, heat energy from natural gas	metals	general manufacturing	kg	REZ	0.26017
10139	1879 metal working machine operation, average process heat	metals	general manufacturing	kg	REZ	1.0913
8331	1880 metal working machine operation, process heat from hard coal	metals	general manufacturing	kg	REZ	1.2147
8333	1881 metal working machine operation, process heat from heavy fuel oil	metals	general manufacturing	kg	REZ	1.146
8332	1882 metal working machine operation, process heat from light fuel oil	metals	general manufacturing	kg	REZ	1.129
8334	1883 metal working machine operation, process heat from natural gas	metals	general manufacturing	kg	REZ	1.0435
8310	1884 steel product manufacturing, average metal working	metals	general manufacturing	kg	REZ	1.8039
1158	1885 anodising, aluminium sheet	metals	processing	m2	REZ	4.071
1159	1886 casting, brass	metals	processing	kg	CH	0.063214
1160	1887 casting, bronze	metals	processing	kg	CH	0.064278
6046	1888 coating powder, at plant	metals	processing	kg	REZ	7.4047
1161	1889 contour, brass	metals	processing	kg	REZ	1.2511
1162	1890 contour, bronze	metals	processing	kg	REZ	1.2638
1163	1891 drawing of pipes, steel	metals	processing	kg	REZ	0.44074
1164	1892 enamelling	metals	processing	m2	REZ	8.679
1165	1893 hot rolling, steel	metals	processing	kg	REZ	0.27978
1166	1894 powder coating, aluminium sheet	metals	processing	m2	REZ	3.7845
1167	1895 powder coating, steel	metals	processing	m2	REZ	4.5746
1169	1896 section bar extrusion, aluminium	metals	processing	kg	REZ	1.0318
1170	1897 section bar rolling, steel	metals	processing	kg	REZ	0.20034
1171	1898 sheet rolling, aluminium	metals	processing	kg	REZ	0.60649
1172	1899 sheet rolling, chromium steel	metals	processing	kg	REZ	0.55734
1173	1900 sheet rolling, copper	metals	processing	kg	REZ	1.1969
1174	1901 sheet rolling, steel	metals	processing	kg	REZ	0.36046
7127	1902 tin plating, pieces	metals	processing	m2	REZ	3.3391
1175	1903 welding, arc, aluminium	metals	processing	m	REZ	0.20024
1176	1904 welding, arc, steel	metals	processing	m	REZ	0.12351
1177	1905 welding, gas, steel	metals	processing	m	REZ	0.15627
1178	1906 wire drawing, copper	metals	processing	kg	REZ	2.1622
1179	1907 wire drawing, steel	metals	processing	kg	REZ	0.40068
1180	1908 zinc coating, coils	metals	processing	m2	REZ	4.4441

						Ecoinvent IPCC2007 GWP100
Name	Category	Subcategory	Unit	Country		
1181 1909 zinc coating, pieces	metals	processing	m2	RER		6.2011
1182 1910 zinc coating, pieces, adjustment per um	metals	processing	m2	RER		0.052185
1184 1911 selective coating, aluminium sheet, nickel pigmented aluminium oxide	metals	refinement	m2	SK		5.648
1185 1912 selective coating, copper sheet, black chrome	metals	refinement	m2	RER		2.1741
1186 1913 selective coating, copper sheet, black majic	metals	refinement	m2	US		1.5692
1187 1914 selective coating, copper sheet, physical vapour deposition	metals	refinement	m2	DE		0.84578
1188 1915 selective coating, copper sheet, sputtering	metals	refinement	m2	DE		2.8913
1189 1916 selective coating, stainless steel sheet, black chrome	metals	refinement	m2	CH		0.62627
1190 1917 silicon, electronic grade, at plant	metals	refinement	kg	DE		86.212
1191 1918 silicon, electronic grade, off-grade, at plant	metals	refinement	kg	DE		27.064
1192 1919 silicon, multi-Si, casted, at plant	metals	refinement	kg	RER		63.236
6874 1920 silicon, production mix, photovoltaics, at plant	metals	refinement	kg	GLO		46.001
1194 1921 silicon, solar grade, modified Siemens process, at plant	metals	refinement	kg	RER		39.94
535 1922 acrylic filler, at plant	mortar and plaster	production	kg	RER		0.40948
9242 1923 adhesive mortar, at plant	mortar and plaster	production	kg	CH		1.0885
9241 1924 anhydrite floor, at plant	mortar and plaster	production	kg	CH		0.94212
536 1925 base plaster, at plant	mortar and plaster	production	kg	CH		0.21253
537 1926 cement mortar, at plant	mortar and plaster	production	kg	CH		0.19006
538 1927 clay plaster, at plant	mortar and plaster	production	kg	CH		0.018776
539 1928 cobwork, at plant	mortar and plaster	production	kg	CH		0.0040505
540 1929 cover coat, mineral, at plant	mortar and plaster	production	kg	CH		0.079907
541 1930 cover coat, organic, at plant	mortar and plaster	production	kg	CH		0.18718
542 1931 light mortar, at plant	mortar and plaster	production	kg	CH		0.46117
543 1932 lime mortar, at plant	mortar and plaster	production	kg	CH		0.60039
544 1933 plaster mixing	mortar and plaster	production	kg	CH		0.0098139
545 1934 thermal plaster, at plant	mortar and plaster	production	kg	CH		0.76878
1245 1935 electricity, at Mini CHP plant, allocation energy	natural gas	cogeneration	kWh	CH		0.29853
1246 1936 electricity, at Mini CHP plant, allocation energy	natural gas	cogeneration	kWh	CH		0.77589
1247 1937 electricity, at Mini CHP plant, allocation heat	natural gas	cogeneration	kWh	CH		0.0014986
1220 1938 electricity, at cogen 160kWe Jakobsberg, allocation electricity	natural gas	cogeneration	kWh	CH		0.97626
1221 1939 electricity, at cogen 160kWe Jakobsberg, allocation energy	natural gas	cogeneration	kWh	CH		0.35197
1222 1940 electricity, at cogen 160kWe Jakobsberg, allocation exergy	natural gas	cogeneration	kWh	CH		0.74215
1223 1941 electricity, at cogen 160kWe Jakobsberg, allocation heat	natural gas	cogeneration	kWh	CH		0.00080702
1224 1942 electricity, at cogen 160kWe Jakobsberg, allocation price	natural gas	cogeneration	kWh	CH		0.63485
1225 1943 electricity, at cogen 160kWe lambda=1, allocation electricity	natural gas	cogeneration	kWh	CH		0.82362
1226 1944 electricity, at cogen 160kWe lambda=1, allocation energy	natural gas	cogeneration	kWh	CH		0.30517
1227 1945 electricity, at cogen 160kWe lambda=1, allocation exergy	natural gas	cogeneration	kWh	CH		0.63434
1228 1946 electricity, at cogen 160kWe lambda=1, allocation heat	natural gas	cogeneration	kWh	CH		0.00068084
1229 1947 electricity, at cogen 160kWe lambda=1, allocation price	natural gas	cogeneration	kWh	CH		0.54382
1230 1948 electricity, at cogen 1MWe lean burn, allocation energy	natural gas	cogeneration	kWh	CH		0.32725
1231 1949 electricity, at cogen 1MWe lean burn, allocation energy	natural gas	cogeneration	kWh	RER		0.32514
1232 1950 electricity, at cogen 1MWe lean burn, allocation exergy	natural gas	cogeneration	kWh	CH		0.59726
1233 1951 electricity, at cogen 1MWe lean burn, allocation exergy	natural gas	cogeneration	kWh	RER		0.59341
1234 1952 electricity, at cogen 1MWe lean burn, allocation heat	natural gas	cogeneration	kWh	CH		0.00039608
1235 1953 electricity, at cogen 1MWe lean burn, allocation heat	natural gas	cogeneration	kWh	RER		0.00039608
1236 1954 electricity, at cogen 200kWe lean burn, allocation energy	natural gas	cogeneration	kWh	CH		0.32145
1237 1955 electricity, at cogen 200kWe lean burn, allocation exergy	natural gas	cogeneration	kWh	CH		0.65052
1238 1956 electricity, at cogen 200kWe lean burn, allocation heat	natural gas	cogeneration	kWh	CH		0.0006046
1239 1957 electricity, at cogen 500kWe lean burn, allocation energy	natural gas	cogeneration	kWh	CH		0.33205
1240 1958 electricity, at cogen 500kWe lean burn, allocation exergy	natural gas	cogeneration	kWh	CH		0.61842
1241 1959 electricity, at cogen 500kWe lean burn, allocation heat	natural gas	cogeneration	kWh	CH		0.000464
1242 1960 electricity, at cogen 50kWe lean burn, allocation energy	natural gas	cogeneration	kWh	CH		0.32752
1243 1961 electricity, at cogen 50kWe lean burn, allocation exergy	natural gas	cogeneration	kWh	CH		0.69956
1244 1962 electricity, at cogen 50kWe lean burn, allocation heat	natural gas	cogeneration	kWh	CH		0.00085656
6918 1963 electricity, natural gas, allocation exergy, at PEM fuel cell 2kWe, future	natural gas	cogeneration	kWh	CH		0.71961
6923 1964 electricity, natural gas, allocation exergy, at SOFC fuel cell 125kWe, future	natural gas	cogeneration	kWh	CH		0.5006
6928 1965 electricity, natural gas, allocation exergy, at SOFC-GT fuel cell 180kWe, future	natural gas	cogeneration	kWh	CH		0.42637
6913 1966 electricity, natural gas, allocation exergy, at micro gas turbine 100kWe	natural gas	cogeneration	kWh	CH		0.70463
1284 1967 heat, at Mini CHP plant, allocation energy	natural gas	cogeneration	MJ	CH		0.08285
1285 1968 heat, at Mini CHP plant, allocation exergy	natural gas	cogeneration	MJ	CH		0.031883
1286 1969 heat, at Mini CHP plant, allocation heat	natural gas	cogeneration	MJ	CH		0.11456
1254 1970 heat, at cogen 160kWe Jakobsberg, allocation electricity	natural gas	cogeneration	MJ	CH		0.00016916
1255 1971 heat, at cogen 160kWe Jakobsberg, allocation energy	natural gas	cogeneration	MJ	CH		0.095724
1256 1972 heat, at cogen 160kWe Jakobsberg, allocation exergy	natural gas	cogeneration	MJ	CH		0.036002
1257 1973 heat, at cogen 160kWe Jakobsberg, allocation heat	natural gas	cogeneration	MJ	CH		0.14947
1258 1974 heat, at cogen 160kWe Jakobsberg, allocation price	natural gas	cogeneration	MJ	CH		0.052426
1259 1975 heat, at cogen 160kWe lambda=1, allocation electricity	natural gas	cogeneration	MJ	CH		0.00015071
1260 1976 heat, at cogen 160kWe lambda=1, allocation energy	natural gas	cogeneration	MJ	CH		0.083951
1261 1977 heat, at cogen 160kWe lambda=1, allocation exergy	natural gas	cogeneration	MJ	CH		0.030745
1262 1978 heat, at cogen 160kWe lambda=1, allocation heat	natural gas	cogeneration	MJ	CH		0.13317
1263 1979 heat, at cogen 160kWe lambda=1, allocation price	natural gas	cogeneration	MJ	CH		0.045376
1264 1980 heat, at cogen 1MWe lean burn, allocation energy	natural gas	cogeneration	MJ	CH		0.09254
1265 1981 heat, at cogen 1MWe lean burn, allocation exergy	natural gas	cogeneration	MJ	RER		0.091945
1266 1982 heat, at cogen 1MWe lean burn, allocation exergy	natural gas	cogeneration	MJ	CH		0.027493
1267 1983 heat, at cogen 1MWe lean burn, allocation exergy	natural gas	cogeneration	MJ	RER		0.027316
1268 1984 heat, at cogen 1MWe lean burn, allocation heat	natural gas	cogeneration	MJ	CH		0.17128
1269 1985 heat, at cogen 1MWe lean burn, allocation heat	natural gas	cogeneration	MJ	RER		0.17018
1270 1986 heat, at cogen 200kWe lean burn, allocation energy	natural gas	cogeneration	MJ	CH		0.088642
1271 1987 heat, at cogen 200kWe lean burn, allocation exergy	natural gas	cogeneration	MJ	CH		0.030612
1272 1988 heat, at cogen 200kWe lean burn, allocation heat	natural gas	cogeneration	MJ	CH		0.14522
1273 1989 heat, at cogen 500kWe lean burn, allocation energy	natural gas	cogeneration	MJ	CH		0.091866
1274 1990 heat, at cogen 500kWe lean burn, allocation exergy	natural gas	cogeneration	MJ	CH		0.029612
1275 1991 heat, at cogen 500kWe lean burn, allocation heat	natural gas	cogeneration	MJ	CH		0.16395
1276 1992 heat, at cogen 50kWe lean burn, allocation energy	natural gas	cogeneration	MJ	CH		0.089797
1277 1993 heat, at cogen 50kWe lean burn, allocation exergy	natural gas	cogeneration	MJ	CH		0.032407
1278 1994 heat, at cogen 50kWe lean burn, allocation heat	natural gas	cogeneration	MJ	CH		0.14019
1279 1995 heat, at local distribution cogen 160kWe Jakobsberg, allocation electricity	natural gas	cogeneration	MJ	CH		0.048817
1280 1996 heat, at local distribution cogen 160kWe Jakobsberg, allocation energy	natural gas	cogeneration	MJ	CH		0.091001
1281 1997 heat, at local distribution cogen 160kWe Jakobsberg, allocation exergy	natural gas	cogeneration	MJ	CH		0.064636
1282 1998 heat, at local distribution cogen 160kWe Jakobsberg, allocation heat	natural gas	cogeneration	MJ	CH		0.11473
1283 1999 heat, at local distribution cogen 160kWe Jakobsberg, allocation price	natural gas	cogeneration	MJ	CH		0.071886
1287 2000 heat, at module cogen 160kWe Jakobsberg, allocation electricity	natural gas	cogeneration	MJ	CH		0.013424
1288 2001 heat, at module cogen 160kWe Jakobsberg, allocation energy	natural gas	cogeneration	MJ	CH		0.079751
1289 2002 heat, at module cogen 160kWe Jakobsberg, allocation exergy	natural gas	cogeneration	MJ	CH		0.038297
1290 2003 heat, at module cogen 160kWe Jakobsberg, allocation heat	natural gas	cogeneration	MJ	CH		0.11706
1291 2004 heat, at module cogen 160kWe Jakobsberg, allocation price	natural gas	cogeneration	MJ	CH		0.049697
1292 2005 heat, at system cogen 160kWe Jakobsberg, allocation electricity	natural gas	cogeneration	MJ	CH		0.045602
1293 2006 heat, at system cogen 160kWe Jakobsberg, allocation energy	natural gas	cogeneration	MJ	CH		0.085398
1294 2007 heat, at system cogen 160kWe Jakobsberg, allocation exergy	natural gas	cogeneration	MJ	CH		0.060526
1295 2008 heat, at system cogen 160kWe Jakobsberg, allocation heat	natural gas	cogeneration	MJ	CH		0.10778
1296 2009 heat, at system cogen 160kWe Jakobsberg, allocation price	natural gas	cogeneration	MJ	CH		0.067366
6916 2010 heat, natural gas, allocation exergy, at PEM fuel cell 2kWe, future	natural gas	cogeneration	MJ	CH		0.020465
6921 2011 heat, natural gas, allocation exergy, at SOFC fuel cell 125kWe, future	natural gas	cogeneration	MJ	CH		0.023642
6926 2012 heat, natural gas, allocation exergy, at SOFC-GT fuel cell 180kWe, future	natural gas	cogeneration	MJ	CH		0.020135
6911 2013 heat, natural gas, allocation exergy, at micro gas turbine 100kWe	natural gas	cogeneration	MJ	CH		0.03328
6939 2014 maintenance PEM fuel cell 2kWe	natural gas	cogeneration	unit	CH		73.278

						Ecoinvent	
						IPCC2007	
						GWP100	
Name	Category	Subcategory	Unit	Country			
6940	2015 maintenance SOFC fuel cell 125kWe, future	natural gas	cogeneration	unit	CH		3032.3
6941	2016 maintenance SOFC-GT fuel cell 180kWe, future	natural gas	cogeneration	unit	CH		3138.1
6938	2017 maintenance micro gas turbine 100kWe	natural gas	cogeneration	unit	CH		192.35
1300	2018 maintenance, Mini CHP plant	natural gas	cogeneration	unit	CH		660.09
1299	2019 maintenance, cogen unit 160kWe	natural gas	cogeneration	unit	RER		31517
1311	2020 natural gas, burned in Mini CHP plant	natural gas	cogeneration	MJ	CH		0.07457
1304	2021 natural gas, burned in cogen 160kWe Jakobsberg	natural gas	cogeneration	MJ	CH		0.073303
1305	2022 natural gas, burned in cogen 160kWe lambda=1	natural gas	cogeneration	MJ	CH		0.073303
1306	2023 natural gas, burned in cogen 1MWe lean burn	natural gas	cogeneration	MJ	CH		0.075406
1307	2024 natural gas, burned in cogen 1MWe lean burn	natural gas	cogeneration	MJ	RER		0.074921
1308	2025 natural gas, burned in cogen 200kWe lean burn	natural gas	cogeneration	MJ	CH		0.075571
1309	2026 natural gas, burned in cogen 500kWe lean burn	natural gas	cogeneration	MJ	CH		0.075464
1310	2027 natural gas, burned in cogen 50kWe lean burn	natural gas	cogeneration	MJ	CH		0.075773
11053	2028 natural gas, at consumer	natural gas	fuels	MJ	RNA		0.013994
6154	2029 natural gas, from high pressure network (1-5 bar), at service station	natural gas	fuels	kg	CH		0.58468
6156	2030 natural gas, from low pressure network (<0.1 bar), at service station	natural gas	fuels	kg	CH		0.82081
6155	2031 natural gas, from medium pressure network (0.1-1 bar), at service station	natural gas	fuels	kg	CH		0.6027
1319	2032 natural gas, high pressure, at consumer	natural gas	fuels	MJ	CH		0.011565
1320	2033 natural gas, high pressure, at consumer	natural gas	fuels	MJ	RER		0.011479
1321	2034 natural gas, high pressure, at consumer	natural gas	fuels	MJ	BE		0.0037054
1322	2035 natural gas, high pressure, at consumer	natural gas	fuels	MJ	DE		0.012165
1323	2036 natural gas, high pressure, at consumer	natural gas	fuels	MJ	FR		0.012284
1324	2037 natural gas, high pressure, at consumer	natural gas	fuels	MJ	IT		0.01224
1325	2038 natural gas, high pressure, at consumer	natural gas	fuels	MJ	NL		0.0030222
1326	2039 natural gas, high pressure, at consumer	natural gas	fuels	MJ	AT		0.022258
1327	2040 natural gas, high pressure, at consumer	natural gas	fuels	MJ	ES		0.010272
1328	2041 natural gas, high pressure, at consumer	natural gas	fuels	MJ	CZ		0.020773
1329	2042 natural gas, high pressure, at consumer	natural gas	fuels	MJ	DK		0.0041867
1330	2043 natural gas, high pressure, at consumer	natural gas	fuels	MJ	FI		0.022864
1331	2044 natural gas, high pressure, at consumer	natural gas	fuels	MJ	GR		0.023485
1332	2045 natural gas, high pressure, at consumer	natural gas	fuels	MJ	HU		0.022528
1333	2046 natural gas, high pressure, at consumer	natural gas	fuels	MJ	IE		0.0043713
1334	2047 natural gas, high pressure, at consumer	natural gas	fuels	MJ	SE		0.0043547
1335	2048 natural gas, high pressure, at consumer	natural gas	fuels	MJ	SK		0.023662
1336	2049 natural gas, high pressure, at consumer	natural gas	fuels	MJ	GB		0.0019928
10771	2050 natural gas, high pressure, at consumer	natural gas	fuels	MJ	JP		0.022729
1337	2051 natural gas, low pressure, at consumer	natural gas	fuels	MJ	CH		0.015231
6153	2052 natural gas, production mix, at service station	natural gas	fuels	kg	CH		0.59048
1342	2053 heat, natural gas, at boiler atm. low-NOx condensing non-modulating <100kW	natural gas	heating systems	MJ	RER		0.075033
1343	2054 heat, natural gas, at boiler atmospheric low-NOx non-modulating <100kW	natural gas	heating systems	MJ	RER		0.081785
1344	2055 heat, natural gas, at boiler atmospheric non-modulating <100kW	natural gas	heating systems	MJ	RER		0.077207
1345	2056 heat, natural gas, at boiler condensing modulating <100kW	natural gas	heating systems	MJ	RER		0.071875
1346	2057 heat, natural gas, at boiler condensing modulating >100kW	natural gas	heating systems	MJ	RER		0.067004
1347	2058 heat, natural gas, at boiler fan burner low-NOx non-modulating <100kW	natural gas	heating systems	MJ	RER		0.085096
1348	2059 heat, natural gas, at boiler fan burner non-modulating <100kW	natural gas	heating systems	MJ	RER		0.077738
1349	2060 heat, natural gas, at boiler modulating <100kW	natural gas	heating systems	MJ	RER		0.076279
1350	2061 heat, natural gas, at boiler modulating >100kW	natural gas	heating systems	MJ	RER		0.071104
1351	2062 heat, natural gas, at industrial furnace >100kW	natural gas	heating systems	MJ	RER		0.071663
1352	2063 heat, natural gas, at industrial furnace low-NOx >100kW	natural gas	heating systems	MJ	RER		0.077798
1354	2064 natural gas, burned in boiler atm. low-NOx condensing non-modulating <100kW	natural gas	heating systems	MJ	RER		0.075033
1355	2065 natural gas, burned in boiler atmospheric burner non-modulating <100kW	natural gas	heating systems	MJ	RER		0.072837
1356	2066 natural gas, burned in boiler atmospheric low-NOx non-modulating <100kW	natural gas	heating systems	MJ	RER		0.075033
1357	2067 natural gas, burned in boiler condensing modulating <100kW	natural gas	heating systems	MJ	RER		0.073342
1358	2068 natural gas, burned in boiler condensing modulating >100kW	natural gas	heating systems	MJ	RER		0.068371
1359	2069 natural gas, burned in boiler fan burner low-NOx non-modulating <100kW	natural gas	heating systems	MJ	RER		0.076663
1360	2070 natural gas, burned in boiler fan burner non-modulating <100kW	natural gas	heating systems	MJ	RER		0.073338
1361	2071 natural gas, burned in boiler modulating <100kW	natural gas	heating systems	MJ	RER		0.073345
1362	2072 natural gas, burned in boiler modulating >100kW	natural gas	heating systems	MJ	RER		0.068369
1363	2073 natural gas, burned in industrial furnace >100kW	natural gas	heating systems	MJ	RER		0.068251
1364	2074 natural gas, burned in industrial furnace low-NOx >100kW	natural gas	heating systems	MJ	RER		0.070089
5877	2075 blast furnace gas, burned in power plant	natural gas	power plants	MJ	RER		0.20038
5876	2076 coke oven gas, burned in power plant	natural gas	power plants	MJ	RER		0.075118
1365	2077 electricity, industrial gas, at power plant	natural gas	power plants	kWh	AT		0.8864
1366	2078 electricity, industrial gas, at power plant	natural gas	power plants	kWh	BE		1.741
1367	2079 electricity, industrial gas, at power plant	natural gas	power plants	kWh	CENTREL		2.2209
1368	2080 electricity, industrial gas, at power plant	natural gas	power plants	kWh	DE		1.507
1369	2081 electricity, industrial gas, at power plant	natural gas	power plants	kWh	ES		1.4276
1370	2082 electricity, industrial gas, at power plant	natural gas	power plants	kWh	FR		2.0306
1371	2083 electricity, industrial gas, at power plant	natural gas	power plants	kWh	IT		2.0241
1372	2084 electricity, industrial gas, at power plant	natural gas	power plants	kWh	NL		2.0238
1373	2085 electricity, industrial gas, at power plant	natural gas	power plants	kWh	NORDEL		1.3237
1374	2086 electricity, industrial gas, at power plant	natural gas	power plants	kWh	UCTE		1.7598
1375	2087 electricity, natural gas, at combined cycle plant, best technology	natural gas	power plants	kWh	RER		0.42533
1376	2088 electricity, natural gas, at power plant	natural gas	power plants	kWh	UCTE		0.64324
1377	2089 electricity, natural gas, at power plant	natural gas	power plants	kWh	AT		0.80726
1378	2090 electricity, natural gas, at power plant	natural gas	power plants	kWh	BE		0.52689
1379	2091 electricity, natural gas, at power plant	natural gas	power plants	kWh	ES		0.51516
1380	2092 electricity, natural gas, at power plant	natural gas	power plants	kWh	FR		0.48815
1381	2093 electricity, natural gas, at power plant	natural gas	power plants	kWh	IT		0.65954
1382	2094 electricity, natural gas, at power plant	natural gas	power plants	kWh	LU		0.99742
1383	2095 electricity, natural gas, at power plant	natural gas	power plants	kWh	NL		0.58564
1384	2096 electricity, natural gas, at power plant	natural gas	power plants	kWh	DE		0.56273
1385	2097 electricity, natural gas, at power plant	natural gas	power plants	kWh	CENTREL		0.9144
1386	2098 electricity, natural gas, at power plant	natural gas	power plants	kWh	NORDEL		0.59804
1387	2099 electricity, natural gas, at power plant	natural gas	power plants	kWh	GB		0.48385
6696	2100 electricity, natural gas, at power plant	natural gas	power plants	kWh	JP		0.73069
7310	2101 electricity, natural gas, at power plant	natural gas	power plants	kWh	US		0.68463
11041	2102 electricity, natural gas, at power plant	natural gas	power plants	kWh	ASCC		0.81732
11042	2103 electricity, natural gas, at power plant	natural gas	power plants	kWh	ERCOT		0.66468
11043	2104 electricity, natural gas, at power plant	natural gas	power plants	kWh	FRCC		0.93316
11044	2105 electricity, natural gas, at power plant	natural gas	power plants	kWh	MRO		0.8276
11045	2106 electricity, natural gas, at power plant	natural gas	power plants	kWh	NPCC		0.68423
11046	2107 electricity, natural gas, at power plant	natural gas	power plants	kWh	RFC		0.70909
11047	2108 electricity, natural gas, at power plant	natural gas	power plants	kWh	SERC		0.66468
11048	2109 electricity, natural gas, at power plant	natural gas	power plants	kWh	SPP		0.66019
11049	2110 electricity, natural gas, at power plant	natural gas	power plants	kWh	WECC		0.67668
1388	2111 electricity, natural gas, at turbine, 10MW	natural gas	power plants	kWh	GLO		0.73071
5875	2112 natural gas, burned in combined cycle plant, best technology	natural gas	power plants	MJ	RER		0.067945
1391	2113 natural gas, burned in gas motor, for storage	natural gas	power plants	MJ	GLO		0.067074
1392	2114 natural gas, burned in gas motor, for storage	natural gas	power plants	MJ	DZ		0.059139
1393	2115 natural gas, burned in gas motor, for storage	natural gas	power plants	MJ	DE		0.05963
1394	2116 natural gas, burned in gas motor, for storage	natural gas	power plants	MJ	RU		0.060857
1395	2117 natural gas, burned in gas motor, for storage	natural gas	power plants	MJ	NO		0.059783
1396	2118 natural gas, burned in gas motor, for storage	natural gas	power plants	MJ	NL		0.057817
1397	2119 natural gas, burned in gas turbine	natural gas	power plants	MJ	GLO		0.067037
1398	2120 natural gas, burned in gas turbine	natural gas	power plants	MJ	CH		0.066578

Name		Category	Subcategory	Unit	Country	Ecoinvent IPCC2007 GWP100
1399	2121 natural gas, burned in gas turbine	natural gas	power plants	MJ	DE	0.059593
1400	2122 natural gas, burned in gas turbine	natural gas	power plants	MJ	NL	0.05778
1401	2123 natural gas, burned in gas turbine, for compressor station	natural gas	power plants	MJ	DZ	0.059103
1402	2124 natural gas, burned in gas turbine, for compressor station	natural gas	power plants	MJ	DE	0.059593
1403	2125 natural gas, burned in gas turbine, for compressor station	natural gas	power plants	MJ	RU	0.06082
1404	2126 natural gas, burned in gas turbine, for compressor station	natural gas	power plants	MJ	NO	0.059746
1405	2127 natural gas, burned in gas turbine, for compressor station	natural gas	power plants	MJ	NL	0.05778
1406	2128 natural gas, burned in gas turbine, for compressor station	natural gas	power plants	MJ	UCTE	0.067037
5862	2129 natural gas, burned in power plant	natural gas	power plants	MJ	AT	0.077621
5863	2130 natural gas, burned in power plant	natural gas	power plants	MJ	BE	0.060078
5864	2131 natural gas, burned in power plant	natural gas	power plants	MJ	DE	0.068376
5865	2132 natural gas, burned in power plant	natural gas	power plants	MJ	ES	0.066645
5866	2133 natural gas, burned in power plant	natural gas	power plants	MJ	FR	0.068657
5867	2134 natural gas, burned in power plant	natural gas	power plants	MJ	IT	0.068702
5868	2135 natural gas, burned in power plant	natural gas	power plants	MJ	LU	0.067852
5869	2136 natural gas, burned in power plant	natural gas	power plants	MJ	NL	0.059395
5870	2137 natural gas, burned in power plant	natural gas	power plants	MJ	UCTE	0.067852
5871	2138 natural gas, burned in power plant	natural gas	power plants	MJ	GB	0.058366
5872	2139 natural gas, burned in power plant	natural gas	power plants	MJ	CENTREL	0.078828
5873	2140 natural gas, burned in power plant	natural gas	power plants	MJ	NORDEL	0.068899
7186	2141 natural gas, burned in power plant	natural gas	power plants	MJ	JP	0.079079
11031	2142 natural gas, burned in power plant	natural gas	power plants	MJ	ASCC	0.064356
11032	2143 natural gas, burned in power plant	natural gas	power plants	MJ	ERCOT	0.065165
11033	2144 natural gas, burned in power plant	natural gas	power plants	MJ	FRCC	0.064803
11034	2145 natural gas, burned in power plant	natural gas	power plants	MJ	MRO	0.065165
11035	2146 natural gas, burned in power plant	natural gas	power plants	MJ	NPCC	0.065165
11036	2147 natural gas, burned in power plant	natural gas	power plants	MJ	RFC	0.065054
11037	2148 natural gas, burned in power plant	natural gas	power plants	MJ	SERC	0.065165
11038	2149 natural gas, burned in power plant	natural gas	power plants	MJ	SPP	0.065365
11039	2150 natural gas, burned in power plant	natural gas	power plants	MJ	WECC	0.065065
11040	2151 natural gas, burned in power plant	natural gas	power plants	MJ	US	0.065203
1407	2152 sour gas, burned in gas turbine, production	natural gas	power plants	Nm3	NO	2.5123
1408	2153 sour gas, burned in gas turbine, production	natural gas	power plants	MJ	NO	0.0679
1409	2154 sweet gas, burned in gas turbine, production	natural gas	power plants	Nm3	NO	2.4444
1410	2155 sweet gas, burned in gas turbine, production	natural gas	power plants	MJ	NO	0.0679
1411	2156 drying, natural gas	natural gas	production	Nm3	NO	0.022274
6697	2157 natural gas, at evaporation plant	natural gas	production	Nm3	JP	0.8029
1412	2158 natural gas, at long-distance pipeline	natural gas	production	Nm3	CH	0.3662
1413	2159 natural gas, at long-distance pipeline	natural gas	production	Nm3	RER	0.3829
1414	2160 natural gas, at production	natural gas	production	Nm3	NG	0.6275
11052	2161 natural gas, at production	natural gas	production	Nm3	RNA	0.31065
1416	2162 natural gas, at production offshore	natural gas	production	Nm3	NO	0.06686
1417	2163 natural gas, at production offshore	natural gas	production	Nm3	NL	0.046271
1418	2164 natural gas, at production offshore	natural gas	production	Nm3	GB	0.017113
1419	2165 natural gas, at production onshore	natural gas	production	Nm3	DZ	0.094366
1420	2166 natural gas, at production onshore	natural gas	production	Nm3	DE	0.14129
1421	2167 natural gas, at production onshore	natural gas	production	Nm3	RU	0.18591
1422	2168 natural gas, at production onshore	natural gas	production	Nm3	NL	0.0305
1423	2169 natural gas, liquefied, at freight ship	natural gas	production	Nm3	DZ	0.50598
6698	2170 natural gas, liquefied, at freight ship	natural gas	production	Nm3	JP	0.76215
1424	2171 natural gas, liquefied, at liquefaction plant	natural gas	production	Nm3	DZ	0.45155
1425	2172 natural gas, production DE, at long-distance pipeline	natural gas	production	Nm3	RER	0.17289
1426	2173 natural gas, production DZ, at evaporation plant	natural gas	production	Nm3	RER	0.58077
1427	2174 natural gas, production DZ, at long-distance pipeline	natural gas	production	Nm3	RER	0.37222
1429	2175 natural gas, production GB, at long-distance pipeline	natural gas	production	Nm3	RER	0.044785
1430	2176 natural gas, production NL, at long-distance pipeline	natural gas	production	Nm3	RER	0.06998
1431	2177 natural gas, production NO, at long-distance pipeline	natural gas	production	Nm3	RER	0.13491
1432	2178 natural gas, production RU, at long-distance pipeline	natural gas	production	Nm3	RER	0.80348
1434	2179 natural gas, sour, burned in production flare	natural gas	production	Nm3	GLO	2.527
1435	2180 natural gas, sour, burned in production flare	natural gas	production	MJ	GLO	0.068298
1437	2181 natural gas, sweet, burned in production flare	natural gas	production	Nm3	GLO	2.4587
1438	2182 natural gas, sweet, burned in production flare	natural gas	production	MJ	GLO	0.068298
11051	2183 natural gas, unprocessed, at extraction	natural gas	production	m3	RNA	0.25021
1445	2184 sweetening, natural gas	natural gas	production	Nm3	DE	0.22248
1446	2185 transport, natural gas, offshore pipeline, long distance	natural gas	production	tkm	DZ	0.054669
1447	2186 transport, natural gas, offshore pipeline, long distance	natural gas	production	tkm	NO	0.055697
1448	2187 transport, natural gas, onshore pipeline, long distance	natural gas	production	tkm	NO	0.056031
1449	2188 transport, natural gas, onshore pipeline, long distance	natural gas	production	tkm	DZ	0.054885
1450	2189 transport, natural gas, pipeline, long distance	natural gas	production	tkm	RER	0.061252
1451	2190 transport, natural gas, pipeline, long distance	natural gas	production	tkm	DE	0.055706
1452	2191 transport, natural gas, pipeline, long distance	natural gas	production	tkm	RU	0.12759
1453	2192 transport, natural gas, pipeline, long distance	natural gas	production	tkm	NL	0.054094
1454	2193 electricity, nuclear, at power plant	nuclear power	power plants	kWh	CH	0.0076655
1455	2194 electricity, nuclear, at power plant	nuclear power	power plants	kWh	DE	0.0097801
1456	2195 electricity, nuclear, at power plant	nuclear power	power plants	kWh	UCTE	0.0078227
7311	2196 electricity, nuclear, at power plant	nuclear power	power plants	kWh	US	0.012811
5936	2197 electricity, nuclear, at power plant boiling water reactor	nuclear power	power plants	kWh	CH	0.010569
5937	2198 electricity, nuclear, at power plant boiling water reactor	nuclear power	power plants	kWh	DE	0.01038
5938	2199 electricity, nuclear, at power plant boiling water reactor	nuclear power	power plants	kWh	UCTE	0.0075407
11076	2200 electricity, nuclear, at power plant boiling water reactor	nuclear power	power plants	kWh	US	0.012023
1465	2201 electricity, nuclear, at power plant pressure water reactor	nuclear power	power plants	kWh	FR	0.0060813
5932	2202 electricity, nuclear, at power plant pressure water reactor	nuclear power	power plants	kWh	CH	0.0052895
5934	2203 electricity, nuclear, at power plant pressure water reactor	nuclear power	power plants	kWh	DE	0.0095352
5935	2204 electricity, nuclear, at power plant pressure water reactor	nuclear power	power plants	kWh	UCTE	0.007854
11075	2205 electricity, nuclear, at power plant pressure water reactor	nuclear power	power plants	kWh	US	0.013208
11099	2206 electricity, nuclear, at power plant pressure water reactor	nuclear power	power plants	kWh	CN	0.010952
5933	2207 electricity, nuclear, at pressure water reactor, centrifugal enrichment	nuclear power	power plants	kWh	CH	0.0053075
5947	2208 MOX fuel element for LWR, at nuclear fuel fabrication plant	nuclear power	production	kg	UCTE	41.018
11081	2209 U enriched 3.0%, in fuel element for LWR, at nuclear fuel fabrication plant	nuclear power	production	kg	US	2299.4
5943	2210 U enriched 3.8%, in fuel element for LWR, at nuclear fuel fabrication plant	nuclear power	production	kg	FR	1395.5
5945	2211 U enriched 3.8%, in fuel element for LWR, at nuclear fuel fabrication plant	nuclear power	production	kg	CH	3258.4
11080	2212 U enriched 3.8%, in fuel element for LWR, at nuclear fuel fabrication plant	nuclear power	production	kg	US	3130.6
11102	2213 U enriched 3.8%, in fuel element for LWR, at nuclear fuel fabrication plant	nuclear power	production	kg	CN	2433.6
5944	2214 U enriched 3.9%, in fuel element for LWR, at nuclear fuel fabrication plant	nuclear power	production	kg	UCTE	1997
5942	2215 U enriched 4.0%, in fuel element for LWR, at nuclear fuel fabrication plant	nuclear power	production	kg	DE	3217.2
5946	2216 U enriched 4.0%, in fuel element for LWR, at nuclear fuel fabrication plant	nuclear power	production	kg	UCTE	2050.4
5941	2217 U enriched 4.2%, centrifugal enrichment, at nuclear fuel fabrication plant	nuclear power	production	kg	CH	1568.8
5940	2218 U enriched 4.2%, in fuel element for LWR, at nuclear fuel fabrication plant	nuclear power	production	kg	CH	1560.8
5953	2219 fuel elements BWR, UO2 4.0% & MOX, at nuclear fuel fabrication plant	nuclear power	production	kg	DE	2899.6
5954	2220 fuel elements BWR, UO2 4.0% & MOX, at nuclear fuel fabrication plant	nuclear power	production	kg	UCTE	1889.7
5951	2221 fuel elements PWR, UO2 3.8% & MOX, at nuclear fuel fabrication plant	nuclear power	production	kg	FR	1260.1
5952	2222 fuel elements PWR, UO2 3.9% & MOX, at nuclear fuel fabrication plant	nuclear power	production	kg	UCTE	1742.7
5950	2223 fuel elements PWR, UO2 4.0% & MOX, at nuclear fuel fabrication plant	nuclear power	production	kg	DE	2740.8
5948	2224 fuel elements PWR, UO2 4.2% & MOX, at nuclear fuel fabrication plant	nuclear power	production	kg	CH	1439.2
5949	2225 fuel elements PWR, UO2 4.2% centrifuge & MOX, at nuclear fuel fabrication plant	nuclear power	production	kg	CH	1446.5
5978	2226 uranium enriched 3.8%, for boiling water reactor	nuclear power	production	kg SWU	CH	605.91

						Ecoinvent IPCC2007 GWP100
Name	Category	Subcategory	Unit	Country		
1486	2227 uranium natural, at mine	nuclear power	production	kg	GLO	19.784
5988	2228 uranium natural, at open pit mine	nuclear power	production	kg	RNA	6.7337
5989	2229 uranium natural, at underground mine	nuclear power	production	kg	RNA	28.484
5982	2230 uranium natural, in uranium hexafluoride, at conversion plant	nuclear power	production	kg	US	152.31
11107	2231 uranium natural, in uranium hexafluoride, at conversion plant	nuclear power	production	kg	CN	158.58
5984	2232 uranium natural, in yellowcake, at mill plant	nuclear power	production	kg	RNA	91.313
11085	2233 uranium, enriched 3.0% at TENEX enrichment plant	nuclear power	production	kg SWU	RU	334.32
11084	2234 uranium, enriched 3.0% at URENCO enrichment plant	nuclear power	production	kg SWU	RER	280.09
11146	2235 uranium, enriched 3.0% for boiling water reactor	nuclear power	production	kg SWU	US	603.16
11105	2236 uranium, enriched 3.0%, at CNNC centrifuge enrichment plant	nuclear power	production	kg SWU	CN	469.97
11083	2237 uranium, enriched 3.0%, at EURODIF enrichment plant	nuclear power	production	kg SWU	FR	277.93
11082	2238 uranium, enriched 3.0%, at USEC enrichment plant	nuclear power	production	kg SWU	US	2724.3
5976	2239 uranium, enriched 3.8% for pressure water reactor	nuclear power	production	kg SWU	FR	255.09
11145	2240 uranium, enriched 3.8% for pressure water reactor	nuclear power	production	kg SWU	US	580.22
11104	2241 uranium, enriched 3.8%, at CNNC centrifuge enrichment plant	nuclear power	production	kg SWU	CN	446.18
5959	2242 uranium, enriched 3.8%, at EURODIF enrichment plant	nuclear power	production	kg SWU	FR	255.09
5958	2243 uranium, enriched 3.8%, at TENEX enrichment plant	nuclear power	production	kg SWU	RU	311.48
5957	2244 uranium, enriched 3.8%, at URENCO enrichment plant	nuclear power	production	kg SWU	RER	257.25
5960	2245 uranium, enriched 3.8%, at USEC enrichment plant	nuclear power	production	kg SWU	US	2701.5
5961	2246 uranium, enriched 3.9% at URENCO enrichment plant	nuclear power	production	kg SWU	RER	255.72
5977	2247 uranium, enriched 3.9% for pressure water reactor	nuclear power	production	kg SWU	UCTE	354.34
5963	2248 uranium, enriched 3.9%, at EURODIF enrichment plant	nuclear power	production	kg SWU	FR	253.56
5962	2249 uranium, enriched 3.9%, at TENEX enrichment plant	nuclear power	production	kg SWU	RU	309.95
5964	2250 uranium, enriched 3.9%, at USEC enrichment plant	nuclear power	production	kg SWU	US	2699.9
5979	2251 uranium, enriched 4.0% for boiling water reactor	nuclear power	production	kg SWU	DE	555.28
5980	2252 uranium, enriched 4.0% for boiling water reactor	nuclear power	production	kg SWU	UCTE	351.3
5975	2253 uranium, enriched 4.0% for pressure water reactor	nuclear power	production	kg SWU	DE	555.28
5967	2254 uranium, enriched 4.0%, at EURODIF enrichment plant	nuclear power	production	kg SWU	FR	250.52
5966	2255 uranium, enriched 4.0%, at USEC enrichment plant	nuclear power	production	kg SWU	RU	306.91
5965	2256 uranium, enriched 4.0%, at URENCO enrichment plant	nuclear power	production	kg SWU	RER	252.68
5968	2257 uranium, enriched 4.0%, at USEC enrichment plant	nuclear power	production	kg SWU	US	2696.9
5973	2258 uranium, enriched 4.2% for pressure water reactor	nuclear power	production	kg SWU	CH	248.33
5971	2259 uranium, enriched 4.2%, at EURODIF enrichment plant	nuclear power	production	kg SWU	FR	247.47
5970	2260 uranium, enriched 4.2%, at TENEX enrichment plant	nuclear power	production	kg SWU	RU	303.86
5969	2261 uranium, enriched 4.2%, at URENCO enrichment plant	nuclear power	production	kg SWU	RER	249.63
5972	2262 uranium, enriched 4.2%, at USEC enrichment plant	nuclear power	production	kg SWU	US	2693.8
6007	2263 uranium, enriched 4.2%, centrifugal enrichment, for pressure water reactor	nuclear power	production	kg SWU	CH	249.63
11179	2264 disposal, uranium tailings, non-radioactive emissions	nuclear power	waste treatment	m3	GLO	0
1518	2265 low active radioactive waste	nuclear power	waste treatment	m3	CH	3.1589
5993	2266 nuclear spent fuel, in conditioning, at plant	nuclear power	waste treatment	kg	CH	124.26
11108	2267 nuclear spent fuel, in conditioning, at plant	nuclear power	waste treatment	kg	CN	123.7
5995	2268 nuclear spent fuel, in reprocessing, at plant	nuclear power	waste treatment	kg	RER	310.12
6005	2269 radioactive waste, in final repository for nuclear waste LLW	nuclear power	waste treatment	m3	CH	1699
6006	2270 radioactive waste, in final repository for nuclear waste SF, HLW, and ILW	nuclear power	waste treatment	m3	CH	15498
6000	2271 radioactive waste, in interim storage conditioning	nuclear power	waste treatment	m3	CH	77147
5998	2272 radioactive waste, in interim storage, for final repository LLW	nuclear power	waste treatment	m3	CH	3056.6
5999	2273 radioactive waste, in interim storage, for final repository SF, HLW, and ILW	nuclear power	waste treatment	m3	CH	17600
5985	2274 tailings, uranium milling	nuclear power	waste treatment	m3	GLO	0
1531	2275 diesel, burned in cogen 200kWe diesel SCR	oil	cogeneration	MJ	CH	0.093368
1532	2276 electricity, at cogen 200kWe diesel SCR, allocation energy	oil	cogeneration	kWh	CH	0.41489
1533	2277 electricity, at cogen 200kWe diesel SCR, allocation exergy	oil	cogeneration	kWh	CH	0.73423
1534	2278 electricity, at cogen 200kWe diesel, allocation heat	oil	cogeneration	kWh	CH	0.00060751
1535	2279 heat, at cogen 200kWe diesel SCR, allocation energy	oil	cogeneration	MJ	CH	0.11293
1536	2280 heat, at cogen 200kWe diesel SCR, allocation exergy	oil	cogeneration	MJ	CH	0.032725
1537	2281 heat, at cogen 200kWe diesel, allocation heat	oil	cogeneration	MJ	CH	0.21698
1538	2282 bitumen, at refinery	oil	fuels	kg	CH	0.59434
1539	2283 bitumen, at refinery	oil	fuels	kg	RER	0.43045
1540	2284 diesel, at refinery	oil	fuels	kg	CH	0.62806
1541	2285 diesel, at refinery	oil	fuels	kg	RER	0.48617
1542	2286 diesel, at regional storage	oil	fuels	kg	CH	0.60003
1543	2287 diesel, at regional storage	oil	fuels	kg	RER	0.51165
1544	2288 diesel, burned in diesel-electric generating set	oil	fuels	MJ	GLO	0.088169
1545	2289 diesel, low-sulphur, at refinery	oil	fuels	kg	CH	0.63665
1546	2290 diesel, low-sulphur, at refinery	oil	fuels	kg	RER	0.49906
1547	2291 diesel, low-sulphur, at regional storage	oil	fuels	kg	CH	0.6113
1548	2292 diesel, low-sulphur, at regional storage	oil	fuels	kg	RER	0.52454
1549	2293 heavy fuel oil, at refinery	oil	fuels	kg	CH	0.59103
1550	2294 heavy fuel oil, at refinery	oil	fuels	kg	RER	0.42774
1551	2295 heavy fuel oil, at regional storage	oil	fuels	kg	CH	0.62559
1552	2296 heavy fuel oil, at regional storage	oil	fuels	kg	RER	0.45217
1553	2297 kerosene, at refinery	oil	fuels	kg	CH	0.62803
1554	2298 kerosene, at refinery	oil	fuels	kg	RER	0.48158
1555	2299 kerosene, at regional storage	oil	fuels	kg	CH	0.5867
1556	2300 kerosene, at regional storage	oil	fuels	kg	RER	0.50606
1557	2301 light fuel oil, at refinery	oil	fuels	kg	RER	0.48448
1558	2302 light fuel oil, at refinery	oil	fuels	kg	CH	0.62778
1559	2303 light fuel oil, at regional storage	oil	fuels	kg	CH	0.59055
1560	2304 light fuel oil, at regional storage	oil	fuels	kg	RER	0.5089
1561	2305 naphtha, APME mix, at refinery	oil	fuels	kg	RER	0.34675
1562	2306 naphtha, at refinery	oil	fuels	kg	RER	0.42271
1563	2307 naphtha, at refinery	oil	fuels	kg	CH	0.58339
5719	2308 naphtha, at regional storage	oil	fuels	kg	CH	0.61795
5720	2309 naphtha, at regional storage	oil	fuels	kg	RER	0.44713
6566	2310 petrol, 15% vol. ETBE additive, EtOH f. biomass, prod. RER, at service station	oil	fuels	kg	CH	0.86337
6567	2311 petrol, 15% vol. ETBE additive, with ethanol from biomass, at refinery	oil	fuels	kg	RER	0.82324
6673	2312 petrol, 4% vol. ETBE additive, EtOH f. biomass, prod. RER, at service station	oil	fuels	kg	CH	0.77596
6674	2313 petrol, 4% vol. ETBE additive, with ethanol from biomass, at refinery	oil	fuels	kg	RER	0.73587
6568	2314 petrol, 5% vol. ethanol, from biomass, at service station	oil	fuels	kg	CH	0.8108
1564	2315 petrol, low-sulphur, at refinery	oil	fuels	kg	CH	0.77613
1565	2316 petrol, low-sulphur, at refinery	oil	fuels	kg	RER	0.7041
1566	2317 petrol, low-sulphur, at regional storage	oil	fuels	kg	CH	0.78832
1567	2318 petrol, low-sulphur, at regional storage	oil	fuels	kg	RER	0.72973
1568	2319 petrol, two-stroke blend, at regional storage	oil	fuels	kg	CH	0.77284
1569	2320 petrol, two-stroke blend, at regional storage	oil	fuels	kg	RER	0.71325
1570	2321 petrol, unleaded, at refinery	oil	fuels	kg	CH	0.76066
1571	2322 petrol, unleaded, at refinery	oil	fuels	kg	RER	0.68049
1572	2323 petrol, unleaded, at regional storage	oil	fuels	kg	CH	0.76692
1573	2324 petrol, unleaded, at regional storage	oil	fuels	kg	RER	0.70612
1574	2325 petroleum coke, at refinery	oil	fuels	kg	RER	0.52128
1575	2326 propane/ butane, at refinery	oil	fuels	kg	CH	0.69676
1576	2327 propane/ butane, at refinery	oil	fuels	kg	RER	0.60494
1578	2328 refinery gas, at refinery	oil	fuels	kg	RER	0.58822
1579	2329 refinery gas, at refinery	oil	fuels	kg	CH	0.68921
1581	2330 heat, heavy fuel oil, at industrial furnace 1MW	oil	heating systems	MJ	CH	0.099656
1582	2331 heat, heavy fuel oil, at industrial furnace 1MW	oil	heating systems	MJ	RER	0.094844
1583	2332 heat, light fuel oil, at boiler 100kW condensing, non-modulating	oil	heating systems	MJ	CH	0.088569

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Name	Category	Subcategory	Unit	Country		
1584	2333 heat, light fuel oil, at boiler 100kW, non-modulating	oil	heating systems	MJ	CH	0.093869
1585	2334 heat, light fuel oil, at boiler 10kW condensing, non-modulating	oil	heating systems	MJ	CH	0.089263
1586	2335 heat, light fuel oil, at boiler 10kW, non-modulating	oil	heating systems	MJ	CH	0.094604
1587	2336 heat, light fuel oil, at industrial furnace 1MW	oil	heating systems	MJ	CH	0.092629
1588	2337 heat, light fuel oil, at industrial furnace 1MW	oil	heating systems	MJ	RER	0.091023
1589	2338 heavy fuel oil, burned in industrial furnace 1MW, non-modulating	oil	heating systems	MJ	RER	0.090327
1590	2339 heavy fuel oil, burned in industrial furnace 1MW, non-modulating	oil	heating systems	MJ	CH	0.09491
1591	2340 heavy fuel oil, burned in refinery furnace	oil	heating systems	kg	CH	3.827
1592	2341 heavy fuel oil, burned in refinery furnace	oil	heating systems	kg	RER	3.5537
1593	2342 heavy fuel oil, burned in refinery furnace	oil	heating systems	MJ	CH	0.092807
1594	2343 heavy fuel oil, burned in refinery furnace	oil	heating systems	MJ	RER	0.086139
1596	2344 light fuel oil, burned in boiler 100kW condensing, non-modulating	oil	heating systems	MJ	CH	0.088569
1597	2345 light fuel oil, burned in boiler 100kW, non-modulating	oil	heating systems	MJ	CH	0.088556
1598	2346 light fuel oil, burned in boiler 10kW condensing, non-modulating	oil	heating systems	MJ	CH	0.089263
1599	2347 light fuel oil, burned in boiler 10kW, non-modulating	oil	heating systems	MJ	CH	0.089249
1600	2348 light fuel oil, burned in industrial furnace 1MW, non-modulating	oil	heating systems	MJ	CH	0.088218
1601	2349 light fuel oil, burned in industrial furnace 1MW, non-modulating	oil	heating systems	MJ	RER	0.086689
1605	2350 refinery gas, burned in furnace	oil	heating systems	kg	CH	3.5166
1606	2351 refinery gas, burned in furnace	oil	heating systems	kg	RER	3.4157
1607	2352 refinery gas, burned in furnace	oil	heating systems	MJ	CH	0.069963
1608	2353 refinery gas, burned in furnace	oil	heating systems	MJ	RER	0.067953
1609	2354 electricity, at refinery	oil	power plants	kWh	CH	0.52126
1610	2355 electricity, at refinery	oil	power plants	kWh	RER	0.50244
1611	2356 electricity, oil, at power plant	oil	power plants	kWh	AT	0.82164
1612	2357 electricity, oil, at power plant	oil	power plants	kWh	BE	0.91979
1613	2358 electricity, oil, at power plant	oil	power plants	kWh	ES	0.97135
1614	2359 electricity, oil, at power plant	oil	power plants	kWh	CS	0.97996
1615	2360 electricity, oil, at power plant	oil	power plants	kWh	FR	0.75741
1616	2361 electricity, oil, at power plant	oil	power plants	kWh	GR	0.88478
1617	2362 electricity, oil, at power plant	oil	power plants	kWh	IT	0.88054
1618	2363 electricity, oil, at power plant	oil	power plants	kWh	NL	0.71131
1619	2364 electricity, oil, at power plant	oil	power plants	kWh	PT	0.91234
1620	2365 electricity, oil, at power plant	oil	power plants	kWh	DE	1.129
1621	2366 electricity, oil, at power plant	oil	power plants	kWh	DK	0.82015
1622	2367 electricity, oil, at power plant	oil	power plants	kWh	FI	0.52297
1623	2368 electricity, oil, at power plant	oil	power plants	kWh	GB	1.1513
1624	2369 electricity, oil, at power plant	oil	power plants	kWh	IE	0.86527
1625	2370 electricity, oil, at power plant	oil	power plants	kWh	SE	0.60608
1626	2371 electricity, oil, at power plant	oil	power plants	kWh	CZ	1.205
1627	2372 electricity, oil, at power plant	oil	power plants	kWh	HU	0.86354
1628	2373 electricity, oil, at power plant	oil	power plants	kWh	SK	0.92135
1629	2374 electricity, oil, at power plant	oil	power plants	kWh	HR	0.96314
1630	2375 electricity, oil, at power plant	oil	power plants	kWh	SI	0.82157
6047	2376 electricity, oil, at power plant	oil	power plants	kWh	UCTE	0.88552
1631	2377 heavy fuel oil, burned in power plant	oil	power plants	MJ	RER	0.091285
5686	2378 heavy fuel oil, burned in power plant	oil	power plants	MJ	AT	0.089797
5687	2379 heavy fuel oil, burned in power plant	oil	power plants	MJ	BE	0.090175
5688	2380 heavy fuel oil, burned in power plant	oil	power plants	MJ	ES	0.091637
5689	2381 heavy fuel oil, burned in power plant	oil	power plants	MJ	CS	0.091585
5690	2382 heavy fuel oil, burned in power plant	oil	power plants	MJ	FR	0.091475
5691	2383 heavy fuel oil, burned in power plant	oil	power plants	MJ	GR	0.093134
5692	2384 heavy fuel oil, burned in power plant	oil	power plants	MJ	IT	0.093674
5693	2385 heavy fuel oil, burned in power plant	oil	power plants	MJ	NL	0.087385
5694	2386 heavy fuel oil, burned in power plant	oil	power plants	MJ	PT	0.09033
5695	2387 heavy fuel oil, burned in power plant	oil	power plants	MJ	DE	0.090321
5696	2388 heavy fuel oil, burned in power plant	oil	power plants	MJ	DK	0.092256
5697	2389 heavy fuel oil, burned in power plant	oil	power plants	MJ	FI	0.089549
5698	2390 heavy fuel oil, burned in power plant	oil	power plants	MJ	GB	0.091374
5699	2391 heavy fuel oil, burned in power plant	oil	power plants	MJ	IE	0.091757
5700	2392 heavy fuel oil, burned in power plant	oil	power plants	MJ	SE	0.08979
5701	2393 heavy fuel oil, burned in power plant	oil	power plants	MJ	CZ	0.091285
5702	2394 heavy fuel oil, burned in power plant	oil	power plants	MJ	HU	0.089393
5703	2395 heavy fuel oil, burned in power plant	oil	power plants	MJ	SK	0.091223
5704	2396 heavy fuel oil, burned in power plant	oil	power plants	MJ	HR	0.090013
5705	2397 heavy fuel oil, burned in power plant	oil	power plants	MJ	SI	0.091285
1633	2398 crude oil, at production	oil	production	kg	NG	0.74475
1634	2399 crude oil, at production offshore	oil	production	kg	NO	0.065136
1635	2400 crude oil, at production offshore	oil	production	kg	NL	0.053427
1636	2401 crude oil, at production offshore	oil	production	kg	GB	0.020303
1637	2402 crude oil, at production onshore	oil	production	kg	RME	0.11688
1638	2403 crude oil, at production onshore	oil	production	kg	NL	0.037389
1639	2404 crude oil, at production onshore	oil	production	kg	RU	0.5434
1640	2405 crude oil, at production onshore	oil	production	kg	RAF	0.31718
1641	2406 crude oil, production GB, at long distance transport	oil	production	kg	RER	0.027551
1643	2407 crude oil, production NG, at long distance transport	oil	production	kg	RER	0.79595
5740	2408 crude oil, production NG, at long distance transport	oil	production	kg	CH	0.80151
1644	2409 crude oil, production NL, at long distance transport	oil	production	kg	RER	0.04993
1645	2410 crude oil, production NO, at long distance transport	oil	production	kg	RER	0.072384
1646	2411 crude oil, production RAF, at long distance transport	oil	production	kg	RER	0.34457
5742	2412 crude oil, production RAF, at long distance transport	oil	production	kg	CH	0.34394
1647	2413 crude oil, production RLA, at long distance transport	oil	production	kg	RER	0.16584
1648	2414 crude oil, production RME, at long distance transport	oil	production	kg	RER	0.23316
5741	2415 crude oil, production RME, at long distance transport	oil	production	kg	CH	0.19296
1649	2416 crude oil, production RU, at long distance transport	oil	production	kg	RER	0.62673
1650	2417 crude oil, used in drilling tests	oil	production	kg	GLO	3.5879
1652	2418 discharge, produced water, offshore	oil	production	kg	OCE	0
1653	2419 discharge, produced water, onshore	oil	production	kg	GLO	0
1655	2420 natural gas, vented	oil	production	Nm3	GLO	14.639
5747	2421 refinery gas, burned in flare	oil	production	MJ	GLO	0.056224
1661	2422 transport, crude oil pipeline, offshore	oil	production	tkm	OCE	0.050931
1662	2423 transport, crude oil pipeline, onshore	oil	production	tkm	RER	0.015735
10844	2424 laminating, foil, with acrylic binder	paintings	processing	m2	RER	0.012432
1666	2425 acrylic binder, 34% in H2O, at plant	paintings	production	kg	RER	1.4285
1667	2426 acrylic dispersion, 65% in H2O, at plant	paintings	production	kg	RER	2.1185
1668	2427 acrylic varnish, 87.5% in H2O, at plant	paintings	production	kg	RER	1.8568
7123	2428 adhesive for metals, at plant	paintings	production	kg	DE	4.5204
1669	2429 alkyd paint, white, 60% in H2O, at plant	paintings	production	kg	RER	2.739
1670	2430 alkyd paint, white, 60% in solvent, at plant	paintings	production	kg	RER	2.8625
1671	2431 alkyd resin, long oil, 70% in white spirit, at plant	paintings	production	kg	RER	3.5643
1672	2432 melamine formaldehyde resin, at plant	paintings	production	kg	RER	4.6125
1673	2433 phenolic resin, at plant	paintings	production	kg	RER	4.1553
1674	2434 polyester resin, unsaturated, at plant	paintings	production	kg	RER	7.4667
1675	2435 printing colour, offset, 47.5% solvent, at plant	paintings	production	kg	RER	1.8059
1676	2436 printing colour, rotogravure, 55% toluene, at plant	paintings	production	kg	RER	2.6983
1678	2437 urea formaldehyde resin, at plant	paintings	production	kg	RER	2.8529
1679	2438 white spirit, at plant	paintings	production	kg	RER	0.93202

					Ecoinvent	
					IPCC2007	
					GWP100	
Name		Category	Subcategory	Unit	Country	
1680	2439 wood preservative, creosote, at plant	paintings	production	kg	RER	1.5706
1681	2440 wood preservative, inorganic salt, containing Cr, at plant	paintings	production	kg	RER	2.5429
1682	2441 wood preservative, organic salt, Cr-free, at plant	paintings	production	kg	RER	3.127
1683	2442 corrugated board base paper, kraftliner, at plant	paper & cardboard	cardboard & corrugated board	kg	RER	0.65908
1684	2443 corrugated board base paper, semichemical fluting, at plant	paper & cardboard	cardboard & corrugated board	kg	RER	1.0443
1685	2444 corrugated board base paper, testliner, at plant	paper & cardboard	cardboard & corrugated board	kg	RER	0.81882
1686	2445 corrugated board base paper, wellenstoff, at plant	paper & cardboard	cardboard & corrugated board	kg	RER	0.81591
1687	2446 corrugated board, fresh fibre, single wall, at plant	paper & cardboard	cardboard & corrugated board	kg	RER	0.9887
1688	2447 corrugated board, fresh fibre, single wall, at plant	paper & cardboard	cardboard & corrugated board	kg	CH	1.0292
1689	2448 corrugated board, mixed fibre, single wall, at plant	paper & cardboard	cardboard & corrugated board	kg	RER	0.93762
1690	2449 corrugated board, mixed fibre, single wall, at plant	paper & cardboard	cardboard & corrugated board	kg	CH	0.94879
1691	2450 corrugated board, recycling fibre, double wall, at plant	paper & cardboard	cardboard & corrugated board	kg	RER	0.95715
1692	2451 corrugated board, recycling fibre, double wall, at plant	paper & cardboard	cardboard & corrugated board	kg	CH	0.96453
1693	2452 corrugated board, recycling fibre, single wall, at plant	paper & cardboard	cardboard & corrugated board	kg	RER	0.98533
1694	2453 corrugated board, recycling fibre, single wall, at plant	paper & cardboard	cardboard & corrugated board	kg	CH	0.98735
1695	2454 folding boxboard, FBB, at plant	paper & cardboard	cardboard & corrugated board	kg	RER	1.308
1696	2455 liquid packaging board, at plant	paper & cardboard	cardboard & corrugated board	kg	RER	0.59608
1698	2456 packaging, corrugated board, mixed fibre, single wall, at plant	paper & cardboard	cardboard & corrugated board	kg	RER	1.1403
1699	2457 packaging, corrugated board, mixed fibre, single wall, at plant	paper & cardboard	cardboard & corrugated board	kg	CH	1.2322
1700	2458 production of carton board boxes, gravure printing, at plant	paper & cardboard	cardboard & corrugated board	kg	CH	0.29446
1701	2459 production of carton board boxes, offset printing, at plant	paper & cardboard	cardboard & corrugated board	kg	CH	0.35864
1702	2460 production of liquid packaging board containers, at plant	paper & cardboard	cardboard & corrugated board	kg	RER	1.4719
1703	2461 solid bleached board, SBB, at plant	paper & cardboard	cardboard & corrugated board	kg	RER	2.6039
1704	2462 solid unbleached board, SUB, at plant	paper & cardboard	cardboard & corrugated board	kg	RER	0.90297
1705	2463 whitelined chipboard, WLC, at plant	paper & cardboard	cardboard & corrugated board	kg	RER	1.0777
1708	2464 paper, newsprint, 0% DIP, at plant	paper & cardboard	graphic paper	kg	RER	1.297
1712	2465 paper, newsprint, DIP containing, at plant	paper & cardboard	graphic paper	kg	RER	1.0691
1709	2466 paper, newsprint, at plant	paper & cardboard	graphic paper	kg	CH	0.82788
1710	2467 paper, newsprint, at regional storage	paper & cardboard	graphic paper	kg	CH	0.95134
1711	2468 paper, newsprint, at regional storage	paper & cardboard	graphic paper	kg	RER	1.2834
1713	2469 paper, recycling, no deinking, at plant	paper & cardboard	graphic paper	kg	RER	0.82719
1714	2470 paper, recycling, with deinking, at plant	paper & cardboard	graphic paper	kg	RER	1.5564
1716	2471 paper, wood-containing, LWC, at regional storage	paper & cardboard	graphic paper	kg	RER	1.5086
1717	2472 paper, wood-containing, LWC, at regional storage	paper & cardboard	graphic paper	kg	CH	1.4716
1719	2473 paper, wood-containing, supercalendred (SC), at regional storage	paper & cardboard	graphic paper	kg	RER	1.1802
1720	2474 paper, wood-containing, supercalendred (SC), at regional storage	paper & cardboard	graphic paper	kg	CH	1.1423
1715	2475 paper, woodcontaining, LWC, at plant	paper & cardboard	graphic paper	kg	RER	1.3962
1718	2476 paper, woodcontaining, supercalendred (SC), at plant	paper & cardboard	graphic paper	kg	RER	1.0703
1721	2477 paper, woodfree, coated, at integrated mill	paper & cardboard	graphic paper	kg	RER	1.1246
1722	2478 paper, woodfree, coated, at non-integrated mill	paper & cardboard	graphic paper	kg	RER	1.1674
1723	2479 paper, woodfree, coated, at regional storage	paper & cardboard	graphic paper	kg	RER	1.2627
1724	2480 paper, woodfree, coated, at regional storage	paper & cardboard	graphic paper	kg	CH	1.1874
1725	2481 paper, woodfree, uncoated, at integrated mill	paper & cardboard	graphic paper	kg	RER	0.85037
1726	2482 paper, woodfree, uncoated, at non-integrated mill	paper & cardboard	graphic paper	kg	RER	1.4654
1727	2483 paper, woodfree, uncoated, at regional storage	paper & cardboard	graphic paper	kg	RER	1.3157
1728	2484 paper, woodfree, uncoated, at regional storage	paper & cardboard	graphic paper	kg	CH	1.2015
1730	2485 core board, at plant	paper & cardboard	packaging papers	kg	RER	0.49062
1731	2486 kraft paper, bleached, at plant	paper & cardboard	packaging papers	kg	RER	1.6851
1732	2487 kraft paper, unbleached, at plant	paper & cardboard	packaging papers	kg	RER	0.844
1733	2488 chemi-thermomechanical pulp, at plant	paper & cardboard	pulps	kg	RER	0.89115
1734	2489 stone groundwood pulp, SGW, at plant	paper & cardboard	pulps	kg	RER	0.85034
1737	2490 sulphate pulp, ECF bleached, at plant	paper & cardboard	pulps	kg	RER	0.52334
1738	2491 sulphate pulp, TCF bleached, at plant	paper & cardboard	pulps	kg	RER	0.4399
1735	2492 sulphate pulp, average, at regional storage	paper & cardboard	pulps	kg	RER	0.79181
1736	2493 sulphate pulp, average, at regional storage	paper & cardboard	pulps	kg	CH	0.7803
10215	2494 sulphate pulp, from eucalyptus ssp. (SFM), unbleached, TH, at maritime harbour	paper & cardboard	pulps	kg	RER	0.67474
10214	2495 sulphate pulp, from eucalyptus ssp. (SFM), unbleached, at pulpmill	paper & cardboard	pulps	kg	TH	0.45678
1739	2496 sulphate pulp, unbleached, at plant	paper & cardboard	pulps	kg	RER	0.39109
1740	2497 sulphite pulp, bleached, at plant	paper & cardboard	pulps	kg	RER	0.5123
1741	2498 thermo-mechanical pulp, at plant	paper & cardboard	pulps	kg	RER	0.75005
1743	2499 waste paper, mixed, from public collection, for further treatment	paper & cardboard	pulps	kg	RER	0.06612
1744	2500 waste paper, mixed, from public collection, for further treatment	paper & cardboard	pulps	kg	CH	0.046437
1745	2501 waste paper, sorted, for further treatment	paper & cardboard	pulps	kg	RER	0.12078
1746	2502 waste paper, sorted, for further treatment	paper & cardboard	pulps	kg	CH	0.085683
1750	2503 electricity, PV, at 3kWp facade installation, multi-Si, panel, mounted	photovoltaic	power plants	kWh	CH	0.095143
1749	2504 electricity, PV, at 3kWp facade installation, single-Si, panel, mounted	photovoltaic	power plants	kWh	CH	0.10566
1748	2505 electricity, PV, at 3kWp facade, multi-Si, laminated, integrated	photovoltaic	power plants	kWh	CH	0.089868
1747	2506 electricity, PV, at 3kWp facade, single-Si, laminated, integrated	photovoltaic	power plants	kWh	CH	0.1007
1752	2507 electricity, PV, at 3kWp flat roof installation, multi-Si	photovoltaic	power plants	kWh	CH	0.065752
1751	2508 electricity, PV, at 3kWp flat roof installation, single-Si	photovoltaic	power plants	kWh	CH	0.072763
6858	2509 electricity, PV, at 3kWp slanted-roof, CIS, panel, mounted	photovoltaic	power plants	kWh	CH	0.065115
6857	2510 electricity, PV, at 3kWp slanted-roof, CdTe, laminated, integrated	photovoltaic	power plants	kWh	CH	0.056296
6850	2511 electricity, PV, at 3kWp slanted-roof, a-Si, lam., integrated	photovoltaic	power plants	kWh	CH	0.056683
6849	2512 electricity, PV, at 3kWp slanted-roof, a-Si, panel, mounted	photovoltaic	power plants	kWh	CH	0.073382
1757	2513 electricity, PV, at 3kWp slanted-roof, multi-Si, laminated, integrated	photovoltaic	power plants	kWh	CH	0.059186
1758	2514 electricity, PV, at 3kWp slanted-roof, multi-Si, panel, mounted	photovoltaic	power plants	kWh	CH	0.064633
6860	2515 electricity, PV, at 3kWp slanted-roof, ribbon-Si, lam., integrated	photovoltaic	power plants	kWh	CH	0.054958
6859	2516 electricity, PV, at 3kWp slanted-roof, ribbon-Si, panel, mounted	photovoltaic	power plants	kWh	CH	0.060934
1754	2517 electricity, PV, at 3kWp slanted-roof, single-Si, laminated, integrated	photovoltaic	power plants	kWh	CH	0.066547
1755	2518 electricity, PV, at 3kWp slanted-roof, single-Si, panel, mounted	photovoltaic	power plants	kWh	CH	0.071668
1759	2519 electricity, production mix photovoltaic, at plant	photovoltaic	power plants	kWh	CH	0.076192
6877	2520 electricity, production mix photovoltaic, at plant	photovoltaic	power plants	kWh	AT	0.078907
6878	2521 electricity, production mix photovoltaic, at plant	photovoltaic	power plants	kWh	AU	0.056137
6879	2522 electricity, production mix photovoltaic, at plant	photovoltaic	power plants	kWh	BE	0.090215
6880	2523 electricity, production mix photovoltaic, at plant	photovoltaic	power plants	kWh	CA	0.065466
6881	2524 electricity, production mix photovoltaic, at plant	photovoltaic	power plants	kWh	CZ	0.08719
6882	2525 electricity, production mix photovoltaic, at plant	photovoltaic	power plants	kWh	DE	0.087688
6883	2526 electricity, production mix photovoltaic, at plant	photovoltaic	power plants	kWh	DK	0.082965
6884	2527 electricity, production mix photovoltaic, at plant	photovoltaic	power plants	kWh	ES	0.051618
6885	2528 electricity, production mix photovoltaic, at plant	photovoltaic	power plants	kWh	FI	0.085331
6886	2529 electricity, production mix photovoltaic, at plant	photovoltaic	power plants	kWh	FR	0.072973
6887	2530 electricity, production mix photovoltaic, at plant	photovoltaic	power plants	kWh	GB	0.090087
6888	2531 electricity, production mix photovoltaic, at plant	photovoltaic	power plants	kWh	GR	0.056742
6889	2532 electricity, production mix photovoltaic, at plant	photovoltaic	power plants	kWh	HU	0.07229
6890	2533 electricity, production mix photovoltaic, at plant	photovoltaic	power plants	kWh	IE	0.086997
6891	2534 electricity, production mix photovoltaic, at plant	photovoltaic	power plants	kWh	IT	0.069358
6892	2535 electricity, production mix photovoltaic, at plant	photovoltaic	power plants	kWh	JP	0.074846
6893	2536 electricity, production mix photovoltaic, at plant	photovoltaic	power plants	kWh	KR	0.071133
6894	2537 electricity, production mix photovoltaic, at plant	photovoltaic	power plants	kWh	LU	0.082637
6895	2538 electricity, production mix photovoltaic, at plant	photovoltaic	power plants	kWh	NL	0.080135
6896	2539 electricity, production mix photovoltaic, at plant	photovoltaic	power plants	kWh	NO	0.080227
6897	2540 electricity, production mix photovoltaic, at plant	photovoltaic	power plants	kWh	NZ	0.061015
6898	2541 electricity, production mix photovoltaic, at plant	photovoltaic	power plants	kWh	PT	0.052063
6899	2542 electricity, production mix photovoltaic, at plant	photovoltaic	power plants	kWh	SE	0.081643
6900	2543 electricity, production mix photovoltaic, at plant	photovoltaic	power plants	kWh	TR	0.051881
6901	2544 electricity, production mix photovoltaic, at plant	photovoltaic	power plants	kWh	US	0.047985

						Ecoinvent IPCC2007 GWP100
Name	Category	Subcategory	Unit	Country		
1772 2545 C2 single crystalline silicon, electronics, at plant	photovoltaic	production of components	kg	RER		252.99
1773 2546 C2 single crystalline silicon, photovoltaics, at plant	photovoltaic	production of components	kg	RER		104.08
6861 2547 metallization paste, back side, aluminium, at plant	photovoltaic	production of components	kg	RER		10.554
6862 2548 metallization paste, back side, at plant	photovoltaic	production of components	kg	RER		68.774
6863 2549 metallization paste, front side, at plant	photovoltaic	production of components	kg	RER		84.728
6826 2550 multi-Si wafer, at plant	photovoltaic	production of components	m2	RER		90.716
6830 2551 multi-Si wafer, ribbon, at plant	photovoltaic	production of components	m2	RER		59.722
6828 2552 photovoltaic cell, multi-Si, at plant	photovoltaic	production of components	m2	RER		121.26
6867 2553 photovoltaic cell, ribbon-Si, at plant	photovoltaic	production of components	m2	RER		89.32
6827 2554 photovoltaic cell, single-Si, at plant	photovoltaic	production of components	m2	RER		163.4
6829 2555 single-Si wafer, electronics, at plant	photovoltaic	production of components	m2	RER		307.2
6825 2556 single-Si wafer, photovoltaics, at plant	photovoltaic	production of components	m2	RER		130.47
1798 2557 butadiene, at plant	plastics	monomers	kg	RER		1.1706
1799 2558 butene, mixed, at plant	plastics	monomers	kg	RER		1.5346
1800 2559 epoxy resin insulator (Al2O3), at plant	plastics	monomers	kg	RER		3.4516
1801 2560 epoxy resin insulator (SiO2), at plant	plastics	monomers	kg	RER		2.7253
1802 2561 epoxy resin, liquid, at plant	plastics	monomers	kg	RER		6.7304
1803 2562 epoxy resin, liquid, disaggregated data, at plant	plastics	monomers	kg	RER		14.807
1804 2563 ethylene, average, at plant	plastics	monomers	kg	RER		1.3989
1805 2564 ethylene, pipeline system, at plant	plastics	monomers	kg	RER		1.4666
1806 2565 methyl methacrylate, at plant	plastics	monomers	kg	RER		6.7023
1807 2566 methylene diphenyl diisocyanate, at plant	plastics	monomers	kg	RER		4.0333
1808 2567 polyols, at plant	plastics	monomers	kg	RER		3.6839
1809 2568 propylene, at plant	plastics	monomers	kg	RER		1.4379
11122 2569 propylene, pipeline system, at plant	plastics	monomers	kg	RER		1.5965
1810 2570 styrene, at plant	plastics	monomers	kg	RER		4.477
1811 2571 toluene diisocyanate, at plant	plastics	monomers	kg	RER		6.3867
1812 2572 vinyl acetate, at plant	plastics	monomers	kg	RER		2.0655
1813 2573 vinyl chloride, at plant	plastics	monomers	kg	RER		1.6003
7132 2574 bitumen adhesive compound, cold, at plant	plastics	others	kg	RER		0.4056
7133 2575 bitumen adhesive compound, hot, at plant	plastics	others	kg	RER		0.57006
7129 2576 bitumen sealing Alu80, at plant	plastics	others	kg	RER		1.4224
7128 2577 bitumen sealing V60, at plant	plastics	others	kg	RER		0.65449
7130 2578 bitumen sealing VA4, at plant	plastics	others	kg	RER		1.1643
1814 2579 bitumen sealing, at plant	plastics	others	kg	RER		1.1188
7131 2580 bitumen sealing, polymer EP4 flame retardant, at plant	plastics	others	kg	RER		0.82511
1815 2581 glass fibre reinforced plastic, polyamide, injection moulding, at plant	plastics	others	kg	RER		8.813
1816 2582 glass fibre reinforced plastic, polyester resin, hand lay-up, at plant	plastics	others	kg	RER		4.8786
7122 2583 natural rubber based sealing, at plant	plastics	others	kg	DE		1.951
7134 2584 polysulphide, sealing compound, at plant	plastics	others	kg	RER		1.5307
1817 2585 acrylonitrile-butadiene-styrene copolymer, ABS, at plant	plastics	polymers	kg	RER		4.4031
1818 2586 ethylene vinyl acetate copolymer, at plant	plastics	polymers	kg	RER		2.1072
1819 2587 ethylvinylacetate, foil, at plant	plastics	polymers	kg	RER		2.7067
1820 2588 fleece, polyethylene, at plant	plastics	polymers	kg	RER		2.883
10457 2589 modified starch, at plant	plastics	polymers	kg	RER		2.0166
1821 2590 nylon 6, at plant	plastics	polymers	kg	RER		9.2845
1822 2591 nylon 6, glass-filled, at plant	plastics	polymers	kg	RER		7.3334
1823 2592 nylon 66, at plant	plastics	polymers	kg	RER		8.0191
1824 2593 nylon 66, glass-filled, at plant	plastics	polymers	kg	RER		7.0457
1825 2594 polybutadiene, at plant	plastics	polymers	kg	RER		3.9161
1826 2595 polycarbonate, at plant	plastics	polymers	kg	RER		7.7876
1827 2596 polyethylene terephthalate, granulate, amorphous, at plant	plastics	polymers	kg	RER		2.7011
1828 2597 polyethylene terephthalate, granulate, bottle grade, at plant	plastics	polymers	kg	RER		2.8951
1829 2598 polyethylene, HDPE, granulate, at plant	plastics	polymers	kg	RER		1.9485
1830 2599 polyethylene, LDPE, granulate, at plant	plastics	polymers	kg	RER		2.1026
1831 2600 polyethylene, LLPE, granulate, at plant	plastics	polymers	kg	RER		1.853
10455 2601 polylactide, granulate, NatureWorks Nebraska	plastics	polymers	kg	US		2.0578
10456 2602 polylactide, granulate, at plant	plastics	polymers	kg	GLO		3.1158
1832 2603 polymethyl methacrylate, beads, at plant	plastics	polymers	kg	RER		7.1294
1833 2604 polymethyl methacrylate, sheet, at plant	plastics	polymers	kg	RER		8.3972
11123 2605 polyphenylene sulfide, at plant	plastics	polymers	kg	GLO		5.5516
1834 2606 polypropylene, granulate, at plant	plastics	polymers	kg	RER		1.9825
1835 2607 polystyrene, expandable, at plant	plastics	polymers	kg	RER		3.383
1836 2608 polystyrene, general purpose, GPPS, at plant	plastics	polymers	kg	RER		3.5138
1837 2609 polystyrene, high impact, HIPS, at plant	plastics	polymers	kg	RER		3.504
1838 2610 polyurethane, flexible foam, at plant	plastics	polymers	kg	RER		4.8436
1839 2611 polyurethane, rigid foam, at plant	plastics	polymers	kg	RER		4.3135
1840 2612 polyvinylchloride, at regional storage	plastics	polymers	kg	RER		1.9981
1841 2613 polyvinylchloride, bulk polymerised, at plant	plastics	polymers	kg	RER		1.9776
1842 2614 polyvinylchloride, emulsion polymerised, at plant	plastics	polymers	kg	RER		2.4921
1843 2615 polyvinylchloride, suspension polymerised, at plant	plastics	polymers	kg	RER		1.9023
1844 2616 polyvinylidenechloride, granulate, at plant	plastics	polymers	kg	RER		4.9157
1845 2617 purified terephthalic acid, at plant	plastics	polymers	kg	RER		1.8163
1846 2618 styrene-acrylonitrile copolymer, SAN, at plant	plastics	polymers	kg	RER		4.0627
1847 2619 synthetic rubber, at plant	plastics	polymers	kg	RER		2.6531
1848 2620 blow moulding	plastics	processing	kg	RER		1.2347
1849 2621 calendering, rigid sheets	plastics	processing	kg	RER		0.3864
1850 2622 extrusion, plastic film	plastics	processing	kg	RER		0.52633
1851 2623 extrusion, plastic pipes	plastics	processing	kg	RER		0.37853
10845 2624 fleece production, polyethylene terephthalate	plastics	processing	kg	RER		5.6049
1852 2625 foaming, expanding	plastics	processing	kg	RER		0.69365
1853 2626 injection moulding	plastics	processing	kg	RER		1.3428
1854 2627 packaging film, LDPE, at plant	plastics	processing	kg	RER		2.702
1855 2628 stretch blow moulding	plastics	processing	kg	RER		1.4994
1856 2629 thermoforming, with calendering	plastics	processing	kg	RER		0.79038
1867 2630 heat, at flat plate collector, multiple dwelling, for hot water	solar collector systems	systems	MJ	CH		0.0029499
1868 2631 heat, at flat plate collector, one-family house, for combined system	solar collector systems	systems	MJ	CH		0.0077389
1869 2632 heat, at flat plate collector, one-family house, for hot water	solar collector systems	systems	MJ	CH		0.010069
1870 2633 heat, at hot water tank, solar-electric, flat plate, multiple dwelling	solar collector systems	systems	MJ	CH		0.032091
1871 2634 heat, at hot water tank, solar-gas, flat plate, multiple dwelling	solar collector systems	systems	MJ	CH		0.061346
1872 2635 heat, at hot water tank, solar-gas, flat plate, one-family house	solar collector systems	systems	MJ	CH		0.039123
1873 2636 heat, at solar+gas heating, flat plate, one-family house, combined system	solar collector systems	systems	MJ	CH		0.057367
1874 2637 heat, at solar+gas heating, tube collector, one-family house, combined system	solar collector systems	systems	MJ	CH		0.056824
1875 2638 heat, at solar+wood heating, flat plate, one-family house, combined system	solar collector systems	systems	MJ	CH		0.007549
1876 2639 heat, at tube collector, one-family house, for combined system	solar collector systems	systems	MJ	CH		0.0067548
10198 2640 textile refinement, cotton	textiles	processing	kg	GLO		5.1405
10197 2641 weaving, bast fibres	textiles	processing	kg	IN		0.40623
10196 2642 weaving, cotton	textiles	processing	kg	GLO		12.438
10183 2643 textile, jute, at plant	textiles	production	kg	IN		3.0649
10187 2644 textile, kenaf, at plant	textiles	production	kg	IN		3.0426
10177 2645 textile, woven cotton, at plant	textiles	production	kg	GLO		27.094
10899 2646 viscose fibres, at plant	textiles	production	kg	GLO		4.7972
10194 2647 yarn production, bast fibres	textiles	production	kg	IN		1.4782
10195 2648 yarn production, cotton fibres	textiles	production	kg	GLO		10.579
10176 2649 yarn, cotton, at plant	textiles	production	kg	GLO		14.348
10182 2650 yarn, jute, at plant	textiles	production	kg	IN		2.5777



										Ecoinvent IPCC2007 GWP100	
	Name	Category	Subcategory	Unit	Country						
10186	2651 yarn, kenaf, at plant	textiles	production	kg	IN					2.5559	
1885	2652 operation, aircraft, freight	transport systems	airplane	tkm	RER					1.0902	
1886	2653 operation, aircraft, freight, Europe	transport systems	airplane	tkm	RER					1.6634	
1887	2654 operation, aircraft, freight, intercontinental	transport systems	airplane	tkm	RER					1.0576	
1888	2655 operation, aircraft, passenger	transport systems	airplane	pkm	RER					0.12387	
1889	2656 operation, aircraft, passenger, Europe	transport systems	airplane	pkm	RER					0.16634	
1890	2657 operation, aircraft, passenger, intercontinental	transport systems	airplane	pkm	RER					0.10576	
1891	2658 operation, maintenance, airport	airplane	transport systems	unit	RER					91053000	
1892	2659 transport, aircraft, freight	transport systems	airplane	tkm	RER					1.1004	
1893	2660 transport, aircraft, freight, Europe	transport systems	airplane	tkm	RER					1.669	
1894	2661 transport, aircraft, freight, intercontinental	transport systems	airplane	tkm	RER					1.0675	
1895	2662 transport, aircraft, passenger	transport systems	airplane	pkm	RER					0.12579	
1896	2663 transport, aircraft, passenger, Europe	transport systems	airplane	pkm	RER					0.16719	
1897	2664 transport, aircraft, passenger, intercontinental	transport systems	airplane	pkm	RER					0.10761	
1898	2665 transport, helicopter	transport systems	airplane	h	GLO					96.971	
1899	2666 transport, helicopter, LTO cycle	transport systems	airplane	unit	GLO					164.88	
6054	2667 operation, coach	transport systems	road	vkml	CH					0.95952	
7294	2668 operation, lorry 16-32t, EURO3	transport systems	road	vkml	RER					0.81	
7295	2669 operation, lorry 16-32t, EURO4	transport systems	road	vkml	RER					0.71967	
7296	2670 operation, lorry 16-32t, EURO5	transport systems	road	vkml	RER					0.73083	
1923	2671 operation, lorry 20-28t, empty, fleet average	transport systems	road	vkml	CH					0.74607	
1921	2672 operation, lorry 20-28t, fleet average	transport systems	road	vkml	CH					0.9358	
1925	2673 operation, lorry 20-28t, full, fleet average	transport systems	road	vkml	CH					1.1291	
6113	2674 operation, lorry 28t, rape methyl ester 100%	transport systems	road	km	CH					0.59968	
1915	2675 operation, lorry 3.5-16t, fleet average	transport systems	road	vkml	RER					0.64042	
1918	2676 operation, lorry 3.5-20t, empty, fleet average	transport systems	road	vkml	CH					0.60042	
1916	2677 operation, lorry 3.5-20t, fleet average	transport systems	road	vkml	CH					0.68815	
1920	2678 operation, lorry 3.5-20t, full, fleet average	transport systems	road	vkml	CH					0.76323	
10755	2679 operation, lorry 3.5-7.5t, EURO3	transport systems	road	vkml	RER					0.55531	
10756	2680 operation, lorry 3.5-7.5t, EURO4	transport systems	road	vkml	RER					0.52406	
10757	2681 operation, lorry 3.5-7.5t, EURO5	transport systems	road	vkml	RER					0.53239	
7291	2682 operation, lorry 7.5-16t, EURO3	transport systems	road	vkml	RER					0.84052	
7292	2683 operation, lorry 7.5-16t, EURO4	transport systems	road	vkml	RER					0.75406	
7293	2684 operation, lorry 7.5-16t, EURO5	transport systems	road	vkml	RER					0.76607	
1926	2685 operation, lorry > 16t, fleet average	transport systems	road	vkml	RER					0.95736	
1929	2686 operation, lorry > 28t, empty, fleet average	transport systems	road	vkml	CH					0.83461	
1927	2687 operation, lorry > 28t, fleet average	transport systems	road	vkml	CH					1.0692	
1931	2688 operation, lorry > 28t, full, fleet average	transport systems	road	vkml	CH					1.368	
7297	2689 operation, lorry > 32t, EURO3	transport systems	road	vkml	RER					1.1058	
7298	2690 operation, lorry > 32t, EURO4	transport systems	road	vkml	RER					0.93556	
7299	2691 operation, lorry > 32t, EURO5	transport systems	road	vkml	RER					0.95074	
1933	2692 operation, passenger car	transport systems	road	km	CH					0.26476	
1934	2693 operation, passenger car	transport systems	road	km	RER					0.24045	
6555	2694 operation, passenger car, diesel, EURO3	transport systems	road	km	CH					0.21177	
6556	2695 operation, passenger car, diesel, EURO4	transport systems	road	km	CH					0.20966	
6557	2696 operation, passenger car, diesel, EURO5	transport systems	road	km	CH					0.20146	
7283	2697 operation, passenger car, diesel, fleet average	transport systems	road	vkml	CH					0.23331	
10812	2698 operation, passenger car, diesel, fleet average	transport systems	road	vkml	RER					0.23292	
7284	2699 operation, passenger car, diesel, fleet average 2010	transport systems	road	vkml	CH					0.22163	
10813	2700 operation, passenger car, diesel, fleet average 2010	transport systems	road	vkml	RER					0.21371	
6114	2701 operation, passenger car, ethanol 5%	transport systems	road	km	CH					0.24026	
6201	2702 operation, passenger car, methane, 96 vol-%, from biogas	transport systems	road	km	CH					0.12316	
6115	2703 operation, passenger car, methanol	transport systems	road	km	CH					0.039307	
6202	2704 operation, passenger car, natural gas	transport systems	road	km	CH					0.21147	
6558	2705 operation, passenger car, petrol, 15% vol. ETBE with ethanol from biomass, EURO4	transport systems	road	km	CH					0.23053	
6672	2706 operation, passenger car, petrol, 4% vol. ETBE with ethanol from biomass, EURO4	transport systems	road	km	CH					0.2312	
6559	2707 operation, passenger car, petrol, EURO3	transport systems	road	km	CH					0.24007	
6560	2708 operation, passenger car, petrol, EURO4	transport systems	road	km	CH					0.23425	
6561	2709 operation, passenger car, petrol, EURO5	transport systems	road	km	CH					0.21311	
7285	2710 operation, passenger car, petrol, fleet average	transport systems	road	vkml	CH					0.27102	
10814	2711 operation, passenger car, petrol, fleet average	transport systems	road	vkml	RER					0.24144	
7286	2712 operation, passenger car, petrol, fleet average 2010	transport systems	road	vkml	CH					0.25849	
10815	2713 operation, passenger car, petrol, fleet average 2010	transport systems	road	vkml	RER					0.24061	
6205	2714 operation, passenger car, rape seed methyl ester 5%	transport systems	road	km	CH					0.20699	
6053	2715 operation, regular bus	transport systems	road	vkml	CH					1.3279	
6056	2716 operation, tram	transport systems	road	vkml	CH					0.55941	
6055	2717 operation, trolleybus	transport systems	road	vkml	CH					0.37589	
1935	2718 operation, van < 3.5t	transport systems	road	km	CH					0.33917	
5743	2719 operation, van < 3.5t	transport systems	road	vkml	RER					0.28693	
6058	2720 transport, coach	transport systems	road	pkml	CH					0.052101	
7303	2721 transport, lorry 16-32t, EURO3	transport systems	road	tkml	RER					0.16898	
7304	2722 transport, lorry 16-32t, EURO4	transport systems	road	tkml	RER					0.15331	
7305	2723 transport, lorry 16-32t, EURO5	transport systems	road	tkml	RER					0.15525	
1942	2724 transport, lorry 20-28t, fleet average	transport systems	road	tkml	CH					0.19443	
6116	2725 transport, lorry 28t, rape methyl ester 100%	transport systems	road	tkml	CH					0.13875	
1941	2726 transport, lorry 3.5-16t, fleet average	transport systems	road	tkml	RER					0.33389	
1940	2727 transport, lorry 3.5-20t, fleet average	transport systems	road	tkml	CH					0.27943	
10758	2728 transport, lorry 3.5-7.5t, EURO3	transport systems	road	tkml	RER					0.66227	
10759	2729 transport, lorry 3.5-7.5t, EURO4	transport systems	road	tkml	RER					0.63037	
10760	2730 transport, lorry 3.5-7.5t, EURO5	transport systems	road	tkml	RER					0.63888	
7300	2731 transport, lorry 7.5-16t, EURO3	transport systems	road	tkml	RER					0.29251	
7301	2732 transport, lorry 7.5-16t, EURO4	transport systems	road	tkml	RER					0.26609	
7302	2733 transport, lorry 7.5-16t, EURO5	transport systems	road	tkml	RER					0.26976	
1943	2734 transport, lorry > 16t, fleet average	transport systems	road	tkml	RER					0.12604	
1944	2735 transport, lorry > 28t, fleet average	transport systems	road	tkml	CH					0.13708	
7306	2736 transport, lorry > 32t, EURO3	transport systems	road	tkml	RER					0.11729	
7307	2737 transport, lorry > 32t, EURO4	transport systems	road	tkml	RER					0.10272	
7308	2738 transport, lorry > 32t, EURO5	transport systems	road	tkml	RER					0.10402	
1945	2739 transport, passenger car	transport systems	road	pkml	RER					0.18191	
1946	2740 transport, passenger car	transport systems	road	pkml	CH					0.19703	
6584	2741 transport, passenger car, diesel, EURO3	transport systems	road	pkml	CH					0.16543	
6585	2742 transport, passenger car, diesel, EURO4	transport systems	road	pkml	CH					0.1641	
6586	2743 transport, passenger car, diesel, EURO5	transport systems	road	pkml	CH					0.15894	
7287	2744 transport, passenger car, diesel, fleet average	transport systems	road	pkml	CH					0.17737	
10816	2745 transport, passenger car, diesel, fleet average	transport systems	road	pkml	RER					0.1772	
7288	2746 transport, passenger car, diesel, fleet average 2010	transport systems	road	pkml	CH					0.17007	
10817	2747 transport, passenger car, diesel, fleet average 2010	transport systems	road	pkml	RER					0.1652	
6117	2748 transport, passenger car, ethanol 5%	transport systems	road	pkml	CH					0.18372	
6203	2749 transport, passenger car, methane, 96 vol-%, from biogas	transport systems	road	pkml	CH					0.11006	
6118	2750 transport, passenger car, methanol	transport systems	road	pkml	CH					0.057316	
6204	2751 transport, passenger car, natural gas	transport systems	road	pkml	CH					0.16561	
6587	2752 transport, passenger car, petrol, 15% vol. ETBE with ethanol from biomass, EURO4	transport systems	road	pkml	CH					0.17722	
6675	2753 transport, passenger car, petrol, 4% vol. ETBE with ethanol from biomass, EURO4	transport systems	road	pkml	CH					0.17765	
6588	2754 transport, passenger car, petrol, EURO3	transport systems	road	pkml	CH					0.18322	
6589	2755 transport, passenger car, petrol, EURO4	transport systems	road	pkml	CH					0.17956	
6590	2756 transport, passenger car, petrol, EURO5	transport systems	road	pkml	CH					0.16627	

								Ecoinvent IPCC2007 GWP100	
	Name	Category	Subcategory	Unit	Country				
7289	2757 transport, passenger car, petrol, fleet average	transport systems	road	pkm	CH			0.20094	
10818	2758 transport, passenger car, petrol, fleet average	transport systems	road	pkm	RER			0.18253	
7290	2759 transport, passenger car, petrol, fleet average 2010	transport systems	road	pkm	CH			0.19311	
10819	2760 transport, passenger car, petrol, fleet average 2010	transport systems	road	pkm	RER			0.18202	
6206	2761 transport, passenger car, rape seed methyl ester 5%	transport systems	road	pkm	CH			0.16279	
6057	2762 transport, regular bus	transport systems	road	pkm	CH			0.10425	
6060	2763 transport, tram	transport systems	road	pkm	CH			0.025117	
6059	2764 transport, trolleybus	transport systems	road	pkm	CH			0.023445	
1947	2765 transport, van <3.5t	transport systems	road	tkm	RER			1.9606	
1948	2766 transport, van <3.5t	transport systems	road	tkm	CH			1.5722	
1958	2767 operation, barge	transport systems	ship	tkm	RER			0.035481	
1959	2768 operation, barge tanker	transport systems	ship	tkm	RER			0.032972	
1961	2769 operation, transoceanic freight ship	transport systems	ship	tkm	OCE			0.0090392	
1962	2770 operation, transoceanic tanker	transport systems	ship	tkm	OCE			0.0046404	
1966	2771 transport, barge	transport systems	ship	tkm	RER			0.046402	
1967	2772 transport, barge tanker	transport systems	ship	tkm	RER			0.043009	
1970	2773 transport, liquefied natural gas, freight ship	transport systems	ship	tkm	OCE			0.052341	
1968	2774 transport, transoceanic freight ship	transport systems	ship	tkm	OCE			0.010749	
1969	2775 transport, transoceanic tanker	transport systems	ship	tkm	OCE			0.0056344	
6076	2776 operation, ICE	transport systems	train	pkm	DE			0.052676	
11097	2777 operation, coal freight train, diesel	transport systems	train	tkm	CN			0.024693	
11096	2778 operation, coal freight train, electricity	transport systems	train	tkm	CN			0.03743	
11098	2779 operation, coal freight train, steam	transport systems	train	tkm	CN			0.14872	
1977	2780 operation, freight train	transport systems	train	tkm	RER			0.029176	
1978	2781 operation, freight train	transport systems	train	tkm	CH			0.004141	
1979	2782 operation, freight train, diesel	transport systems	train	tkm	RER			0.039694	
1980	2783 operation, freight train, electricity	transport systems	train	tkm	RER			0.027585	
6074	2784 operation, long-distance train, SBB mix	transport systems	train	pkm	CH			0.0018	
6072	2785 operation, regional train, SBB mix	transport systems	train	pkm	CH			0.0037513	
6081	2786 transport, ICE	transport systems	train	pkm	DE			0.060161	
11095	2787 transport, coal freight, rail	transport systems	train	tkm	CN			0.044459	
1983	2788 transport, freight, rail	transport systems	train	tkm	RER			0.039557	
1984	2789 transport, freight, rail	transport systems	train	tkm	CH			0.014521	
11073	2790 transport, freight, rail, diesel	transport systems	train	tkm	US			0.0500074	
6079	2791 transport, long-distance train, SBB mix	transport systems	train	pkm	CH			0.0082994	
6077	2792 transport, regional train, SBB mix	transport systems	train	pkm	CH			0.015356	
10851	2793 air distribution housing, steel, 120 m³/h, at plant	ventilation	production of components	unit	CH			30.85	
10867	2794 air filter, central unit, 600 m³/h, at plant	ventilation	production of components	unit	RER			1.7316	
10865	2795 air filter, decentralized unit, 180-250 m³/h, at plant	ventilation	production of components	unit	RER			1.2386	
10864	2796 air filter, decentralized unit, 250 m³/h, at plant	ventilation	production of components	unit	RER			0.30304	
10866	2797 air filter, in exhaust air valve, at plant	ventilation	production of components	unit	RER			0.36886	
10859	2798 connection piece, steel, 100x50 mm, at plant	ventilation	production of components	unit	RER			0.88316	
10870	2799 control and wiring, central unit, at plant	ventilation	production of components	unit	RER			31.495	
10869	2800 control and wiring, decentralized unit, at plant	ventilation	production of components	unit	RER			21.765	
10858	2801 elbow 90°, steel, 100x50 mm, at plant	ventilation	production of components	unit	RER			1.2162	
10848	2802 exhaust air outlet, steel/aluminum, 85x365 mm, at plant	ventilation	production of components	unit	CH			12.743	
10847	2803 exhaust air roof hood, steel, DN 400, at plant	ventilation	production of components	unit	CH			48.785	
10850	2804 exhaust air valve, in-wall housing, plastic/steel, DN 125, at plant	ventilation	production of components	unit	CH			1.7294	
10861	2805 flexible duct, aluminum/PET, DN of 125, at plant	ventilation	production of components	m	RER			1.0524	
10853	2806 ground heat exchanger, PE, DN 200, at plant	ventilation	production of components	m	RER			8.9757	
10855	2807 insulation spiral-seam duct, rockwool, DN 400, 30 mm, at plant	ventilation	production of components	m	RER			18.137	
10846	2808 outside air intake, stainless steel, DN 370, at plant	ventilation	production of components	unit	RER			190.4	
10852	2809 overflow element, steel, approx. 40 m³/h, at plant	ventilation	production of components	unit	RER			4.5061	
10868	2810 sealing tape, aluminum/PE, 50 mm wide, at plant	ventilation	production of components	m	RER			0.23917	
10863	2811 silencer, steel, DN 125, at plant	ventilation	production of components	unit	CH			25.305	
10862	2812 silencer, steel, DN 315, 50 mm, at plant	ventilation	production of components	unit	CH			52.754	
10856	2813 spiral-seam duct, steel, DN 125, at plant	ventilation	production of components	m	RER			8.4172	
10854	2814 spiral-seam duct, steel, DN 400, at plant	ventilation	production of components	m	RER			25.968	
10849	2815 supply air inlet, steel/SS, DN 75, at plant	ventilation	production of components	unit	RER			8.8499	
10860	2816 ventilation duct, PE corrugated tube, DN 75, at plant	ventilation	production of components	m	RER			0.98838	
10857	2817 ventilation duct, steel, 100x50 mm, at plant	ventilation	production of components	m	RER			6.4063	
10873	2818 ventilation equipment, Avent E 97, at plant	ventilation	production of components	unit	RER			353.55	
10875	2819 ventilation equipment, GE 250 RH, at plant	ventilation	production of components	unit	CH			463.43	
10872	2820 ventilation equipment, KWL 250, at plant	ventilation	production of components	unit	RER			225.44	
10877	2821 ventilation equipment, KWL C 1200, at plant	ventilation	production of components	unit	RER			970.43	
10874	2822 ventilation equipment, Storkair G 90, at plant	ventilation	production of components	unit	RER			150.13	
10878	2823 ventilation equipment, Twl-700, at plant	ventilation	production of components	unit	RER			669.14	
10876	2824 ventilation equipment, central, 600-1200 m³/h, at plant	ventilation	production of components	unit	RER			815.52	
10871	2825 ventilation equipment, decentralized, 180-250 m³/h, at plant	ventilation	production of components	unit	RER			260.07	
10896	2826 energy reduction, ventilation system, 1 x 720 m³/h, PE ducts, with GHE	ventilation	ventilation systems	MJ	CH			0.020905	
10895	2827 energy reduction, ventilation system, 1 x 720 m³/h, steel ducts, with GHE	ventilation	ventilation systems	MJ	CH			0.023744	
10894	2828 energy reduction, ventilation system, 6 x 120 m³/h, PE ducts, with GHE	ventilation	ventilation systems	MJ	CH			0.024432	
10898	2829 energy reduction, ventilation system, 6 x 120 m³/h, PE ducts, without GHE	ventilation	ventilation systems	MJ	CH			0.024642	
10893	2830 energy reduction, ventilation system, 6 x 120 m³/h, steel ducts, with GHE	ventilation	ventilation systems	MJ	CH			0.027271	
10897	2831 energy reduction, ventilation system, 6 x 120 m³/h, steel ducts, without GHE	ventilation	ventilation systems	MJ	CH			0.027754	
10890	2832 ventilation of dwellings, central, 1 x 720 m³/h, PE ducts, with GHE	ventilation	ventilation systems	m2a	CH			0.71422	
10889	2833 ventilation of dwellings, central, 1 x 720 m³/h, steel ducts, with GHE	ventilation	ventilation systems	m2a	CH			0.8112	
10888	2834 ventilation of dwellings, decentralized, 6 x 120 m³/h, PE ducts, with GHE	ventilation	ventilation systems	m2a	CH			0.83472	
10892	2835 ventilation of dwellings, decentralized, 6 x 120 m³/h, PE ducts, without GHE	ventilation	ventilation systems	m2a	CH			0.76791	
10887	2836 ventilation of dwellings, decentralized, 6 x 120 m³/h, steel ducts, with GHE	ventilation	ventilation systems	m2a	CH			0.9317	
10891	2837 ventilation of dwellings, decentralized, 6 x 120 m³/h, steel ducts, without GHE	ventilation	ventilation systems	m2a	CH			0.86489	
1986	2838 DAS-1, fluorescent whitening agent triazinylaminostilben type, at plant	washing agents	auxiliary agents	kg	RER			10.91	
1985	2839 carboxymethyl cellulose, powder, at plant	washing agents	auxiliary agents	kg	RER			4.2109	
1987	2840 fluorescent whitening agent distyrylbiphenyl type, at plant	washing agents	auxiliary agents	kg	RER			22.342	
1988	2841 steam, for chemical processes, at plant	washing agents	auxiliary agents	kg	RER			0.23455	
1989	2842 sodium perborate, monohydrate, powder, at plant	washing agents	bleaches	kg	RER			3.6771	
1990	2843 sodium perborate, tetrahydrate, powder, at plant	washing agents	bleaches	kg	RER			1.613	
1991	2844 sodium percarbonate, powder, at plant	washing agents	bleaches	kg	RER			1.595	
1992	2845 layered sodium silicate, SKS-6, powder, at plant	washing agents	builders	kg	RER			2.0498	
1993	2846 polycarboxylates, 40% active substance, at plant	washing agents	builders	kg	RER			1.1392	
1994	2847 sodium metasilicate pentahydrate, 58%, powder, at plant	washing agents	builders	kg	RER			1.2473	
1995	2848 sodium tripolyphosphate, at plant	washing agents	builders	kg	RER			5.8815	
1996	2849 zeolite, powder, at plant	washing agents	builders	kg	RER			4.1846	
1997	2850 zeolite, slurry, 50% in H2O, at plant	washing agents	builders	kg	RER			1.8962	
1998	2851 alkylbenzene sulfonate, linear, petrochemical, at plant	washing agents	tensides	kg	RER			1.631	
1999	2852 esterquat, coconut oil and palm kernel oil, at plant	washing agents	tensides	kg	RER			2.3198	
2000	2853 esterquat, tallow, at plant	washing agents	tensides	kg	RER			1.7795	
5905	2854 ethoxylated alcohols (AE11), palm oil, at plant	washing agents	tensides	kg	RER			2.5014	
5901	2855 ethoxylated alcohols (AE3), coconut oil, at plant	washing agents	tensides	kg	RER			1.8198	
5900	2856 ethoxylated alcohols (AE3), palm kernel oil, at plant	washing agents	tensides	kg	RER			3.515	
2001	2857 ethoxylated alcohols (AE3), petrochemical, at plant	washing agents	tensides	kg	RER			2.5399	
5904	2858 ethoxylated alcohols (AE7), coconut oil, at plant	washing agents	tensides	kg	RER			1.9198	
5903	2859 ethoxylated alcohols (AE7), palm kernel oil, at plant	washing agents	tensides	kg	RER			3.1058	
5902	2860 ethoxylated alcohols (AE7), petrochemical, at plant	washing agents	tensides	kg	RER			2.3523	
5906	2861 ethoxylated alcohols, unspecified, at plant	washing agents	tensides	kg	RER			2.5472	
5897	2862 fatty alcohol sulfate, coconut oil, at plant	washing agents	tensides	kg	RER			1.5297	

Name		Category	Subcategory	Unit	Country	Ecoinvent IPCC2007 GWP100
5899	2863 fatty alcohol sulfate, mix, at plant	washing agents	tensides	kg	RER	2.4278
2002	2864 fatty alcohol sulfate, palm kernel oil, at plant	washing agents	tensides	kg	RER	3.534
5898	2865 fatty alcohol sulfate, palm oil, at plant	washing agents	tensides	kg	RER	2.3159
5896	2866 fatty alcohol sulfate, petrochemical, at plant	washing agents	tensides	kg	RER	2.3316
2003	2867 soap, at plant	washing agents	tensides	kg	RER	1.7253
10823	2868 disposal, air distribution housing, steel, 120 m <sup>3</sup> /h	waste management	building demolition	unit	CH	0.53017
10832	2869 disposal, air filter, central unit, 600 m <sup>3</sup> /h	waste management	building demolition	unit	CH	0.10309
10830	2870 disposal, air filter, decentralized unit, 180-250 m <sup>3</sup> /h	waste management	building demolition	unit	CH	0.2469
10829	2871 disposal, air filter, decentralized unit, 250 m <sup>3</sup> /h	waste management	building demolition	unit	CH	0.061589
10831	2872 disposal, air filter, in exhaust air valve	waste management	building demolition	unit	CH	0.081396
2031	2873 disposal, building, PE sealing sheet, to final disposal	waste management	building demolition	kg	CH	2.5512
2044	2874 disposal, building, PVC sealing sheet, to final disposal	waste management	building demolition	kg	CH	2.0907
2004	2875 disposal, building, bitumen sheet, to final disposal	waste management	building demolition	kg	CH	2.3418
2005	2876 disposal, building, brick, to final disposal	waste management	building demolition	kg	CH	0.013352
2006	2877 disposal, building, bulk iron (excluding reinforcement), to sorting plant	waste management	building demolition	kg	CH	0.003834
2007	2878 disposal, building, cement (in concrete) and mortar, to final disposal	waste management	building demolition	kg	CH	0.01407
2008	2879 disposal, building, cement-fibre slab, to final disposal	waste management	building demolition	kg	CH	0.019934
2009	2880 disposal, building, concrete gravel, to final disposal	waste management	building demolition	kg	CH	0.01407
2010	2881 disposal, building, concrete, not reinforced, to final disposal	waste management	building demolition	kg	CH	0.01407
7158	2882 disposal, building, door, inner, glass-wood, to final disposal	waste management	building demolition	m <sup>2</sup>	CH	10.454
7157	2883 disposal, building, door, inner, wood, to final disposal	waste management	building demolition	m <sup>2</sup>	CH	7.2799
7155	2884 disposal, building, door, outer, wood-aluminium, to final disposal	waste management	building demolition	m <sup>2</sup>	CH	3.1987
7156	2885 disposal, building, door, outer, wood-glass, to final disposal	waste management	building demolition	m <sup>2</sup>	CH	4.7583
2011	2886 disposal, building, electric wiring, to final disposal	waste management	building demolition	kg	CH	1.4593
2012	2887 disposal, building, emulsion paint on walls, to final disposal	waste management	building demolition	kg	CH	0.010048
2013	2888 disposal, building, emulsion paint on walls, to sorting plant	waste management	building demolition	kg	CH	0.04437
2014	2889 disposal, building, emulsion paint on wood, to final disposal	waste management	building demolition	kg	CH	1.1287
2015	2890 disposal, building, emulsion paint remains, to final disposal	waste management	building demolition	kg	CH	2.5414
2016	2891 disposal, building, fibre board, to final disposal	waste management	building demolition	kg	CH	0.19812
2017	2892 disposal, building, glass pane (in burnable frame), to final disposal	waste management	building demolition	kg	CH	0.026627
2018	2893 disposal, building, glass pane (in burnable frame), to sorting plant	waste management	building demolition	kg	CH	0.030623
2019	2894 disposal, building, glass sheet, to final disposal	waste management	building demolition	kg	CH	0.010048
2020	2895 disposal, building, glass sheet, to sorting plant	waste management	building demolition	kg	CH	0.0098964
7138	2896 disposal, building, glazing 2-IV, U<1.1W/m <sup>2</sup> K, LSG, to final disposal	waste management	building demolition	m <sup>2</sup>	CH	4.9991
7137	2897 disposal, building, glazing 2-IV, U<1.1W/m <sup>2</sup> K, to final disposal	waste management	building demolition	m <sup>2</sup>	CH	1.6523
7139	2898 disposal, building, glazing 3-IV, U<0.5W/m <sup>2</sup> K, to final disposal	waste management	building demolition	m <sup>2</sup>	CH	2.4939
2021	2899 disposal, building, mineral plaster, to final disposal	waste management	building demolition	kg	CH	0.010048
2022	2900 disposal, building, mineral plaster, to sorting plant	waste management	building demolition	kg	CH	0.016327
2023	2901 disposal, building, mineral wool, to final disposal	waste management	building demolition	kg	CH	0.010048
2024	2902 disposal, building, mineral wool, to sorting plant	waste management	building demolition	kg	CH	0.025661
2025	2903 disposal, building, paint on metal, to final disposal	waste management	building demolition	kg	CH	0.010048
2026	2904 disposal, building, paint on metal, to sorting plant	waste management	building demolition	kg	CH	0.0044583
2027	2905 disposal, building, paint on walls, to final disposal	waste management	building demolition	kg	CH	0.010048
2028	2906 disposal, building, paint on walls, to sorting plant	waste management	building demolition	kg	CH	0.084012
2029	2907 disposal, building, paint on wood, to final disposal	waste management	building demolition	kg	CH	2.3822
2030	2908 disposal, building, paint remains, to final disposal	waste management	building demolition	kg	CH	3.5553
2032	2909 disposal, building, plaster board, gypsum plaster, to final disposal	waste management	building demolition	kg	CH	0.013352
2033	2910 disposal, building, plaster board, gypsum plaster, to sorting plant	waste management	building demolition	kg	CH	0.020878
2034	2911 disposal, building, plaster-cardboard sandwich, to final disposal	waste management	building demolition	kg	CH	0.013352
2035	2912 disposal, building, plaster-cardboard sandwich, to sorting plant	waste management	building demolition	kg	CH	0.023226
2036	2913 disposal, building, plastic plaster, to final disposal	waste management	building demolition	kg	CH	0.010048
2037	2914 disposal, building, plastic plaster, to sorting plant	waste management	building demolition	kg	CH	0.019138
2038	2915 disposal, building, polyethylene/polypropylene products, to final disposal	waste management	building demolition	kg	CH	2.9982
2039	2916 disposal, building, polystyrene isolation, flame-retardant, to final disposal	waste management	building demolition	kg	CH	3.151
2040	2917 disposal, building, polyurethane foam, to final disposal	waste management	building demolition	kg	CH	2.4725
2041	2918 disposal, building, polyurethane sealing, to final disposal	waste management	building demolition	kg	CH	0.010048
2042	2919 disposal, building, polyurethane sealing, to sorting plant	waste management	building demolition	kg	CH	0.084691
2043	2920 disposal, building, polyvinylchloride products, to final disposal	waste management	building demolition	kg	CH	2.263
2045	2921 disposal, building, reinforced concrete, to final disposal	waste management	building demolition	kg	CH	0.015681
2046	2922 disposal, building, reinforced plaster board, to final disposal	waste management	building demolition	kg	CH	0.013352
2047	2923 disposal, building, reinforced plaster board, to sorting plant	waste management	building demolition	kg	CH	0.22413
2048	2924 disposal, building, reinforcement steel, to final disposal	waste management	building demolition	kg	CH	0.067665
2049	2925 disposal, building, reinforcement steel, to sorting plant	waste management	building demolition	kg	CH	0.061652
2050	2926 disposal, building, vapour barrier, flame-retarded, to final disposal	waste management	building demolition	kg	CH	2.8179
2051	2927 disposal, building, waste wood, chrome preserved, to final disposal	waste management	building demolition	kg	CH	0.014144
2052	2928 disposal, building, waste wood, untreated, to final disposal	waste management	building demolition	kg	CH	0.013704
7145	2929 disposal, building, window frame, plastic, to final disposal	waste management	building demolition	m <sup>2</sup>	CH	132.11
7143	2930 disposal, building, window frame, wood, to final disposal	waste management	building demolition	m <sup>2</sup>	CH	19.236
7144	2931 disposal, building, window frame, wood-metal, to final disposal	waste management	building demolition	m <sup>2</sup>	CH	25.318
10835	2932 disposal, control and wiring, central unit	waste management	building demolition	unit	CH	4.5771
10834	2933 disposal, control and wiring, decentralized unit	waste management	building demolition	unit	CH	2.1222
2053	2934 disposal, electronics for control units	waste management	building demolition	kg	RER	1.0772
10821	2935 disposal, exhaust air roof hood, steel, DN 400	waste management	building demolition	unit	CH	0.065789
10822	2936 disposal, exhaust air valve, in-wall housing, plastic/steel, DN 125	waste management	building demolition	unit	CH	0.20524
2054	2937 disposal, facilities, chemical production	waste management	building demolition	kg	RER	0.061936
10826	2938 disposal, flexible duct, aluminum/PET, DN of 125	waste management	building demolition	m	CH	0.26678
10825	2939 disposal, insulation spiral-seam duct, rockwool, DN 400, 30 mm	waste management	building demolition	m	CH	0.047576
10820	2940 disposal, outside air intake, stainless steel, DN 370	waste management	building demolition	unit	CH	6.1114
10824	2941 disposal, overflow element, steel, approx. 40 m <sup>3</sup> /h	waste management	building demolition	unit	CH	0.78844
10833	2942 disposal, sealing tape, aluminum/PE, 50 mm wide	waste management	building demolition	m	CH	0.1238
10828	2943 disposal, silencer, steel, DN 125	waste management	building demolition	unit	CH	0.066746
10827	2944 disposal, silencer, steel, DN 315, 50 mm	waste management	building demolition	unit	CH	0.14216
10838	2945 disposal, ventilation equipment, Avent E 97	waste management	building demolition	unit	CH	0.32741
10840	2946 disposal, ventilation equipment, GE 250 RH	waste management	building demolition	unit	CH	1.3537
10837	2947 disposal, ventilation equipment, KWL 250	waste management	building demolition	unit	CH	0.82047
10842	2948 disposal, ventilation equipment, KWLC 1200	waste management	building demolition	unit	CH	3.5304
10839	2949 disposal, ventilation equipment, Storkair G 90	waste management	building demolition	unit	CH	29.576
10843	2950 disposal, ventilation equipment, Twl-700	waste management	building demolition	unit	CH	4.4045
10841	2951 disposal, ventilation equipment, central, 600-1200 m <sup>3</sup> /h	waste management	building demolition	unit	CH	3.3507
10836	2952 disposal, ventilation equipment, decentralized, 180-250 m <sup>3</sup> /h	waste management	building demolition	unit	CH	30.077
2055	2953 disposal, antifreezer liquid, 51.8% water, to hazardous waste incineration	waste management	hazardous waste incineration	kg	CH	2.7636
2056	2954 disposal, bilge oil, 90% water, to hazardous waste incineration	waste management	hazardous waste incineration	kg	CH	2.2084
10919	2955 disposal, capacitors, 0% water, to hazardous waste incineration	waste management	hazardous waste incineration	kg	CH	2.5017
2057	2956 disposal, catalyst for EDC production, 0% water, to hazardous waste incineration	waste management	hazardous waste incineration	kg	CH	2.4323
2058	2957 disposal, emulsion paint remains, 0% water, to hazardous waste incineration	waste management	hazardous waste incineration	kg	CH	2.5317
2059	2958 disposal, hazardous waste, 25% water, to hazardous waste incineration	waste management	hazardous waste incineration	kg	CH	2.4252
2060	2959 disposal, paint remains, 0% water, to hazardous waste incineration	waste management	hazardous waste incineration	kg	CH	3.5456
2061	2960 disposal, refinery sludge, 89.5% water, to hazardous waste incineration	waste management	hazardous waste incineration	kg	CH	2.1675
2062	2961 disposal, separator sludge, 90% water, to hazardous waste incineration	waste management	hazardous waste incineration	kg	CH	2.1319
2063	2962 disposal, solvents mixture, 16.5% water, to hazardous waste incineration	waste management	hazardous waste incineration	kg	CH	1.9838
2064	2963 disposal, used mineral oil, 10% water, to hazardous waste incineration	waste management	hazardous waste incineration	kg	CH	2.8526
2068	2964 process-specific burdens, hazardous waste incineration plant	waste management	hazardous waste incineration	kg	CH	0.014916
2069	2965 disposal, concrete, 5% water, to inert material landfill	waste management	inert material landfill	kg	CH	0.0071315
2070	2966 disposal, emulsion paint, 0% water, to inert material landfill	waste management	inert material landfill	kg	CH	0.0071315
2071	2967 disposal, glass, 0% water, to inert material landfill	waste management	inert material landfill	kg	CH	0.0071315
2072	2968 disposal, gypsum, 19.4% water, to inert material landfill	waste management	inert material landfill	kg	CH	0.0071315

						Ecoinvent IPCC2007 GWP100
	Name	Category	Subcategory	Unit	Country	
2073	2969 disposal, inert waste, 5% water, to inert material landfill	waste management	inert material landfill	kg	CH	0.0071315
2074	2970 disposal, limestone residue, 5% water, to inert material landfill	waste management	inert material landfill	kg	CH	0.0071315
2075	2971 disposal, mineral wool, 0% water, to inert material landfill	waste management	inert material landfill	kg	CH	0.0071315
2076	2972 disposal, natural gas pipeline, 0% water, to inert material landfill	waste management	inert material landfill	kg	CH	0.0071315
2077	2973 disposal, packaging cardboard, 19.6% water, to inert material landfill	waste management	inert material landfill	kg	CH	0.0071315
2078	2974 disposal, paint, 0% water, to inert material landfill	waste management	inert material landfill	kg	CH	0.0071315
2079	2975 disposal, plastic plaster, 0% water, to inert material landfill	waste management	inert material landfill	kg	CH	0.0071315
2080	2976 disposal, polyurethane, 0.2% water, to inert material landfill	waste management	inert material landfill	kg	CH	0.0071315
2081	2977 disposal, slag from MG silicon production, 0% water, to inert material landfill	waste management	inert material landfill	kg	CH	0.0071315
2082	2978 disposal, steel, 0% water, to inert material landfill	waste management	inert material landfill	kg	CH	0.0071315
2083	2979 disposal, zeolite, 5% water, to inert material landfill	waste management	inert material landfill	kg	CH	0.0071315
2085	2980 process-specific burdens, inert material landfill	waste management	inert material landfill	kg	CH	0.0026145
2086	2981 disposal, drilling waste, 71.5% water, to landfarming	waste management	landfarming	kg	CH	0.0012149
2087	2982 disposal, refinery sludge, 89.5% water, to landfarming	waste management	landfarming	kg	CH	0.0012149
2088	2983 disposal, wood ash mixture, pure, 0% water, to landfarming	waste management	landfarming	kg	CH	0.0012149
10975	2984 disposal, LCD module, to municipal waste incineration	waste management	municipal incineration	kg	CH	0.24901
2109	2985 disposal, PE sealing sheet, 4% water, to municipal incineration	waste management	municipal incineration	kg	CH	2.5493
2120	2986 disposal, PVC sealing sheet, 1.64% water, to municipal incineration	waste management	municipal incineration	kg	CH	2.0888
2089	2987 disposal, aluminium in car shredder residue, 0% water, to municipal incineration	waste management	municipal incineration	kg	CH	0.081796
2090	2988 disposal, aluminium, 0% water, to municipal incineration	waste management	municipal incineration	kg	CH	0.034386
2091	2989 disposal, anion exchange resin f. water, 50% water, to municipal incineration	waste management	municipal incineration	kg	CH	1.2788
6712	2990 disposal, biowaste, 60% H2O, to municipal incineration, allocation price	waste management	municipal incineration	kg	CH	0.031059
6713	2991 disposal, biowaste, 60% H2O, to municipal incineration, future, alloc. price	waste management	municipal incineration	kg	CH	0.015018
2092	2992 disposal, bitumen sheet, 1.5% water, to municipal incineration	waste management	municipal incineration	kg	CH	2.3398
6008	2993 disposal, building wood, chrome preserved, 20% water, to municipal incineration	waste management	municipal incineration	kg	CH	0.012199
2093	2994 disposal, cation exchange resin f. water, 50% water, to municipal incineration	waste management	municipal incineration	kg	CH	0.99581
2094	2995 disposal, cement-fibre slab, 0% water, to municipal incineration	waste management	municipal incineration	kg	CH	0.014685
10994	2996 disposal, coatings in CRT screens, to municipal waste incineration	waste management	municipal incineration	kg	CH	0.031955
2095	2997 disposal, copper in car shredder residue, 0% water, to municipal incineration	waste management	municipal incineration	kg	CH	0.074271
2096	2998 disposal, copper, 0% water, to municipal incineration	waste management	municipal incineration	kg	CH	0.029078
6715	2999 disposal, digester sludge, to incineration, future, allocation price	waste management	municipal incineration	kg	CH	0.0078649
6714	3000 disposal, digester sludge, to municipal incineration	waste management	municipal incineration	kg	CH	0.01227
2097	3001 disposal, emulsion paint, 0% water, to municipal incineration	waste management	municipal incineration	kg	CH	1.1267
2098	3002 disposal, expanded polystyrene, 5% water, to municipal incineration	waste management	municipal incineration	kg	CH	3.1491
2099	3003 disposal, glass, 0% water, to municipal incineration	waste management	municipal incineration	kg	CH	0.024683
2100	3004 disposal, hard coal ash from stove, 0% water, to municipal incineration	waste management	municipal incineration	kg	CH	0.027965
2101	3005 disposal, lead in car shredder residue, 0% water, to municipal incineration	waste management	municipal incineration	kg	CH	0.2096
2102	3006 disposal, lignite ash from stove, 0% water, to municipal incineration	waste management	municipal incineration	kg	CH	0.034997
2103	3007 disposal, municipal solid waste, 22.9% water, to municipal incineration	waste management	municipal incineration	kg	CH	0.50484
2104	3008 disposal, newspaper, 14.7% water, to municipal incineration	waste management	municipal incineration	kg	CH	0.017707
2105	3009 disposal, packaging cardboard, 19.6% water, to municipal incineration	waste management	municipal incineration	kg	CH	0.025153
2106	3010 disposal, packaging paper, 13.7% water, to municipal incineration	waste management	municipal incineration	kg	CH	0.024694
2107	3011 disposal, paint, 0% water, to municipal incineration	waste management	municipal incineration	kg	CH	2.3803
2108	3012 disposal, paper, 11.2% water, to municipal incineration	waste management	municipal incineration	kg	CH	0.02402
2110	3013 disposal, plastic, consumer electronics, 15.3% water, to municipal incineration	waste management	municipal incineration	kg	CH	3.029
2111	3014 disposal, plastic, industr. electronics, 15.3% water, to municipal incineration	waste management	municipal incineration	kg	CH	2.9799
2112	3015 disposal, plastics, mixture, 15.3% water, to municipal incineration	waste management	municipal incineration	kg	CH	2.3483
2113	3016 disposal, polyethylene terephthalate, 0.2% water, to municipal incineration	waste management	municipal incineration	kg	CH	2.033
2114	3017 disposal, polyethylene, 0.4% water, to municipal incineration	waste management	municipal incineration	kg	CH	2.9962
2115	3018 disposal, polypropylene, 15.9% water, to municipal incineration	waste management	municipal incineration	kg	CH	2.5352
2116	3019 disposal, polystyrene, 0.2% water, to municipal incineration	waste management	municipal incineration	kg	CH	3.1674
2117	3020 disposal, polyurethane, 0.2% water, to municipal incineration	waste management	municipal incineration	kg	CH	2.4706
2118	3021 disposal, polyvinylchloride, 0.2% water, to municipal incineration	waste management	municipal incineration	kg	CH	2.2611
2119	3022 disposal, polyvinylfluoride, 0.2% water, to municipal incineration	waste management	municipal incineration	kg	CH	2.1931
6717	3023 disposal, raw sewage sludge, to municipal incineration	waste management	municipal incineration	kg	CH	0.013026
10981	3024 disposal, residues, mechanical treatment, CRT screen, in MSWI	waste management	municipal incineration	kg	CH	2.7713
10992	3025 disposal, residues, mechanical treatment, IT accessoires, in MSWI	waste management	municipal incineration	kg	CH	2.8562
10982	3026 disposal, residues, mechanical treatment, LCD screen, in MSWI	waste management	municipal incineration	kg	CH	2.9273
10920	3027 disposal, residues, mechanical treatment, desktop computer, in MSWI	waste management	municipal incineration	kg	CH	2.2343
10984	3028 disposal, residues, mechanical treatment, industrial device, in MSWI	waste management	municipal incineration	kg	CH	2.3146
10921	3029 disposal, residues, mechanical treatment, laptop computer, in MSWI	waste management	municipal incineration	kg	CH	2.7766
10983	3030 disposal, residues, mechanical treatment, laser printer, in MSWI	waste management	municipal incineration	kg	CH	2.8913
10922	3031 disposal, residues, shredder fraction from manual dismantling, in MSWI	waste management	municipal incineration	kg	CH	2.8556
2121	3032 disposal, rubber, unspecified, 0% water, to municipal incineration	waste management	municipal incineration	kg	CH	3.1388
2122	3033 disposal, steel in car shredder residue, 0% water, to municipal incineration	waste management	municipal incineration	kg	CH	0.045029
2123	3034 disposal, steel, 0% water, to municipal incineration	waste management	municipal incineration	kg	CH	0.017355
2124	3035 disposal, textiles, soiled, 25% water, to municipal incineration	waste management	municipal incineration	kg	CH	0.14551
2125	3036 disposal, tin sheet, 0% water, to municipal incineration	waste management	municipal incineration	kg	CH	0.017535
2126	3037 disposal, vapour barrier, flame-retarded, 4.5% water, to municipal incineration	waste management	municipal incineration	kg	CH	2.816
2127	3038 disposal, wire plastic, 3.55% water, to municipal incineration	waste management	municipal incineration	kg	CH	2.3515
2128	3039 disposal, wood ash mixture, pure, 0% water, to municipal incineration	waste management	municipal incineration	kg	CH	0.022495
2129	3040 disposal, wood pole, chrome preserved, 20% water, to municipal incineration	waste management	municipal incineration	kg	CH	0.012754
2130	3041 disposal, wood untreated, 20% water, to municipal incineration	waste management	municipal incineration	kg	CH	0.01176
2131	3042 disposal, zinc in car shredder residue, 0% water, to municipal incineration	waste management	municipal incineration	kg	CH	0.27446
2132	3043 electricity from waste, at municipal waste incineration plant	waste management	municipal incineration	kWh	CH	0
6718	3044 electricity, biowaste, at waste incineration plant, allocation price	waste management	municipal incineration	kWh	CH	0.14692
6719	3045 electricity, biowaste, at waste incineration plant, future, alloc. price	waste management	municipal incineration	kWh	CH	0.071292
6721	3046 electricity, digester sludge, at incineration plant, future, alloc. price	waste management	municipal incineration	kWh	CH	0.18558
2133	3047 heat from waste, at municipal waste incineration plant	waste management	municipal incineration	MJ	CH	0
6723	3048 heat, biowaste, at waste incineration plant, allocation price	waste management	municipal incineration	MJ	CH	0.013977
6724	3049 heat, biowaste, at waste incineration plant, future, allocation price	waste management	municipal incineration	MJ	CH	0.0067679
6726	3050 heat, digester sludge, at incineration plant, future, allocation price	waste management	municipal incineration	MJ	CH	0.017652
2135	3051 process-specific burdens, municipal waste incineration	waste management	municipal incineration	kg	CH	0.00529
2136	3052 process-specific burdens, slag compartment	waste management	municipal incineration	kg	CH	0.0025819
5786	3053 disposal, lignite ash, 0% water, to opencast refill	waste management	others	kg	AT	0
5787	3054 disposal, lignite ash, 0% water, to opencast refill	waste management	others	kg	BA	0
5788	3055 disposal, lignite ash, 0% water, to opencast refill	waste management	others	kg	CZ	0
5789	3056 disposal, lignite ash, 0% water, to opencast refill	waste management	others	kg	DE	0
5790	3057 disposal, lignite ash, 0% water, to opencast refill	waste management	others	kg	ES	0
5791	3058 disposal, lignite ash, 0% water, to opencast refill	waste management	others	kg	FR	0
5792	3059 disposal, lignite ash, 0% water, to opencast refill	waste management	others	kg	GR	0
5793	3060 disposal, lignite ash, 0% water, to opencast refill	waste management	others	kg	HU	0
5794	3061 disposal, lignite ash, 0% water, to opencast refill	waste management	others	kg	MK	0
5795	3062 disposal, lignite ash, 0% water, to opencast refill	waste management	others	kg	PL	0
5796	3063 disposal, lignite ash, 0% water, to opencast refill	waste management	others	kg	SI	0
5797	3064 disposal, lignite ash, 0% water, to opencast refill	waste management	others	kg	SK	0
5798	3065 disposal, lignite ash, 0% water, to opencast refill	waste management	others	kg	CS	0
2141	3066 transport, municipal waste collection, lorry 21t	waste management	others	tkm	CH	1.311
10926	3067 Al fraction, mechanical treatment, CRT screen, at plant	waste management	recycling	kg	GLO	0
10989	3068 Al fraction, mechanical treatment, IT accessoires, at plant	waste management	recycling	kg	GLO	0
10931	3069 Al fraction, mechanical treatment, LCD screen, at plant	waste management	recycling	kg	GLO	0
10907	3070 Al fraction, mechanical treatment, desktop computer, at plant	waste management	recycling	kg	GLO	0
10941	3071 Al fraction, mechanical treatment, industrial devices, at plant	waste management	recycling	kg	GLO	0
10912	3072 Al fraction, mechanical treatment, laptop computer, at plant	waste management	recycling	kg	GLO	0
10936	3073 Al fraction, mechanical treatment, printer, laser, at plant	waste management	recycling	kg	GLO	0
10986	3074 Al fraction, mechanical treatment, shredder mat. of manual dismantling, at plant	waste management	recycling	kg	GLO	0

					Ecoinvent IPCC2007 GWP100		
Name			Category	Subcategory	Unit	Country	
10953	3075	Co powder, hydrometallurgical processing Li-ion batteries, at plant	waste management	recycling	kg	GLO	0
10949	3076	Co powder, pyrometallurgical processing Li-ion batteries, at plant	waste management	recycling	kg	GLO	0
10927	3077	Cu fraction, mechanical treatment, CRT screen, at plant	waste management	recycling	kg	GLO	0
10990	3078	Cu fraction, mechanical treatment, IT accessoires, at plant	waste management	recycling	kg	GLO	0
10932	3079	Cu fraction, mechanical treatment, LCD screen, at plant	waste management	recycling	kg	GLO	0
10908	3080	Cu fraction, mechanical treatment, desktop computer, at plant	waste management	recycling	kg	GLO	0
10942	3081	Cu fraction, mechanical treatment, industrial devices, at plant	waste management	recycling	kg	GLO	0
10913	3082	Cu fraction, mechanical treatment, laptop computer, at plant	waste management	recycling	kg	GLO	0
10937	3083	Cu fraction, mechanical treatment, printer, laser, at plant	waste management	recycling	kg	GLO	0
10987	3084	Cu fraction, mechanical treatment, shredder mat. of manual dismantling, at plant	waste management	recycling	kg	GLO	0
10902	3085	Disposal, power adapter, external, for laptop, to WEEE treatment	waste management	recycling	unit	CH	0.738
10925	3086	Fe fraction, mechanical treatment, CRT screen, at plant	waste management	recycling	kg	GLO	0
10988	3087	Fe fraction, mechanical treatment, IT accessoires, at plant	waste management	recycling	kg	GLO	0
10930	3088	Fe fraction, mechanical treatment, LCD screen, at plant	waste management	recycling	kg	GLO	0
10906	3089	Fe fraction, mechanical treatment, desktop computer, at plant	waste management	recycling	kg	GLO	0
10940	3090	Fe fraction, mechanical treatment, industrial devices, at plant	waste management	recycling	kg	GLO	0
10911	3091	Fe fraction, mechanical treatment, laptop computer, at plant	waste management	recycling	kg	GLO	0
10935	3092	Fe fraction, mechanical treatment, printer, laser, at plant	waste management	recycling	kg	GLO	0
10985	3093	Fe fraction, mechanical treatment, shredder mat. of manual dismantling, at plant	waste management	recycling	kg	GLO	0
10954	3094	Li salt, hydrometallurgical processing Li-ion batteries, at plant	waste management	recycling	kg	GLO	0
10951	3095	MnO2 powder, pyrometallurgical processing Li-ion batteries, at plant	waste management	recycling	kg	GLO	0
10945	3096	Ni-Co-Fe residues, pyrometallurgical processing NiMH batteries, at plant	waste management	recycling	kg	GLO	0
11144	3097	copper, secondary, from cable treatment, at plant	waste management	recycling	kg	GLO	0
10924	3098	dismantling, CRT screen, manually, at plant	waste management	recycling	kg	CH	0.61444
10928	3099	dismantling, CRT screen, mechanically, at plant	waste management	recycling	kg	GLO	0.67325
10991	3100	dismantling, IT accessoires, mechanically, at plant	waste management	recycling	kg	GLO	1.3925
10929	3101	dismantling, LCD screen, manually, at plant	waste management	recycling	kg	CH	1.2806
10933	3102	dismantling, LCD screen, mechanically, at plant	waste management	recycling	kg	GLO	1.2049
10905	3103	dismantling, desktop computer, manually, at plant	waste management	recycling	kg	CH	0.39629
10909	3104	dismantling, desktop computer, mechanically, at plant	waste management	recycling	kg	GLO	0.41264
10939	3105	dismantling, industrial devices, manually, at plant	waste management	recycling	kg	CH	0.26532
10943	3106	dismantling, industrial devices, mechanically, at plant	waste management	recycling	kg	GLO	0.30108
10910	3107	dismantling, laptop, manually, at plant	waste management	recycling	kg	CH	0.67044
10914	3108	dismantling, laptop, mechanically, at plant	waste management	recycling	kg	GLO	1.0298
10934	3109	dismantling, printer, laser, manually, at plant	waste management	recycling	kg	CH	2.0368
10938	3110	dismantling, printer, laser, mechanically, at plant	waste management	recycling	kg	GLO	2.0465
10915	3111	dismantling, shredder fraction from manual dismantling, mechanically, at plant	waste management	recycling	kg	GLO	1.0857
7050	3112	disposal, CRT screen, 17 inches, to WEEE treatment	waste management	recycling	unit	CH	13.129
7051	3113	disposal, LCD flat screen, 17 inches, to WEEE treatment	waste management	recycling	unit	CH	6.2826
10952	3114	disposal, Li-ions batteries, hydrometallurgical	waste management	recycling	kg	GLO	0.51065
10946	3115	disposal, Li-ions batteries, mixed technology	waste management	recycling	kg	GLO	0.92818
10947	3116	disposal, Li-ions batteries, pyrometallurgical	waste management	recycling	kg	GLO	1.3457
10944	3117	disposal, NiMH batteries	waste management	recycling	kg	GLO	0.63837
2142	3118	disposal, building, brick, to recycling	waste management	recycling	kg	CH	0.0033043
2143	3119	disposal, building, brick, to sorting plant	waste management	recycling	kg	CH	0.013334
2144	3120	disposal, building, cement (in concrete) and mortar, to sorting plant	waste management	recycling	kg	CH	0.020241
2145	3121	disposal, building, cement-fibre slab, to recycling	waste management	recycling	kg	CH	0.0033043
2146	3122	disposal, building, concrete gravel, to recycling	waste management	recycling	kg	CH	0.0040222
2147	3123	disposal, building, concrete gravel, to sorting plant	waste management	recycling	kg	CH	0.013978
2148	3124	disposal, building, concrete, not reinforced, to recycling	waste management	recycling	kg	CH	0.0040222
2149	3125	disposal, building, concrete, not reinforced, to sorting plant	waste management	recycling	kg	CH	0.013951
2150	3126	disposal, building, mineral wool, to recycling	waste management	recycling	kg	CH	0
2151	3127	disposal, building, plaster board, gypsum plaster, to recycling	waste management	recycling	kg	CH	0.0033043
2152	3128	disposal, building, plaster-cardboard sandwich, to recycling	waste management	recycling	kg	CH	0.0033043
2153	3129	disposal, building, reinforced concrete, to recycling	waste management	recycling	kg	CH	0.0056329
2154	3130	disposal, building, reinforced concrete, to sorting plant	waste management	recycling	kg	CH	0.015384
2155	3131	disposal, building, reinforced plaster board, to recycling	waste management	recycling	kg	CH	0.0033043
2156	3132	disposal, building, reinforcement steel, to recycling	waste management	recycling	kg	CH	0.057617
7049	3133	disposal, desktop computer, to WEEE treatment	waste management	recycling	unit	CH	4.6203
10976	3134	disposal, fluorescent lamps	waste management	recycling	kg	GLO	0.079413
7100	3135	disposal, industrial devices, to WEEE treatment	waste management	recycling	kg	CH	0.29286
7055	3136	disposal, keyboard, standard version, to WEEE treatment	waste management	recycling	unit	CH	1.7406
7052	3137	disposal, laptop computer, to WEEE treatment	waste management	recycling	unit	CH	2.9552
7056	3138	disposal, mouse device, optical, with cable, to WEEE treatment	waste management	recycling	unit	CH	0.1671
7053	3139	disposal, printer, laser jet, b/w, to WEEE treatment	waste management	recycling	unit	CH	12
7054	3140	disposal, printer, laser jet, colour, to WEEE treatment	waste management	recycling	unit	CH	12
10977	3141	disposal, treatment of CRT glass	waste management	recycling	kg	GLO	0.079477
10903	3142	disposal, treatment of batteries	waste management	recycling	kg	GLO	0.76881
10918	3143	disposal, treatment of cables	waste management	recycling	kg	GLO	0.92684
7095	3144	disposal, treatment of printed wiring boards	waste management	recycling	kg	GLO	0.084451
10993	3145	electronics scrap, for precious metal recovery, at preparation plant	waste management	recycling	kg	GLO	0
11119	3146	glass cullets, from fluorescent lamps treatment, at plant	waste management	recycling	kg	GLO	0
10979	3147	glass cullets, funnel glass, for CRT glass production, at plant	waste management	recycling	kg	GLO	0
10980	3148	glass cullets, mixed glass, for CRT glass production, at plant	waste management	recycling	kg	GLO	0
10978	3149	glass cullets, panel glass, for CRT glass production, at plant	waste management	recycling	kg	GLO	0
10955	3150	iron and steel, hydrometallurgical processing Li-ion batteries, at plant	waste management	recycling	kg	GLO	0
11118	3151	mercury, from fluorescent lamps treatment, at plant	waste management	recycling	kg	GLO	0
10956	3152	non-Fe-metals, hydrometallurgical processing Li-ion batteries, at plant	waste management	recycling	kg	GLO	0
10950	3153	non-Fe-metals, pyrometallurgical processing Li-ion batteries, at plant	waste management	recycling	kg	GLO	0
11120	3154	rare-earth activated phosphors, from fluorescent lamps treatment, at plant	waste management	recycling	kg	GLO	0
11121	3155	secondary metals, from fluorescent lamps treatment, at plant	waste management	recycling	kg	GLO	0
10904	3156	shredding, electrical and electronic scrap	waste management	recycling	kg	GLO	0.043419
10948	3157	steel, pyrometallurgical processing Li-ion batteries, at plant	waste management	recycling	kg	GLO	0
2170	3158	disposal, H3PO4 purification residue, 0% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.32865
2157	3159	disposal, ash from deinking sludge, 0% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.32865
2158	3160	disposal, ash from paper prod. sludge, 0% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.0095895
2159	3161	disposal, average incineration residue, 0% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.32865
2160	3162	disposal, basic oxygen furnace wastes, 0% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.32865
2161	3163	disposal, carbon SPL, Al electrolysis, 0% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.32862
2162	3164	disposal, catalyst base CH2O production, 0% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.0095895
2163	3165	disposal, catalyst base Ethoxide prod., 0% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.0095895
2164	3166	disposal, cement, hydrated, 0% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.0095895
2165	3167	disposal, decarbonising waste, 30% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.0095895
2166	3168	disposal, drilling waste, 71.5% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.0095895
2167	3169	disposal, dross from Al electrolysis, 0% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.0095895
2203	3170	disposal, dust, alloyed EAF steel, 15.4% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.32865
2204	3171	disposal, dust, unalloyed EAF steel, 15.4% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.0095895
2168	3172	disposal, filter dust Al electrolysis, 0% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.32855
7089	3173	disposal, frit for CRT tube production, to residual material landfill	waste management	residual material landfill	kg	CH	0.32865
2169	3174	disposal, green liquor dregs, 25% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.32865
2171	3175	disposal, hard coal ash, 0% water, to residual material landfill	waste management	residual material landfill	kg	ES	0.0095895
2172	3176	disposal, hard coal ash, 0% water, to residual material landfill	waste management	residual material landfill	kg	PL	0.0095895
2173	3177	disposal, hard coal ash, 0% water, to residual material landfill	waste management	residual material landfill	kg	CZ	0.0095895
2174	3178	disposal, hard coal ash, 0% water, to residual material landfill	waste management	residual material landfill	kg	HR	0.0095895
2175	3179	disposal, hard coal ash, 0% water, to residual material landfill	waste management	residual material landfill	kg	SK	0.0095895
2176	3180	disposal, hard coal ash, 0% water, to residual material landfill	waste management	residual material landfill	kg	AT	0.0095895

					Ecoinvent IPCC2007 GWP100	
	Name	Category	Subcategory	Unit	Country	
2177	3181 disposal, hard coal ash, 0% water, to residual material landfill	waste management	residual material landfill	kg	BE	0.0095895
2178	3182 disposal, hard coal ash, 0% water, to residual material landfill	waste management	residual material landfill	kg	DE	0.0095895
2179	3183 disposal, hard coal ash, 0% water, to residual material landfill	waste management	residual material landfill	kg	FR	0.0095895
2180	3184 disposal, hard coal ash, 0% water, to residual material landfill	waste management	residual material landfill	kg	IT	0.0095895
2181	3185 disposal, hard coal ash, 0% water, to residual material landfill	waste management	residual material landfill	kg	NL	0.0095895
2182	3186 disposal, hard coal ash, 0% water, to residual material landfill	waste management	residual material landfill	kg	PT	0.0095895
7162	3187 disposal, lead smelter slag, 0% water, to residual material landfill	waste management	residual material landfill	kg	GLO	0.0095895
2210	3188 disposal, nickel smelter slag, 0% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.0095895
2196	3189 disposal, non-sulfidic overburden, off-site	waste management	residual material landfill	kg	GLO	0
2197	3190 disposal, non-sulfidic tailings, off-site	waste management	residual material landfill	kg	GLO	0
2198	3191 disposal, pollutants from rail ballast, 0% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.32865
2199	3192 disposal, redmud from bauxite digestion, 0% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.0095895
2200	3193 disposal, refractory SPL, Al elec.lysis, 0% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.32881
5855	3194 disposal, residue from TiO2 prod. Cl, 56% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.0096106
5854	3195 disposal, residue from TiO2 prod. SO4, 30% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.32865
2201	3196 disposal, residues Na-dichromate prod., 0% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.32865
2202	3197 disposal, salt tailings potash mining, 0% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.0095895
2205	3198 disposal, slag, unalloyed electr. steel, 0% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.0095895
2206	3199 disposal, sludge from steel rolling, 20% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.32865
2207	3200 disposal, sludge, NaCl electrolysis Hg, 0% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.32865
2208	3201 disposal, sludge, NaCl electrolysis, 0% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.32865
2209	3202 disposal, sludge, pig iron production, 8.6% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.32865
2211	3203 disposal, sulfidic tailings, off-site	waste management	residual material landfill	kg	GLO	0
2212	3204 disposal, waste, Si waferprod., inorg. 9.4% water, to residual material landfill	waste management	residual material landfill	kg	CH	0.32865
2213	3205 process-specific burdens, residual material landfill	waste management	residual material landfill	kg	CH	0.0030317
2215	3206 disposal, aluminium, 0% water, to sanitary landfill	waste management	sanitary landfill	kg	CH	0.021488
2216	3207 disposal, asphalt, 0.1% water, to sanitary landfill	waste management	sanitary landfill	kg	CH	0.017631
2217	3208 disposal, bitumen, 1.4% water, to sanitary landfill	waste management	sanitary landfill	kg	CH	0.11373
2218	3209 disposal, emulsion paint, 0% water, to sanitary landfill	waste management	sanitary landfill	kg	CH	0.04501
2219	3210 disposal, gypsum, 19.4% water, to sanitary landfill	waste management	sanitary landfill	kg	CH	0.013375
2220	3211 disposal, hard coal ash from stove, 0% water, to sanitary landfill	waste management	sanitary landfill	kg	CH	0.073759
2221	3212 disposal, inert material, 0% water, to sanitary landfill	waste management	sanitary landfill	kg	CH	0.012257
2222	3213 disposal, lignite ash from stove, 0% water, to sanitary landfill	waste management	sanitary landfill	kg	CH	0.074003
2223	3214 disposal, municipal solid waste, 22.9% water, to sanitary landfill	waste management	sanitary landfill	kg	CH	0.56003
2224	3215 disposal, newspaper, 14.7% water, to sanitary landfill	waste management	sanitary landfill	kg	CH	0.64567
2225	3216 disposal, packaging cardboard, 19.6% water, to sanitary landfill	waste management	sanitary landfill	kg	CH	1.3661
2226	3217 disposal, packaging paper, 13.7% water, to sanitary landfill	waste management	sanitary landfill	kg	CH	1.062
2227	3218 disposal, paint, 0% water, to sanitary landfill	waste management	sanitary landfill	kg	CH	0.091648
2228	3219 disposal, paper, 11.2% water, to sanitary landfill	waste management	sanitary landfill	kg	CH	1.0642
2229	3220 disposal, plastic plaster, 0% water, to sanitary landfill	waste management	sanitary landfill	kg	CH	0.015376
2230	3221 disposal, plastics, mixture, 15.3% water, to sanitary landfill	waste management	sanitary landfill	kg	CH	0.089694
2231	3222 disposal, polyethylene terephthalate, 0.2% water, to sanitary landfill	waste management	sanitary landfill	kg	CH	0.080132
2232	3223 disposal, polyethylene, 0.4% water, to sanitary landfill	waste management	sanitary landfill	kg	CH	0.11265
2233	3224 disposal, polypropylene, 15.9% water, to sanitary landfill	waste management	sanitary landfill	kg	CH	0.096824
2234	3225 disposal, polystyrene, 0.2% water, to sanitary landfill	waste management	sanitary landfill	kg	CH	0.11806
2235	3226 disposal, polyurethane, 0.2% water, to sanitary landfill	waste management	sanitary landfill	kg	CH	0.092452
2236	3227 disposal, polyvinylchloride, 0.2% water, to sanitary landfill	waste management	sanitary landfill	kg	CH	0.065943
2237	3228 disposal, refinery sludge, 89.5% water, to sanitary landfill	waste management	sanitary landfill	kg	CH	0.64605
2238	3229 disposal, residue from cooling tower, 30% water, to sanitary landfill	waste management	sanitary landfill	kg	CH	0.01938
2239	3230 disposal, sludge from pulp and paper production, 25% water, to sanitary landfill	waste management	sanitary landfill	kg	CH	0.96126
2240	3231 disposal, tin sheet, 0% water, to sanitary landfill	waste management	sanitary landfill	kg	CH	0.013436
2241	3232 disposal, wood ash mixture, pure, 0% water, to sanitary landfill	waste management	sanitary landfill	kg	CH	0.018647
2242	3233 disposal, wood untreated, 20% water, to sanitary landfill	waste management	sanitary landfill	kg	CH	0.0770099
2245	3234 process-specific burdens, sanitary landfill	waste management	sanitary landfill	kg	CH	0.004603
2247	3235 disposal, catalyst for EDC production, 0% water, to underground deposit	waste management	underground deposit	kg	DE	0.18496
2249	3236 disposal, catalytic converter NOx reduction, 0% water, to underground deposit	waste management	underground deposit	kg	DE	0.18496
2248	3237 disposal, catalytic converter for cars, 0% water, to underground deposit	waste management	underground deposit	kg	DE	0.18496
2250	3238 disposal, hazardous waste, 0% water, to underground deposit	waste management	underground deposit	kg	DE	0.18496
2251	3239 disposal, sludge from FeCl3 production, 30% water, to underground deposit	waste management	underground deposit	kg	DE	0.6028
2252	3240 disposal, spent activated carbon with mercury, 0% water, to underground deposit	waste management	underground deposit	kg	DE	0.014682
2253	3241 disposal, waste, silicon wafer production, 0% water, to underground deposit	waste management	underground deposit	kg	DE	0.082274
7088	3242 treatment, CRT tube production effluent, to wastewater treatment, class 2	waste management	wastewater treatment	m3	CH	1.3244
7104	3243 treatment, LCD backlight production effluent, to wastewater treatment, class 2	waste management	wastewater treatment	m3	CH	4.4173
10168	3244 treatment, LCD module production effluent, to wastewater treatment, class 2	waste management	wastewater treatment	m3	CH	8.3874
6876	3245 treatment, PV cell production effluent, to wastewater treatment, class 3	waste management	wastewater treatment	m3	CH	1.6289
2260	3246 treatment, black chrome coating effluent, to wastewater treatment, class 2	waste management	wastewater treatment	m3	CH	0.26655
2261	3247 treatment, ceramic production effluent, to wastewater treatment, class 3	waste management	wastewater treatment	m3	CH	0.29659
2262	3248 treatment, concrete production effluent, to wastewater treatment, class 3	waste management	wastewater treatment	m3	CH	0.33494
2263	3249 treatment, condensate from light oil boiler, to wastewater treatment, class 2	waste management	wastewater treatment	m3	CH	0.34822
2264	3250 treatment, fibre board production effluent, to wastewater treatment, class 3	waste management	wastewater treatment	m3	CH	13.071
2265	3251 treatment, glass production effluent, to wastewater treatment, class 2	waste management	wastewater treatment	m3	CH	0.4347
2266	3252 treatment, heat carrier liquid, 40% C3H8O2, to wastewater treatment, class 2	waste management	wastewater treatment	m3	CH	886.73
7107	3253 treatment, liquid crystal production effluent, to wastewater treatment, class 2	waste management	wastewater treatment	m3	CH	189.55
2267	3254 treatment, lorry production effluent, to wastewater treatment, class 1	waste management	wastewater treatment	m3	CH	0.21175
2268	3255 treatment, maize starch production effluent, to wastewater treatment, class 2	waste management	wastewater treatment	m3	CH	3.1434
2269	3256 treatment, particle board production effluent, to wastewater treatment, class 3	waste management	wastewater treatment	m3	CH	0.33179
2270	3257 treatment, pig iron production effluent, to wastewater treatment, class 3	waste management	wastewater treatment	m3	CH	0.29641
2271	3258 treatment, plywood production effluent, to wastewater treatment, class 3	waste management	wastewater treatment	m3	CH	0.93328
2272	3259 treatment, potato starch production effluent, to wastewater treatment, class 2	waste management	wastewater treatment	m3	CH	0.5313
2273	3260 treatment, rainwater mineral oil storage, to wastewater treatment, class 2	waste management	wastewater treatment	m3	CH	0.36457
6591	3261 treatment, sewage grass refinery, to wastewater treatment, class 3	waste management	wastewater treatment	m3	CH	80.367
6824	3262 treatment, sewage whey digestion, to wastewater treatment, class 4	waste management	wastewater treatment	m3	CH	18.521
2274	3263 treatment, sewage, from residence, to wastewater treatment, class 2	waste management	wastewater treatment	m3	CH	0.41754
2275	3264 treatment, sewage, to wastewater treatment, class 1	waste management	wastewater treatment	m3	CH	0.29866
2276	3265 treatment, sewage, to wastewater treatment, class 2	waste management	wastewater treatment	m3	CH	0.35241
2277	3266 treatment, sewage, to wastewater treatment, class 3	waste management	wastewater treatment	m3	CH	0.38498
2278	3267 treatment, sewage, to wastewater treatment, class 4	waste management	wastewater treatment	m3	CH	0.41984
2279	3268 treatment, sewage, to wastewater treatment, class 5	waste management	wastewater treatment	m3	CH	0.45956
2280	3269 treatment, sewage, unpolluted, from residence, to wastewater treatment, class 2	waste management	wastewater treatment	m3	CH	0.32956
2281	3270 treatment, sewage, unpolluted, to wastewater treatment, class 3	waste management	wastewater treatment	m3	CH	0.29639
11168	3271 treatment, soft fibreboard production effluent, to wastewater treatment, class 3	waste management	wastewater treatment	m3	CH	0.876
2282	3272 treatment, tube collector production effluent, to wastewater treatment, class 2	waste management	wastewater treatment	m3	CH	0.26464
10170	3273 treatment, wafer fabrication effluent, to wastewater treatment, class 2	waste management	wastewater treatment	m3	CH	0.54356
2288	3274 tap water, at user	water supply	production	kg	RER	0.00031838
5739	3275 tap water, at user	water supply	production	kg	CH	0.00016167
2290	3276 water, completely softened, at plant	water supply	production	kg	RER	0.000024404
2291	3277 water, decarbonised, at plant	water supply	production	kg	RER	0.000007779
2292	3278 water, deionised, at plant	water supply	production	kg	CH	0.00078935
7237	3279 water, ultrapure, at plant	water supply	production	kg	GLO	0.00067991
2293	3280 electricity, at wind power plant	wind power	power plants	kWh	RER	0.011418
2294	3281 electricity, at wind power plant	wind power	power plants	kWh	CH	0.017543
2295	3282 electricity, at wind power plant 2MW, offshore	wind power	power plants	kWh	OCE	0.01444
2296	3283 electricity, at wind power plant 600kW	wind power	power plants	kWh	CH	0.017432
2297	3284 electricity, at wind power plant 800kW	wind power	power plants	kWh	CH	0.016245
2298	3285 electricity, at wind power plant 800kW	wind power	power plants	kWh	RER	0.011356
2299	3286 electricity, at wind power plant Grenchenberg 150kW	wind power	power plants	kWh	CH	0.031487

						Ecoinvent IPCC2007 GWP100
Name		Category	Subcategory	Unit	Country	
2300	3287 electricity, at wind power plant Simplan 30kW	wind power	power plants	kWh	CH	0.054459
2319	3288 electricity, at cogen 6400kWth, wood, allocation energy	wood energy	cogeneration	kWh	CH	0.013261
2320	3289 electricity, at cogen 6400kWth, wood, allocation exergy	wood energy	cogeneration	kWh	CH	0.030269
2321	3290 electricity, at cogen 6400kWth, wood, allocation heat	wood energy	cogeneration	kWh	CH	0.0019608
2322	3291 electricity, at cogen 6400kWth, wood, emission control, allocation energy	wood energy	cogeneration	kWh	CH	0.038576
2323	3292 electricity, at cogen 6400kWth, wood, emission control, allocation exergy	wood energy	cogeneration	kWh	CH	0.094338
2324	3293 electricity, at cogen 6400kWth, wood, emission control, allocation heat	wood energy	cogeneration	kWh	CH	0.0020563
2325	3294 electricity, at cogen ORC 1400kWth, wood, allocation energy	wood energy	cogeneration	kWh	CH	0.019995
2326	3295 electricity, at cogen ORC 1400kWth, wood, allocation exergy	wood energy	cogeneration	kWh	CH	0.058806
2327	3296 electricity, at cogen ORC 1400kWth, wood, allocation heat	wood energy	cogeneration	kWh	CH	0.0077714
2328	3297 electricity, at cogen ORC 1400kWth, wood, emission control, allocation energy	wood energy	cogeneration	kWh	CH	0.049431
2329	3298 electricity, at cogen ORC 1400kWth, wood, emission control, allocation exergy	wood energy	cogeneration	kWh	CH	0.18161
2330	3299 electricity, at cogen ORC 1400kWth, wood, emission control, allocation heat	wood energy	cogeneration	kWh	CH	0.0085967
2331	3300 heat, at cogen 6400kWth, wood, allocation energy	wood energy	cogeneration	MJ	CH	0.0031545
2332	3301 heat, at cogen 6400kWth, wood, allocation exergy	wood energy	cogeneration	MJ	CH	0.0026445
2333	3302 heat, at cogen 6400kWth, wood, allocation heat	wood energy	cogeneration	MJ	CH	0.0034933
2334	3303 heat, at cogen 6400kWth, wood, emission control, allocation energy	wood energy	cogeneration	MJ	CH	0.010216
2335	3304 heat, at cogen 6400kWth, wood, emission control, allocation exergy	wood energy	cogeneration	MJ	CH	0.0086166
2336	3305 heat, at cogen 6400kWth, wood, emission control, allocation heat	wood energy	cogeneration	MJ	CH	0.011264
2337	3306 heat, at cogen ORC 1400kWth, wood, allocation energy	wood energy	cogeneration	MJ	CH	0.0033998
2338	3307 heat, at cogen ORC 1400kWth, wood, allocation exergy	wood energy	cogeneration	MJ	CH	0.00295
2339	3308 heat, at cogen ORC 1400kWth, wood, allocation heat	wood energy	cogeneration	MJ	CH	0.0035414
2340	3309 heat, at cogen ORC 1400kWth, wood, emission control, allocation energy	wood energy	cogeneration	MJ	CH	0.010903
2341	3310 heat, at cogen ORC 1400kWth, wood, emission control, allocation exergy	wood energy	cogeneration	MJ	CH	0.0095089
2342	3311 heat, at cogen ORC 1400kWth, wood, emission control, allocation heat	wood energy	cogeneration	MJ	CH	0.011334
2343	3312 wood chips, burned in cogen 6400kWth	wood energy	cogeneration	MJ	CH	0.0027245
2344	3313 wood chips, burned in cogen 6400kWth, emission control	wood energy	cogeneration	MJ	CH	0.0086844
2345	3314 wood chips, burned in cogen ORC 1400kWth	wood energy	cogeneration	MJ	CH	0.002789
2346	3315 wood chips, burned in cogen ORC 1400kWth, emission control	wood energy	cogeneration	MJ	CH	0.0087738
2347	3316 charcoal, at plant	wood energy	fuels	kg	GLO	1.1228
2348	3317 logs, hardwood, at forest	wood energy	fuels	m3	RER	13.771
2349	3318 logs, mixed, at forest	wood energy	fuels	m3	RER	15.908
2350	3319 logs, softwood, at forest	wood energy	fuels	m3	RER	16.74
6098	3320 waste wood chips, mixed, from industry, u=40%, at plant	wood energy	fuels	m3	CH	4.7015
2351	3321 wood chips, hardwood, from industry, u=40%, at plant	wood energy	fuels	m3	RER	3.376
2352	3322 wood chips, hardwood, u=80%, at forest	wood energy	fuels	m3	RER	5.6198
2353	3323 wood chips, mixed, from industry, u=40%, at plant	wood energy	fuels	m3	RER	3.1375
2354	3324 wood chips, mixed, u=120%, at forest	wood energy	fuels	m3	RER	5.5095
2355	3325 wood chips, softwood, from industry, u=40%, at plant	wood energy	fuels	m3	RER	3.0447
2356	3326 wood chips, softwood, u=140%, at forest	wood energy	fuels	m3	RER	5.4666
2358	3327 wood pellets, u=10%, at storehouse	wood energy	fuels	m3	RER	103.4
2381	3328 heat, hardwood chips from forest, at furnace 1000kW	wood energy	heating systems	MJ	CH	0.004056
2382	3329 heat, hardwood chips from forest, at furnace 300kW	wood energy	heating systems	MJ	CH	0.0042694
2383	3330 heat, hardwood chips from forest, at furnace 50kW	wood energy	heating systems	MJ	CH	0.0055869
2384	3331 heat, hardwood chips from industry, at furnace 1000kW	wood energy	heating systems	MJ	CH	0.0031826
2385	3332 heat, hardwood chips from industry, at furnace 300kW	wood energy	heating systems	MJ	CH	0.003428
2386	3333 heat, hardwood chips from industry, at furnace 50kW	wood energy	heating systems	MJ	CH	0.0047249
2387	3334 heat, hardwood logs, at furnace 100kW	wood energy	heating systems	MJ	CH	0.0046432
2388	3335 heat, hardwood logs, at furnace 30kW	wood energy	heating systems	MJ	CH	0.0054563
2389	3336 heat, hardwood logs, at wood heater 6kW	wood energy	heating systems	MJ	CH	0.005932
2390	3337 heat, mixed chips from forest, at furnace 1000kW	wood energy	heating systems	MJ	CH	0.0045448
2391	3338 heat, mixed chips from forest, at furnace 300kW	wood energy	heating systems	MJ	CH	0.0047747
2392	3339 heat, mixed chips from forest, at furnace 50kW	wood energy	heating systems	MJ	CH	0.0062923
2393	3340 heat, mixed chips from industry, at furnace 1000kW	wood energy	heating systems	MJ	CH	0.0032993
2394	3341 heat, mixed chips from industry, at furnace 300kW	wood energy	heating systems	MJ	CH	0.0036032
2395	3342 heat, mixed chips from industry, at furnace 50kW	wood energy	heating systems	MJ	CH	0.005092
2396	3343 heat, mixed logs, at furnace 100kW	wood energy	heating systems	MJ	CH	0.0053553
2397	3344 heat, mixed logs, at furnace 30kW	wood energy	heating systems	MJ	CH	0.0061885
2398	3345 heat, mixed logs, at wood heater 6kW	wood energy	heating systems	MJ	CH	0.0065944
2399	3346 heat, softwood chips from forest, at furnace 1000kW	wood energy	heating systems	MJ	CH	0.0047955
2400	3347 heat, softwood chips from forest, at furnace 300kW	wood energy	heating systems	MJ	CH	0.0050303
2401	3348 heat, softwood chips from forest, at furnace 50kW	wood energy	heating systems	MJ	CH	0.0066241
2402	3349 heat, softwood chips from industry, at furnace 1000kW	wood energy	heating systems	MJ	CH	0.0033698
2403	3350 heat, softwood chips from industry, at furnace 300kW	wood energy	heating systems	MJ	CH	0.0036986
2404	3351 heat, softwood chips from industry, at furnace 50kW	wood energy	heating systems	MJ	CH	0.0052596
2405	3352 heat, softwood logs, at furnace 100kW	wood energy	heating systems	MJ	CH	0.0057644
2406	3353 heat, softwood logs, at furnace 30kW	wood energy	heating systems	MJ	CH	0.006609
2407	3354 heat, softwood logs, at wood heater 6kW	wood energy	heating systems	MJ	CH	0.0069749
2408	3355 heat, wood pellets, at furnace 15kW	wood energy	heating systems	MJ	CH	0.015253
2409	3356 heat, wood pellets, at furnace 50kW	wood energy	heating systems	MJ	CH	0.0139
2410	3357 logs, hardwood, burned in furnace 100kW	wood energy	heating systems	MJ	CH	0.003247
2411	3358 logs, hardwood, burned in furnace 30kW	wood energy	heating systems	MJ	CH	0.0037118
2412	3359 logs, hardwood, burned in wood heater 6kW	wood energy	heating systems	MJ	CH	0.0044602
2413	3360 logs, mixed, burned in furnace 100kW	wood energy	heating systems	MJ	CH	0.003745
2414	3361 logs, mixed, burned in furnace 30kW	wood energy	heating systems	MJ	CH	0.0042099
2415	3362 logs, mixed, burned in wood heater 6kW	wood energy	heating systems	MJ	CH	0.0049582
2416	3363 logs, softwood, burned in furnace 100kW	wood energy	heating systems	MJ	CH	0.004031
2417	3364 logs, softwood, burned in furnace 30kW	wood energy	heating systems	MJ	CH	0.0044959
2418	3365 logs, softwood, burned in wood heater 6kW	wood energy	heating systems	MJ	CH	0.0052443
2419	3366 pellets, mixed, burned in furnace 15kW	wood energy	heating systems	MJ	CH	0.012502
2420	3367 pellets, mixed, burned in furnace 50kW	wood energy	heating systems	MJ	CH	0.011779
2421	3368 wood chips, from forest, hardwood, burned in furnace 1000kW	wood energy	heating systems	MJ	CH	0.0034373
2422	3369 wood chips, from forest, hardwood, burned in furnace 300kW	wood energy	heating systems	MJ	CH	0.0034995
2423	3370 wood chips, from forest, hardwood, burned in furnace 50kW	wood energy	heating systems	MJ	CH	0.0044695
2424	3371 wood chips, from forest, mixed, burned in furnace 1000kW	wood energy	heating systems	MJ	CH	0.0038515
2425	3372 wood chips, from forest, mixed, burned in furnace 300kW	wood energy	heating systems	MJ	CH	0.0039137
2426	3373 wood chips, from forest, mixed, burned in furnace 50kW	wood energy	heating systems	MJ	CH	0.0050338
2427	3374 wood chips, from forest, softwood, burned in furnace 1000kW	wood energy	heating systems	MJ	CH	0.004064
2428	3375 wood chips, from forest, softwood, burned in furnace 300kW	wood energy	heating systems	MJ	CH	0.0041232
2429	3376 wood chips, from forest, softwood, burned in furnace 50kW	wood energy	heating systems	MJ	CH	0.0052992
2430	3377 wood chips, from industry, hardwood, burned in furnace 1000kW	wood energy	heating systems	MJ	CH	0.0026971
2431	3378 wood chips, from industry, hardwood, burned in furnace 300kW	wood energy	heating systems	MJ	CH	0.0028099
2432	3379 wood chips, from industry, hardwood, burned in furnace 50kW	wood energy	heating systems	MJ	CH	0.0037799
2433	3380 wood chips, from industry, mixed, burned in furnace 1000kW	wood energy	heating systems	MJ	CH	0.002796
2434	3381 wood chips, from industry, mixed, burned in furnace 300kW	wood energy	heating systems	MJ	CH	0.0029535
2435	3382 wood chips, from industry, mixed, burned in furnace 50kW	wood energy	heating systems	MJ	CH	0.0040736
2436	3383 wood chips, from industry, softwood, burned in furnace 1000kW	wood energy	heating systems	MJ	CH	0.0028558
2437	3384 wood chips, from industry, softwood, burned in furnace 300kW	wood energy	heating systems	MJ	CH	0.0030317
2438	3385 wood chips, from industry, softwood, burned in furnace 50kW	wood energy	heating systems	MJ	CH	0.0042077
10199	3386 azobe (SFM), standing, under bark, in rain forest	wooden materials	extraction	m3	CM	0
2439	3387 bark chips, softwood, u=140%, at forest road	wooden materials	extraction	m3	RER	2.0087
2440	3388 bark chips, softwood, u=140%, at plant	wooden materials	extraction	m3	RER	0
2441	3389 chips, Scandinavian softwood (plant-debarked), u=70%, at plant	wooden materials	extraction	m3	NORDEL	2.6788
2444	3390 diesel, burned in chopper	wooden materials	extraction	MJ	RER	0.098526
10212	3391 eucalyptus ssp., standing, under bark, u=50%, in plantation	wooden materials	extraction	m3	TH	0
2445	3392 fibreboard hard, at plant	wooden materials	extraction	m3	RER	584.55

						Ecoinvent	
						IPCC2007	
						GWP100	
Name	Category	Subcategory	Unit	Country			
2446	3393 fibreboard soft, at plant (u=7%)	wooden materials	extraction	m3	CH	53.875	
11166	3394 fibreboard soft, latex bonded, at plant (u=7%)	wooden materials	extraction	m3	CH	97.497	
11167	3395 fibreboard soft, without adhesives, at plant (u=7%)	wooden materials	extraction	m3	CH	78.399	
2447	3396 glued laminated timber, indoor use, at plant	wooden materials	extraction	m3	RER	206.51	
2448	3397 glued laminated timber, outdoor use, at plant	wooden materials	extraction	m3	RER	225.18	
5745	3398 hardwood, Scandinavian, standing, under bark, in forest	wooden materials	extraction	m3	NORDEL	0	
2449	3399 hardwood, allocation correction, 1	wooden materials	extraction	m3	RER	0	
2450	3400 hardwood, allocation correction, 2	wooden materials	extraction	m3	RER	0	
2451	3401 hardwood, allocation correction, 3	wooden materials	extraction	m3	RER	0	
2452	3402 hardwood, stand establishment / tending / site development, under bark	wooden materials	extraction	m3	RER	3.7076	
2453	3403 hardwood, standing, under bark, in forest	wooden materials	extraction	m3	RER	0	
2454	3404 industrial residual wood chopping, stationary electric chopper, at plant	wooden materials	extraction	kg	RER	0.010944	
2455	3405 industrial residue wood, 3-layered LB production, softwood, u=20%, at plant	wooden materials	extraction	m3	RER	6.6395	
2460	3406 industrial residue wood, GLT production, indoor use, u=10%, at plant	wooden materials	extraction	m3	RER	0	
2461	3407 industrial residue wood, GLT production, outdoor use, u=10%, at plant	wooden materials	extraction	m3	RER	0	
2464	3408 industrial residue wood, LTE production, hardwood, u=20%, at plant	wooden materials	extraction	m3	RER	0	
2465	3409 industrial residue wood, LTE production, softwood, u=20%, at plant	wooden materials	extraction	m3	RER	7.6285	
2456	3410 industrial residue wood, from planing, hard, air/kiln dried, u=10%, at plant	wooden materials	extraction	m3	RER	6.4487	
2457	3411 industrial residue wood, from planing, hardwood, kiln dried, u=10%, at plant	wooden materials	extraction	m3	RER	7.5685	
2458	3412 industrial residue wood, from planing, softwood, air dried, u=20%, at plant	wooden materials	extraction	m3	RER	5.8801	
2459	3413 industrial residue wood, from planing, softwood, kiln dried, u=10%, at plant	wooden materials	extraction	m3	RER	7.1377	
2462	3414 industrial residue wood, hardwood, including bark, air dried, u=20%, at plant	wooden materials	extraction	m3	RER	2.3249	
2463	3415 industrial residue wood, hardwood, including bark, u=70%, at plant	wooden materials	extraction	m3	RER	2.0394	
2466	3416 industrial residue wood, mix, hardwood, u=40%, at plant	wooden materials	extraction	m3	RER	2.0663	
2467	3417 industrial residue wood, mix, softwood, u=40%, at plant	wooden materials	extraction	m3	RER	3.1871	
2468	3418 industrial residue wood, plywood prod., indoor use, hardwood, u=20%, at plant	wooden materials	extraction	m3	RER	0	
2469	3419 industrial residue wood, plywood prod., outdoor use, hardwood, u=20%, at plant	wooden materials	extraction	m3	RER	0	
2470	3420 industrial residue wood, softwood, forest-debarked, air dried, u=20%, at plant	wooden materials	extraction	m3	RER	3.4384	
2471	3421 industrial residue wood, softwood, forest-debarked, u=70%, at plant	wooden materials	extraction	m3	RER	3.1258	
2472	3422 industrial residue wood, softwood, plant-debarked, u=70%, at plant	wooden materials	extraction	m3	RER	2.9433	
2473	3423 industrial residue wood, wood wool production, softwood, u=20%, at plant	wooden materials	extraction	m3	RER	0	
2475	3424 industrial wood, Scandinavian hardwood, under bark, u=80%, at forest road	wooden materials	extraction	m3	NORDEL	27.267	
2476	3425 industrial wood, Scandinavian softwood, under bark, u=140%, at forest road	wooden materials	extraction	m3	NORDEL	21.424	
2474	3426 industrial wood, hardwood, under bark, u=80%, at forest road	wooden materials	extraction	m3	RER	6.9885	
2477	3427 industrial wood, softwood, under bark, u=140%, at forest road	wooden materials	extraction	m3	RER	9.1453	
2478	3428 laminated timber element, transversally prestressed, for outdoor use, at plant	wooden materials	extraction	m3	RER	185.96	
2479	3429 medium density fibreboard, at plant	wooden materials	extraction	m3	RER	500.21	
10204	3430 meranti, standing, under bark, u=70%, in rainforest	wooden materials	extraction	m3	MY	0	
2480	3431 oriented strand board, at plant	wooden materials	extraction	m3	RER	312.07	
10207	3432 paraná pine, standing, under bark, in rain forest	wooden materials	extraction	m3	BR	0	
2481	3433 particle board, cement bonded, at plant	wooden materials	extraction	m3	RER	744.42	
2482	3434 particle board, indoor use, at plant	wooden materials	extraction	m3	RER	263.36	
2483	3435 particle board, outdoor use, at plant	wooden materials	extraction	m3	RER	329.07	
2485	3436 plywood, indoor use, at plant	wooden materials	extraction	m3	RER	501.08	
2486	3437 plywood, outdoor use, at plant	wooden materials	extraction	m3	RER	647.47	
6731	3438 provision, stubbed land	wooden materials	extraction	m2	BR	14.979	
6732	3439 provision, stubbed land	wooden materials	extraction	m2	MY	11.905	
2488	3440 raw cork, at forest road	wooden materials	extraction	kg	RER	0.020733	
2489	3441 residual wood, hardwood, under bark, air dried, u=20%, at forest road	wooden materials	extraction	m3	RER	8.3815	
2490	3442 residual wood, hardwood, under bark, u=80%, at forest road	wooden materials	extraction	m3	RER	7.3522	
2491	3443 residual wood, softwood, under bark, air dried, u=20%, at forest road	wooden materials	extraction	m3	RER	11.5	
2492	3444 residual wood, softwood, under bark, u=140%, at forest road	wooden materials	extraction	m3	RER	10.454	
2494	3445 round wood, Scandinavian softwood, under bark, u=70% at forest road	wooden materials	extraction	m3	NORDEL	17.95	
2493	3446 round wood, hardwood, under bark, u=70%, at forest road	wooden materials	extraction	m3	RER	14.488	
6729	3447 round wood, primary forest, clear-cutting, at forest road	wooden materials	extraction	m3	BR	8.5265	
6730	3448 round wood, primary forest, clear-cutting, at forest road	wooden materials	extraction	m3	MY	8.5266	
2495	3449 round wood, softwood, debarked, u=70% at forest road	wooden materials	extraction	m3	RER	16.538	
2496	3450 round wood, softwood, under bark, u=70% at forest road	wooden materials	extraction	m3	RER	14.099	
10201	3451 roundwood, azobe (SFM), debarked, u=30%, CM, at maritime harbour	wooden materials	extraction	m3	RER	232.9	
10200	3452 roundwood, azobe (SFM), under bark, u=30%, at forest road	wooden materials	extraction	m3	CM	99.074	
10213	3453 roundwood, eucalyptus ssp. (SFM), under bark, u=50%, at forest road	wooden materials	extraction	m3	TH	15.94	
10205	3454 roundwood, meranti (SFM), under bark, u=70%, at forest road	wooden materials	extraction	m3	MY	57.425	
10208	3455 roundwood, paraná pine (SFM), under bark, u=50%, at forest road	wooden materials	extraction	m3	BR	186.23	
2497	3456 sawdust, Scandinavian softwood (plant-debarked), u=70%, at plant	wooden materials	extraction	m3	NORDEL	2.5032	
2505	3457 sawn timber, Scandinavian softwood, raw, plant-debarked, u=70%, at plant	wooden materials	extraction	m3	NORDEL	72.093	
2499	3458 sawn timber, hardwood, planed, air / kiln dried, u=10%, at plant	wooden materials	extraction	m3	RER	95.763	
2500	3459 sawn timber, hardwood, planed, kiln dried, u=10%, at plant	wooden materials	extraction	m3	RER	112.39	
2501	3460 sawn timber, hardwood, raw, air / kiln dried, u=10%, at plant	wooden materials	extraction	m3	RER	66.006	
2502	3461 sawn timber, hardwood, raw, air dried, u=20%, at plant	wooden materials	extraction	m3	RER	58.708	
2503	3462 sawn timber, hardwood, raw, kiln dried, u=10%, at plant	wooden materials	extraction	m3	RER	80.613	
2504	3463 sawn timber, hardwood, raw, plant-debarked, u=70%, at plant	wooden materials	extraction	m3	RER	51.499	
2506	3464 sawn timber, softwood, planed, air dried, at plant	wooden materials	extraction	m3	RER	87.32	
2507	3465 sawn timber, softwood, planed, kiln dried, at plant	wooden materials	extraction	m3	RER	105.99	
2508	3466 sawn timber, softwood, raw, air dried, u=20%, at plant	wooden materials	extraction	m3	RER	58.59	
2509	3467 sawn timber, softwood, raw, forest-debarked, u=70%, at plant	wooden materials	extraction	m3	RER	53.263	
2510	3468 sawn timber, softwood, raw, kiln dried, u=10%, at plant	wooden materials	extraction	m3	RER	74.993	
2511	3469 sawn timber, softwood, raw, kiln dried, u=20%, at plant	wooden materials	extraction	m3	RER	69.416	
2512	3470 sawn timber, softwood, raw, plant-debarked, u=70%, at plant	wooden materials	extraction	m3	RER	50.154	
5746	3471 softwood, Scandinavian, standing, under bark, in forest	wooden materials	extraction	m3	NORDEL	0	
2513	3472 softwood, allocation correction, 1	wooden materials	extraction	m3	RER	0	
2514	3473 softwood, allocation correction, 2	wooden materials	extraction	m3	RER	0	
2515	3474 softwood, allocation correction, 3	wooden materials	extraction	m3	RER	0	
2516	3475 softwood, stand establishment / tending / site development, under bark	wooden materials	extraction	m3	RER	1.6434	
2517	3476 softwood, standing, under bark, in forest	wooden materials	extraction	m3	RER	0	
2519	3477 three layered laminated board, at plant	wooden materials	extraction	m3	RER	279.08	
2520	3478 wood chopping, mobile chopper, in forest	wooden materials	extraction	kg	RER	0.013894	
2521	3479 wood wool boards, cement bonded, at plant	wooden materials	extraction	m3	RER	202.26	
2522	3480 wood wool, u=20%, at plant	wooden materials	extraction	kg	RER	0.061572	
2523	3481 wood, cork oak, under bark, u=70%, at forest road	wooden materials	extraction	m3	RER	0.27032	
2526	3482 EUR-flat pallet	wooden materials	processing	unit	RER	6.155	
10216	3483 azobe, allocation correction 1	wooden materials	processing	m3	GLO	0	
10217	3484 azobe, allocation correction 2	wooden materials	processing	m3	GLO	0	
10203	3485 industrial residual wood, azobe (SFM), u=15%, CM, at sawmill	wooden materials	processing	m3	RER	55.903	
10210	3486 industrial residual wood, paraná pine (SFM), u=15%, at sawmill	wooden materials	processing	m3	BR	19.206	
10218	3487 paraná pine, allocation correction 1	wooden materials	processing	m3	GLO	0	
10219	3488 paraná pine, allocation correction 2	wooden materials	processing	m3	GLO	0	
10206	3489 roundwood, meranti (SFM), debarked, u=70%, MY, at maritime harbour	wooden materials	processing	m3	RER	250.43	
10202	3490 sawn timber (SFM), azobe, planed, air dried, u=15%, CM, at sawmill	wooden materials	processing	m3	RER	402.5	
10209	3491 sawn timber, paraná pine (SFM), kiln dried, u=15%, at sawmill	wooden materials	processing	m3	BR	653.54	
10211	3492 sawn timber, paraná pine (SFM), u=15%, BR, at maritime harbour	wooden materials	processing	m3	RER	741.78	
2527	3493 preservative treatment, logs, pressure vessel	wooden materials	refinement	m3	RER	3.6311	
2528	3494 preservative treatment, sawn timber, pressure vessel	wooden materials	refinement	m3	RER	6.7819	
1	3495 compost plant, open	agricultural means of production	buildings	unit	CH	725980	
2	3496 dried roughage store, air dried, solar	agricultural means of production	buildings	m3	CH	89.067	
4	3497 dried roughage store, cold-air dried, conventional	agricultural means of production	buildings	m3	CH	78.594	
6	3498 dried roughage store, non ventilated	agricultural means of production	buildings	m3	CH	60.799	



						Ecoinvent IPCC2007 GWP100
	Name	Category	Subcategory	Unit	Country	
8	3499 dung slab	agricultural means of production	buildings	m2	CH	129.91
9	3500 housing system with fully-slatted floor, pig	agricultural means of production	buildings	pig place	CH	1428.7
11	3501 label housing system, pig	agricultural means of production	buildings	pig place	CH	1482.5
13	3502 loose housing system, cattle	agricultural means of production	buildings	LU	CH	14326
15	3503 milking parlour	agricultural means of production	buildings	unit	CH	64270
16	3504 shed	agricultural means of production	buildings	m2	CH	217.33
17	3505 slurry store and processing	agricultural means of production	buildings	m3	CH	168.58
19	3506 tied housing system, cattle	agricultural means of production	buildings	LU	CH	14863
21	3507 tower silo, plastic	agricultural means of production	buildings	m3	CH	146.1
32	3508 agricultural machinery, general, production	agricultural means of production	machinery	kg	CH	3.8465
33	3509 agricultural machinery, tillage, production	agricultural means of production	machinery	kg	CH	4.4447
34	3510 harvester, production	agricultural means of production	machinery	kg	CH	4.5523
35	3511 slurry tanker, production	agricultural means of production	machinery	kg	CH	3.3903
36	3512 tractor, production	agricultural means of production	machinery	kg	CH	6.0962
37	3513 trailer, production	agricultural means of production	machinery	kg	CH	4.4593
6930	3514 stirling cogen unit 3kWe, wood pellets, future	biomass	cogeneration	unit	CH	2753.5
10767	3515 anaerobic digestion plant covered, agriculture	biomass	fuels	unit	CH	90824
6171	3516 anaerobic digestion plant, agriculture	biomass	fuels	unit	CH	43169
6170	3517 anaerobic digestion plant, biowaste	biomass	fuels	unit	CH	1109900
6172	3518 anaerobic digestion plant, sewage sludge	biomass	fuels	unit	CH	169640
6227	3519 ethanol fermentation plant	biomass	fuels	unit	CH	4571500
6105	3520 oil mill	biomass	fuels	unit	CH	3653100
6103	3521 synthetic gas plant	biomass	fuels	unit	CH	441690
6107	3522 vegetable oil esterification plant	biomass	fuels	unit	CH	2300000
242	3523 air separation plant	chemicals	inorganics	unit	RER	749290
303	3524 phosphate rock mine	chemicals	inorganics	unit	US	196520000
304	3525 phosphate rock mine	chemicals	inorganics	unit	MA	96580000
307	3526 phosphoric acid plant, fertiliser grade	chemicals	inorganics	unit	US	3133000
323	3527 silicone plant	chemicals	inorganics	unit	RER	1052200000
345	3528 storage building, chemicals, solid	chemicals	inorganics	unit	CH	3569400
381	3529 chemical plant, organics	chemicals	organics	unit	RER	123900000
415	3530 liquid storage tank, chemicals, organics	chemicals	organics	unit	CH	1286300
421	3531 methanol plant	chemicals	organics	unit	GLO	25571000
5724	3532 mine, bentonite	construction materials	additives	unit	DE	76669000
469	3533 mine, clay	construction materials	additives	unit	CH	14987000
470	3534 mine, gravel/sand	construction materials	additives	unit	CH	2249700
471	3535 mine, limestone	construction materials	additives	unit	CH	249300
6045	3536 mine, vermiculite	construction materials	additives	unit	ZA	445450
520	3537 cement plant	construction materials	others	unit	CH	34263000
521	3538 ceramic plant	construction materials	others	unit	CH	14615000
522	3539 concrete mixing plant	construction materials	others	unit	CH	3101600
524	3540 explosive production plant	construction materials	others	unit	CH	4347600
546	3541 building, hall	construction processes	buildings	m2	CH	297.45
547	3542 building, hall, steel construction	construction processes	buildings	m2	CH	309.67
548	3543 building, hall, wood construction	construction processes	buildings	m2	CH	268.94
549	3544 building, multi-storey	construction processes	buildings	m3	RER	209.54
551	3545 facilities, chemical production	construction processes	buildings	kg	RER	6.8861
555	3546 hydraulic digger	construction processes	civil engineering	unit	RER	41669
556	3547 building machine	construction processes	machinery	unit	RER	27728
557	3548 conveyor belt, at plant	construction processes	machinery	m	RER	1130.1
560	3549 industrial machine, heavy, unspecified, at plant	construction processes	machinery	kg	RER	1.9615
561	3550 power saw, with catalytic converter	construction processes	machinery	unit	RER	116.56
562	3551 power saw, without catalytic converter	construction processes	machinery	unit	RER	113.9
7368	3552 absorption chiller 100kW	cooling	production of components	unit	CH	20601
568	3553 distribution network, electricity, low voltage	electricity	distribution	km	CH	12744
570	3554 transmission network, electricity, high voltage	electricity	distribution	km	CH	43850
573	3555 transmission network, electricity, medium voltage	electricity	distribution	km	CH	18582
574	3556 transmission network, long-distance	electricity	distribution	km	UCTE	344220
7097	3557 electronic component machinery, unspecified	electronics	component	unit	GLO	19194
7083	3558 electronic component production plant	electronics	component	unit	GLO	277000000
10799	3559 printed wiring board mounting facilities, SMT type	electronics	module	unit	GLO	89202
10801	3560 printed wiring board mounting facilities, THT type	electronics	module	unit	GLO	16460
10798	3561 printed wiring board mounting plant	electronics	module	unit	GLO	7376600
6579	3562 sugar refinery	food industry	processing	unit	GLO	5442000
804	3563 flat glass plant	glass	construction	unit	RER	36576000
807	3564 glass etching plant	glass	construction	unit	DK	356940
809	3565 glass tube plant	glass	construction	unit	DE	26235000
814	3566 glass production site	glass	packaging	unit	RER	166060000
815	3567 glass sorting site	glass	packaging	unit	RER	2300400
845	3568 coal stove, 5-15 kW	hard coal	heating systems	unit	RER	682.06
853	3569 industrial furnace, coal, 1-10 MW	hard coal	heating systems	unit	RER	223630
868	3570 hard coal power plant	hard coal	power plants	unit	RER	145560000
11091	3571 hard coal power plant	hard coal	power plants	unit	CN	155300000
11070	3572 hard coal power plant, 100MW	hard coal	power plants	unit	GLO	30556000
11071	3573 hard coal power plant, 500MW	hard coal	power plants	unit	GLO	112510000
884	3574 hard coal briquettes production plant	hard coal	production	unit	RER	23410000
885	3575 hard coal coke production plant	hard coal	production	unit	RER	467990000
916	3576 open cast mine, hard coal	hard coal	production	unit	GLO	142980000
917	3577 underground mine, hard coal	hard coal	production	unit	GLO	122740000
11093	3578 underground mine, hard coal	hard coal	production	unit	CN	148130000
924	3579 borehole heat exchanger 150 m	heat pumps	production of components	unit	CH	2885.9
6933	3580 diffusion absorption heat pump 4kW, future	heat pumps	production of components	unit	CH	1197.9
925	3581 heat distribution, hydronic radiant floor heating, 150m2	heat pumps	production of components	unit	CH	2693
927	3582 heat pump 30kW	heat pumps	production of components	unit	RER	5053.2
926	3583 heat pump, brine-water, 10kW	heat pumps	production of components	unit	CH	1684.4
986	3584 reservoir hydropower plant	hydro power	production of components	unit	CH	12509000000
987	3585 reservoir hydropower plant, alpine region	hydro power	production of components	unit	RER	13703000000
988	3586 reservoir hydropower plant, non alpine regions	hydro power	production of components	unit	RER	13703000000
989	3587 run-of-river hydropower plant	hydro power	production of components	unit	CH	4325100000
990	3588 run-of-river hydropower plant	hydro power	production of components	unit	RER	4570500000
7161	3589 foam glass plant	insulation materials	production	unit	BE	18803000
999	3590 rock wool plant	insulation materials	production	unit	CH	60476000
1002	3591 tube insulation plant	insulation materials	production	unit	DE	7109100
1025	3592 lignite power plant	lignite	power plants	unit	RER	185490000
1041	3593 lignite briquettes production plant	lignite	production	unit	RER	23410000
1042	3594 lignite dust production plant	lignite	production	unit	RER	23410000
1043	3595 open cast mine, lignite	lignite	production	unit	RER	56700000
5894	3596 open cast mine, peat	lignite	production	unit	NORDEL	56700000
9620	3597 air compressor, screw-type compressor, 300 kW, at plant	mechanical engineering	compressed air equipment	unit	RER	11921
9619	3598 air compressor, screw-type compressor, 4 kW, at plant	mechanical engineering	compressed air equipment	unit	RER	650.02
1046	3599 aluminium casting, plant	metals	extraction	unit	RER	10970000
1047	3600 aluminium electrolysis, plant	metals	extraction	unit	RER	16499000
1049	3601 aluminium hydroxide, plant	metals	extraction	unit	RER	20614000
1050	3602 aluminium melting furnace	metals	extraction	unit	RER	593910
1051	3603 aluminium oxide, plant	metals	extraction	unit	RER	2401500
1062	3604 anode plant	metals	extraction	unit	RER	8600100

						Ecoinvent IPCC2007 GWP100
Name	Category	Subcategory	Unit	Country		
1064	3605 blast furnace	metals	extraction	unit	RER	57255000
1065	3606 blast oxygen furnace converter	metals	extraction	unit	RER	165230000
1094	3607 electric arc furnace converter	metals	extraction	unit	RER	97541000
8146	3608 facilities anode refinery, secondary copper	metals	extraction	unit	SE	19377000
8145	3609 facilities blister-copper conversion, secondary copper	metals	extraction	unit	SE	8428900
9272	3610 facilities precious metal refinery	metals	extraction	unit	SE	949100
1105	3611 magnesium plant	metals	extraction	unit	RER	148730000
1113	3612 mine, bauxite	metals	extraction	unit	GLO	3308400
10080	3613 mine, gold	metals	extraction	unit	CA	63686000
10081	3614 mine, gold	metals	extraction	unit	US	70140000
10082	3615 mine, gold	metals	extraction	unit	ZA	63686000
10083	3616 mine, gold	metals	extraction	unit	TZ	70140000
10084	3617 mine, gold	metals	extraction	unit	AU	70140000
10085	3618 mine, gold and silver	metals	extraction	unit	PG	70140000
10086	3619 mine, gold and silver	metals	extraction	unit	PE	70140000
10087	3620 mine, gold and silver	metals	extraction	unit	CL	70140000
10079	3621 mine, gold-silver-zinc-lead-copper	metals	extraction	unit	SE	70140000
1114	3622 mine, iron	metals	extraction	unit	GLO	14386000
1122	3623 non-ferrous metal mine, surface	metals	extraction	unit	GLO	70140000
1123	3624 non-ferrous metal mine, underground	metals	extraction	unit	GLO	63686000
1119	3625 non-ferrous metal smelter	metals	extraction	unit	GLO	771330000
1146	3626 scrap preparation plant	metals	extraction	unit	RER	6301500
10140	3627 metal working factory	metals	general manufacturing	unit	RER	102300000
10138	3628 metal working machine, unspecified, at plant	metals	general manufacturing	kg	RER	4.5376
1168	3629 rolling mill	metals	processing	unit	RER	67679
1183	3630 metal coating plant	metals	refinement	unit	RER	155870
1195	3631 solder production plant	metals	refinement	unit	RER	178470
1301	3632 Mini CHP plant, common components for heat+electricity	natural gas	cogeneration	unit	CH	1808
1302	3633 Mini CHP plant, components for electricity only	natural gas	cogeneration	unit	CH	748.23
1303	3634 Mini CHP plant, components for heat only	natural gas	cogeneration	unit	CH	6088
6915	3635 PEM fuel cell 2kW <sub>e</sub> , future	natural gas	cogeneration	unit	CH	2334.8
6920	3636 SOFC fuel cell 125kW <sub>e</sub> , future	natural gas	cogeneration	unit	CH	82856
6925	3637 SOFC-GT fuel cell 180kW <sub>e</sub> , future	natural gas	cogeneration	unit	CH	98150
1197	3638 assembly, generator and motor, Mini CHP plant	natural gas	cogeneration	unit	CH	273.5
1196	3639 assembly, generator and motor, cogen unit 160kW <sub>e</sub>	natural gas	cogeneration	unit	RER	1368.5
1198	3640 assembly, module cogen unit 160kW <sub>e</sub>	natural gas	cogeneration	unit	RER	5277.2
1199	3641 catalytic converter, three-way, 19.1 litre	natural gas	cogeneration	unit	RER	1343.4
1200	3642 catalytic converter, three-way, Mini CHP plant	natural gas	cogeneration	unit	CH	16.232
1201	3643 cogen unit 160kW <sub>e</sub> , common components for heat+electricity	natural gas	cogeneration	unit	RER	83217
1202	3644 cogen unit 160kW <sub>e</sub> , components for electricity only	natural gas	cogeneration	unit	RER	12105
1203	3645 cogen unit 160kW <sub>e</sub> , components for heat only	natural gas	cogeneration	unit	RER	16578
1204	3646 cogen unit 1MW <sub>e</sub> , common components for heat+electricity	natural gas	cogeneration	unit	RER	216160
1205	3647 cogen unit 1MW <sub>e</sub> , components for electricity only	natural gas	cogeneration	unit	RER	39608
1206	3648 cogen unit 1MW <sub>e</sub> , components for heat only	natural gas	cogeneration	unit	RER	43218
1207	3649 cogen unit 200kW <sub>e</sub> , common components for heat+electricity	natural gas	cogeneration	unit	RER	76500
1208	3650 cogen unit 200kW <sub>e</sub> , components for electricity only	natural gas	cogeneration	unit	RER	12105
1209	3651 cogen unit 200kW <sub>e</sub> , components for heat only	natural gas	cogeneration	unit	RER	16578
1210	3652 cogen unit 500kW <sub>e</sub> , common components for heat+electricity	natural gas	cogeneration	unit	RER	135720
1211	3653 cogen unit 500kW <sub>e</sub> , components for electricity only	natural gas	cogeneration	unit	RER	23200
1212	3654 cogen unit 500kW <sub>e</sub> , components for heat only	natural gas	cogeneration	unit	RER	28238
1213	3655 cogen unit 50kW <sub>e</sub> , common components for heat+electricity	natural gas	cogeneration	unit	RER	29796
1214	3656 cogen unit 50kW <sub>e</sub> , components for electricity only	natural gas	cogeneration	unit	RER	4272.6
1215	3657 cogen unit 50kW <sub>e</sub> , components for heat only	natural gas	cogeneration	unit	RER	6868.8
1216	3658 construction work, cogen unit 160kW <sub>e</sub>	natural gas	cogeneration	unit	RER	3089.2
1217	3659 control cabinet cogen unit 160kW <sub>e</sub>	natural gas	cogeneration	unit	RER	14599
1219	3660 electric parts of Mini CHP plant	natural gas	cogeneration	unit	CH	403.05
1218	3661 electric parts of cogen unit 160kW <sub>e</sub>	natural gas	cogeneration	unit	RER	7092.8
1248	3662 gas motor 206kW	natural gas	cogeneration	unit	RER	3840.5
1249	3663 gas motor Mini CHP plant	natural gas	cogeneration	unit	CH	236.75
1250	3664 generator 200kW <sub>e</sub>	natural gas	cogeneration	unit	RER	2915.2
1251	3665 generator Mini CHP plant	natural gas	cogeneration	unit	CH	57.345
1253	3666 heat exchanger of Mini CHP plant	natural gas	cogeneration	unit	CH	89.278
1252	3667 heat exchanger of cogen unit 160kW <sub>e</sub>	natural gas	cogeneration	unit	RER	1944.8
1298	3668 heating, sanitary equipment Mini CHP plant	natural gas	cogeneration	unit	CH	2202.9
1297	3669 heating, sanitary equipment cogen unit 160kW <sub>e</sub>	natural gas	cogeneration	unit	RER	5003.6
6910	3670 micro gas turbine 100kW <sub>e</sub>	natural gas	cogeneration	unit	CH	15294
1312	3671 operation start, cogen unit 160kW <sub>e</sub>	natural gas	cogeneration	unit	RER	54.573
1313	3672 planning, cogen unit 160kW <sub>e</sub>	natural gas	cogeneration	unit	RER	9466.5
1314	3673 planning, cogen unit Mini CHP plant	natural gas	cogeneration	unit	CH	474.88
1315	3674 sound insulation cogen unit 160kW <sub>e</sub>	natural gas	cogeneration	unit	RER	3422.5
6936	3675 stack PEM fuel cell 2kW <sub>e</sub> , future	natural gas	cogeneration	unit	CH	135.2
6937	3676 stack SOFC fuel cell 125kW <sub>e</sub> , future	natural gas	cogeneration	unit	CH	15369
1316	3677 storage 10'000 l	natural gas	cogeneration	unit	RER	4571.6
1317	3678 storage 650 l Mini CHP plant	natural gas	cogeneration	unit	CH	1886.7
1318	3679 supply air input/spent air output cogen unit 160kW <sub>e</sub>	natural gas	cogeneration	unit	RER	4274
6157	3680 natural gas service station	natural gas	fuels	unit	CH	21424
1338	3681 pipeline, natural gas, high pressure distribution network	natural gas	fuels	km	CH	77928
1339	3682 pipeline, natural gas, high pressure distribution network	natural gas	fuels	km	RER	62510
1340	3683 pipeline, natural gas, low pressure distribution network	natural gas	fuels	km	CH	69149
1341	3684 gas boiler	natural gas	heating systems	unit	RER	379.59
1353	3685 industrial furnace, natural gas	natural gas	heating systems	unit	RER	10338
5874	3686 gas combined cycle power plant, 400MW <sub>e</sub>	natural gas	power plants	unit	RER	59567000
1389	3687 gas power plant, 100MW <sub>e</sub>	natural gas	power plants	unit	RER	4805300
11050	3688 gas power plant, 300MW <sub>e</sub>	natural gas	power plants	unit	GLO	14413000
1390	3689 gas turbine, 10MW <sub>e</sub> , at production plant	natural gas	power plants	unit	RER	296760
1439	3690 pipeline, natural gas, long distance, high capacity, offshore	natural gas	production	km	GLO	1485900
1440	3691 pipeline, natural gas, long distance, high capacity, onshore	natural gas	production	km	GLO	1104500
1441	3692 pipeline, natural gas, long distance, low capacity, onshore	natural gas	production	km	GLO	834440
1442	3693 plant offshore, natural gas, production	natural gas	production	unit	OCE	49125000
1443	3694 plant onshore, natural gas, production	natural gas	production	unit	GLO	2828700
1444	3695 production plant, natural gas	natural gas	production	unit	GLO	9847500000
5929	3696 nuclear power plant, boiling water reactor 1000MW	nuclear power	power plants	unit	CH	341970000
5930	3697 nuclear power plant, boiling water reactor 1000MW	nuclear power	power plants	unit	DE	628240000
5931	3698 nuclear power plant, boiling water reactor 1000MW	nuclear power	power plants	unit	UCTE	561440000
11078	3699 nuclear power plant, boiling water reactor 1000MW	nuclear power	power plants	unit	US	688980000
5925	3700 nuclear power plant, pressure water reactor 1000MW	nuclear power	power plants	unit	CH	321550000
5926	3701 nuclear power plant, pressure water reactor 1000MW	nuclear power	power plants	unit	DE	608020000
5927	3702 nuclear power plant, pressure water reactor 1000MW	nuclear power	power plants	unit	FR	309540000
5928	3703 nuclear power plant, pressure water reactor 1000MW	nuclear power	power plants	unit	UCTE	541480000
11077	3704 nuclear power plant, pressure water reactor 1000MW	nuclear power	power plants	unit	US	668810000
11100	3705 nuclear power plant, pressure water reactor 1000MW	nuclear power	power plants	unit	CN	886280000
11106	3706 uranium conversion plant	nuclear power	power plants	unit	CN	262690000
5939	3707 nuclear fuel fabrication plant	nuclear power	production	unit	GLO	70126000
11079	3708 nuclear fuel fabrication plant	nuclear power	production	unit	US	70418000
11101	3709 nuclear fuel fabrication plant	nuclear power	production	unit	CN	70489000
5981	3710 uranium conversion plant	nuclear power	production	unit	US	261830000

						Ecoinvent IPCC2007 GWP100	
	Name	Category	Subcategory	Unit	Country		
5955	3711 uranium enrichment centrifuge plant	nuclear power	production	unit	GLO	348500000	
11086	3712 uranium enrichment centrifuge plant	nuclear power	production	unit	RU	349230000	
11103	3713 uranium enrichment centrifuge plant	nuclear power	production	unit	CN	354200000	
5956	3714 uranium enrichment diffusion plant	nuclear power	production	unit	US	3174900000	
5983	3715 uranium mill	nuclear power	production	unit	US	124780000	
5986	3716 uranium open pit mine	nuclear power	production	unit	RNA	6307000	
5987	3717 uranium underground mine	nuclear power	production	unit	RNA	4538200	
6003	3718 final repository for nuclear waste LLW	nuclear power	waste treatment	unit	CH	134110000	
6004	3719 final repository for nuclear waste SF, HLW, and ILW	nuclear power	waste treatment	unit	CH	143540000	
5996	3720 interim storage, nuclear waste to dispose in final repository LLW	nuclear power	waste treatment	unit	CH	4780300	
5997	3721 interim storage, nuclear waste to dispose in final repository SF, HLW, and ILW	nuclear power	waste treatment	unit	CH	4780300	
5992	3722 nuclear spent fuel conditioning plant	nuclear power	waste treatment	unit	CH	27441000	
11109	3723 nuclear spent fuel conditioning plant	nuclear power	waste treatment	unit	CN	27439000	
5994	3724 nuclear spent fuel reprocessing plant	nuclear power	waste treatment	unit	RER	983060000	
1527	3725 catalytic converter, SCR, 200 litre	oil	cogeneration	unit	RER	2036.7	
1526	3726 catalytic converter, oxidation, 20 litre	oil	cogeneration	unit	RER	849.53	
1528	3727 cogen unit 200kWe diesel SCR, common components for heat+electricity	oil	cogeneration	unit	RER	98971	
1529	3728 cogen unit 200kWe diesel SCR, components for electricity only	oil	cogeneration	unit	RER	12105	
1530	3729 cogen unit 200kWe diesel SCR, components for heat only	oil	cogeneration	unit	RER	16578	
1577	3730 refinery	oil	fuels	unit	RER	12870000	
1580	3731 chimney	oil	heating systems	m	CH	15.691	
1595	3732 industrial furnace 1MW, oil	oil	heating systems	unit	CH	10338	
1602	3733 oil boiler 100kW	oil	heating systems	unit	CH	1473.7	
1603	3734 oil boiler 10kW	oil	heating systems	unit	CH	379.59	
1604	3735 oil storage 3000l	oil	heating systems	unit	CH	991.23	
1632	3736 oil power plant 500MW	oil	power plants	unit	RER	132220000	
1651	3737 diesel-electric generating set production 10MW	oil	production	unit	RER	398170	
1656	3738 pipeline, crude oil, offshore	oil	production	km	OCE	1189800	
1657	3739 pipeline, crude oil, onshore	oil	production	km	RER	540050	
1658	3740 platform, crude oil, offshore	oil	production	unit	OCE	9273700	
1659	3741 production plant crude oil, onshore	oil	production	unit	GLO	24186000	
1660	3742 regional distribution, oil products	oil	production	unit	RER	4694800	
1663	3743 well for exploration and production, offshore	oil	production	m	OCE	2561.6	
1664	3744 well for exploration and production, onshore	oil	production	m	GLO	1706.2	
1697	3745 packaging box production unit	paper & cardboard	cardboard & corrugated board	unit	RER	5524500	
5835	3746 paper machine, at paper mill	paper & cardboard	graphic paper	unit	RER	28144000	
1706	3747 paper mill, integrated	paper & cardboard	graphic paper	unit	RER	171040000	
1707	3748 paper mill, non-integrated	paper & cardboard	graphic paper	unit	RER	117920000	
1729	3749 pulp plant	paper & cardboard	graphic paper	unit	RER	223020000	
1742	3750 waste paper sorting plant	paper & cardboard	pulps	unit	RER	5137500	
1762	3751 3kWp facade installation, multi-Si, laminated, integrated, at building	photovoltaic	production of components	unit	CH	5014.4	
1763	3752 3kWp facade installation, multi-Si, panel, mounted, at building	photovoltaic	production of components	unit	CH	5308.8	
1760	3753 3kWp facade installation, single-Si, laminated, integrated, at building	photovoltaic	production of components	unit	CH	5619	
1761	3754 3kWp facade installation, single-Si, panel, mounted, at building	photovoltaic	production of components	unit	CH	5895.8	
1765	3755 3kWp flat roof installation, multi-Si, on roof	photovoltaic	production of components	unit	CH	5455.9	
1764	3756 3kWp flat roof installation, single-Si, on roof	photovoltaic	production of components	unit	CH	6037.7	
6854	3757 3kWp slanted-roof installation, CIS, panel, mounted, on roof	photovoltaic	production of components	unit	CH	5402.9	
6853	3758 3kWp slanted-roof installation, CdTe, laminated, integrated, on roof	photovoltaic	production of components	unit	CH	4671	
6847	3759 3kWp slanted-roof installation, a-Si, laminated, integrated, on roof	photovoltaic	production of components	unit	CH	4703	
6848	3760 3kWp slanted-roof installation, a-Si, panel, mounted, on roof	photovoltaic	production of components	unit	CH	6088.8	
1770	3761 3kWp slanted-roof installation, multi-Si, laminated, integrated, on roof	photovoltaic	production of components	unit	CH	4911	
1771	3762 3kWp slanted-roof installation, multi-Si, panel, mounted, on roof	photovoltaic	production of components	unit	CH	5363.1	
6855	3763 3kWp slanted-roof installation, ribbon-Si, laminated, integrated, on roof	photovoltaic	production of components	unit	CH	4560.2	
6856	3764 3kWp slanted-roof installation, ribbon-Si, panel, mounted, on roof	photovoltaic	production of components	unit	CH	5056	
1767	3765 3kWp slanted-roof installation, single-Si, laminated, integrated, on roof	photovoltaic	production of components	unit	CH	5521.8	
1768	3766 3kWp slanted-roof installation, single-Si, panel, mounted, on roof	photovoltaic	production of components	unit	CH	5946.8	
1774	3767 electric installation, photovoltaic plant, at plant	photovoltaic	production of components	unit	CH	164.34	
6831	3768 facade construction, integrated, at building	photovoltaic	production of components	m2	RER	40.642	
6832	3769 facade construction, mounted, at building	photovoltaic	production of components	m2	RER	36.742	
6833	3770 flat roof construction, on roof	photovoltaic	production of components	m2	RER	40.571	
1778	3771 inverter, 2500W, at plant	photovoltaic	production of components	unit	RER	184.73	
6851	3772 inverter, 500W, at plant	photovoltaic	production of components	unit	RER	37.671	
6852	3773 inverter, 500kW, at plant	photovoltaic	production of components	unit	RER	13335	
1783	3774 photovoltaic cell factory	photovoltaic	production of components	unit	DE	1141300	
6866	3775 photovoltaic laminate, CIS, at plant	photovoltaic	production of components	m2	DE	112.37	
6864	3776 photovoltaic laminate, CdTe, at plant	photovoltaic	production of components	m2	US	79.995	
6865	3777 photovoltaic laminate, CdTe, at plant	photovoltaic	production of components	m2	DE	73.306	
6869	3778 photovoltaic laminate, CdTe, mix, at regional storage	photovoltaic	production of components	m2	RER	78.37	
6846	3779 photovoltaic laminate, a-Si, at plant	photovoltaic	production of components	m2	US	49.516	
6839	3780 photovoltaic laminate, multi-Si, at plant	photovoltaic	production of components	m2	RER	144.83	
6868	3781 photovoltaic laminate, ribbon-Si, at plant	photovoltaic	production of components	m2	RER	115.05	
6838	3782 photovoltaic laminate, single-Si, at plant	photovoltaic	production of components	m2	RER	184.12	
1792	3783 photovoltaic panel factory	photovoltaic	production of components	unit	GLO	255860	
6870	3784 photovoltaic panel, CIS, at plant	photovoltaic	production of components	m2	DE	123.12	
6845	3785 photovoltaic panel, a-Si, at plant	photovoltaic	production of components	m2	US	74.178	
6837	3786 photovoltaic panel, multi-Si, at plant	photovoltaic	production of components	m2	RER	160.52	
6871	3787 photovoltaic panel, ribbon-Si, at plant	photovoltaic	production of components	m2	RER	130.74	
6836	3788 photovoltaic panel, single-Si, at plant	photovoltaic	production of components	m2	RER	199.81	
6834	3789 slanted-roof construction, integrated, on roof	photovoltaic	production of components	m2	RER	36.105	
6835	3790 slanted-roof construction, mounted, on roof	photovoltaic	production of components	m2	RER	39.122	
1797	3791 wafer factory	photovoltaic	production of components	unit	DE	79024	
1857	3792 auxiliary heating, electric, 5kW, at plant	solar collector systems	production of components	unit	CH	6.6824	
1858	3793 evacuated tube collector, at plant	solar collector systems	production of components	m2	GB	92.855	
1859	3794 expansion vessel 25l, at plant	solar collector systems	production of components	unit	CH	16.846	
1860	3795 expansion vessel 80l, at plant	solar collector systems	production of components	unit	CH	39.82	
1861	3796 flat plate collector, at plant	solar collector systems	production of components	m2	CH	106.54	
1862	3797 heat storage 2000l, at plant	solar collector systems	production of components	unit	CH	800.86	
1863	3798 hot water tank 600l, at plant	solar collector systems	production of components	unit	CH	658.46	
1864	3799 hot water tank factory	solar collector systems	production of components	unit	CH	520540	
1865	3800 pump 40W, at plant	solar collector systems	production of components	unit	CH	7.0316	
1866	3801 solar collector factory	solar collector systems	production of components	unit	RER	1695000	
1877	3802 solar system with evacuated tube collector, one-family house, combined system	solar collector systems	systems	unit	CH	2391.8	
1878	3803 solar system, flat plate collector, multiple dwelling, hot water	solar collector systems	systems	unit	CH	10491	
1879	3804 solar system, flat plate collector, one-family house, combined system	solar collector systems	systems	unit	CH	2804.1	
1880	3805 solar system, flat plate collector, one-family house, hot water	solar collector systems	systems	unit	CH	1347.9	
5880	3806 aircraft, freight	transport systems	airplane	unit	RER	6107800	
5879	3807 aircraft, long haul	transport systems	airplane	unit	RER	6526100	
5878	3808 aircraft, medium haul	transport systems	airplane	unit	RER	2219500	
5881	3809 aircraft, passenger	transport systems	airplane	unit	RER	4972700	
1882	3810 airport	transport systems	airplane	unit	RER	433360000	
1883	3811 disposal, airport	transport systems	airplane	unit	RER	578940	
1884	3812 helicopter	transport systems	airplane	unit	GLO	5065.2	
6061	3813 bus	transport systems	road	unit	RER	37337	
6065	3814 disposal, bus	transport systems	road	unit	CH	1389.6	
1901	3815 disposal, lorry 16t	transport systems	road	unit	CH	701.37	
1902	3816 disposal, lorry 28t	transport systems	road	unit	CH	1117.5	

								Ecoinvent IPCC2007 GWP100	
	Name	Category	Subcategory	Unit	Country				
1903	3817 disposal, lorry 40t	transport systems	road	unit	CH			1710.3	
1904	3818 disposal, passenger car	transport systems	road	unit	RER			414.5	
1905	3819 disposal, road	transport systems	road	ma	RER			0.108	
6066	3820 disposal, tram	transport systems	road	unit	CH			2188.4	
6069	3821 disposal, tram track	transport systems	road	ma	CH			1.048	
5744	3822 disposal, van < 3.5t	transport systems	road	unit	CH			107.89	
1906	3823 lorry 16t	transport systems	road	unit	RER			19232	
1907	3824 lorry 28t	transport systems	road	unit	RER			27710	
1908	3825 lorry 40t	transport systems	road	unit	RER			38240	
6063	3826 maintenance, bus	transport systems	road	unit	CH			19374	
1909	3827 maintenance, lorry 16t	transport systems	road	unit	CH			10702	
1911	3828 maintenance, lorry 28t	transport systems	road	unit	CH			14174	
1912	3829 maintenance, lorry 40t	transport systems	road	unit	CH			20400	
1913	3830 maintenance, passenger car	transport systems	road	unit	RER			784.69	
6064	3831 maintenance, tram	transport systems	road	unit	CH			59266	
1914	3832 maintenance, van < 3.5t	transport systems	road	unit	RER			5812.3	
1932	3833 operation, maintenance, road	transport systems	road	ma	CH			6.5794	
6068	3834 operation, tram track	transport systems	road	ma	CH			9.3627	
1936	3835 passenger car	transport systems	road	unit	RER			4261.9	
1937	3836 road	transport systems	road	ma	CH			10.196	
1938	3837 road vehicle plant	transport systems	road	unit	RER			186580000	
1939	3838 roads, company, internal	transport systems	road	m2a	CH			1.2839	
6062	3839 tram	transport systems	road	unit	RER			65023	
6067	3840 tram track	transport systems	road	ma	CH			92.977	
1949	3841 van <3.5t	transport systems	road	unit	RER			7737.4	
1950	3842 barge	transport systems	ship	unit	RER			827430	
1951	3843 barge tanker	transport systems	ship	unit	RER			992800	
1952	3844 canal	transport systems	ship	ma	RER			57.275	
1955	3845 maintenance, barge	transport systems	ship	unit	RER			126390	
1956	3846 maintenance, operation, canal	transport systems	ship	ma	RER			1.8171	
1957	3847 maintenance, transoceanic freight ship	transport systems	ship	unit	RER			191320	
1960	3848 operation, maintenance, port	transport systems	ship	unit	RER			1206100000	
1963	3849 port facilities	transport systems	ship	unit	RER			77553000	
1964	3850 transoceanic freight ship	transport systems	ship	unit	OCE			11326000	
1965	3851 transoceanic tanker	transport systems	ship	unit	OCE			33723000	
6083	3852 ICE	transport systems	train	unit	DE			2441800	
6087	3853 disposal, ICE	transport systems	train	unit	DE			29930	
1971	3854 disposal, locomotive	transport systems	train	unit	RER			12057	
6089	3855 disposal, long-distance train	transport systems	train	unit	CH			8834.9	
1972	3856 disposal, railway track	transport systems	train	ma	CH			7.5154	
6088	3857 disposal, regional train	transport systems	train	unit	CH			1680.3	
1973	3858 goods wagon	transport systems	train	unit	RER			56238	
1974	3859 locomotive	transport systems	train	unit	RER			378230	
6085	3860 long-distance train	transport systems	train	unit	CH			1807300	
6091	3861 maintenance, ICE	transport systems	train	unit	DE			1882300	
1975	3862 maintenance, goods wagon	transport systems	train	unit	RER			54274	
1976	3863 maintenance, locomotive	transport systems	train	unit	RER			105540	
6093	3864 maintenance, long-distance train	transport systems	train	unit	CH			1054300	
6092	3865 maintenance, regional train	transport systems	train	unit	CH			64320	
1981	3866 operation, maintenance, railway track	transport systems	train	ma	CH			6.9779	
6095	3867 operation, maintenance, railway track, ICE	transport systems	train	ma	DE			4.4079	
1982	3868 railway track	transport systems	train	ma	CH			42.34	
6094	3869 railway track, ICE	transport systems	train	ma	DE			42.312	
6084	3870 regional train	transport systems	train	unit	CH			343260	
10880	3871 plastics processing factory	ventilation	production of components	unit	RER			127010000	
10879	3872 ventilation components factory	ventilation	production of components	unit	RER			52617000	
10884	3873 ventilation system, central, 1 x 720 m3/h, PE ducts, with GHE	ventilation	ventilation systems	unit	CH			7185	
10883	3874 ventilation system, central, 1 x 720 m3/h, steel ducts, with GHE	ventilation	ventilation systems	unit	CH			10946	
10882	3875 ventilation system, decentralized, 6 x 120 m3/h, PE ducts, with GHE	ventilation	ventilation systems	unit	CH			8683.4	
10886	3876 ventilation system, decentralized, 6 x 120 m3/h, PE ducts, without GHE	ventilation	ventilation systems	unit	CH			4505.3	
10881	3877 ventilation system, decentralized, 6 x 120 m3/h, steel ducts, with GHE	ventilation	ventilation systems	unit	CH			12444	
10885	3878 ventilation system, decentralized, 6 x 120 m3/h, steel ducts, without GHE	ventilation	ventilation systems	unit	CH			8266.3	
2066	3879 hazardous waste incineration plant	waste management	hazardous waste incineration	unit	CH			4968500	
2084	3880 inert material landfill facility	waste management	inert material landfill	unit	CH			3052000	
2134	3881 municipal waste incineration plant	waste management	municipal incineration	unit	CH			13800000	
2137	3882 slag compartment	waste management	municipal incineration	unit	CH			3171000	
2139	3883 lorry 21t, municipal waste collection	waste management	others	unit	CH			36615	
2140	3884 sorting plant for construction waste	waste management	others	unit	CH			229850	
10923	3885 facilities for mechanical treatment of WEEE scrap	waste management	recycling	unit	GLO			154900	
10916	3886 manual treatment plant, WEEE scrap	waste management	recycling	unit	GLO			448850	
10917	3887 mechanical treatment plant, WEEE scrap	waste management	recycling	unit	GLO			3319100	
2214	3888 residual material landfill facility	waste management	residual material landfill	unit	CH			3147800	
2246	3889 sanitary landfill facility	waste management	sanitary landfill	unit	CH			12433000	
2254	3890 residential sewer grid	waste management	wastewater treatment	km	CH			226840	
2255	3891 sewer grid, class 1	waste management	wastewater treatment	km	CH			664440	
2256	3892 sewer grid, class 2	waste management	wastewater treatment	km	CH			631920	
2257	3893 sewer grid, class 3	waste management	wastewater treatment	km	CH			596770	
2258	3894 sewer grid, class 4	waste management	wastewater treatment	km	CH			564840	
2259	3895 sewer grid, class 5	waste management	wastewater treatment	km	CH			527050	
2283	3896 wastewater treatment plant, class 1	waste management	wastewater treatment	unit	CH			142060000	
2284	3897 wastewater treatment plant, class 2	waste management	wastewater treatment	unit	CH			57831000	
2285	3898 wastewater treatment plant, class 3	waste management	wastewater treatment	unit	CH			21680000	
2286	3899 wastewater treatment plant, class 4	waste management	wastewater treatment	unit	CH			4775600	
2287	3900 wastewater treatment plant, class 5	waste management	wastewater treatment	unit	CH			728380	
5736	3901 pump station	water supply	production	unit	CH			160750	
5737	3902 water storage	water supply	production	unit	CH			320260	
5735	3903 water supply network	water supply	production	km	CH			45829	
2289	3904 water treatment plant, deionisation	water supply	production	unit	CH			134250	
5738	3905 water works	water supply	production	unit	CH			3814500	
2301	3906 wind power plant 150kW, fixed parts	wind power	production of components	unit	CH			48052	
2302	3907 wind power plant 150kW, moving parts	wind power	production of components	unit	CH			58774	
2303	3908 wind power plant 2MW, offshore, fixed parts	wind power	production of components	unit	OCE			698510	
2304	3909 wind power plant 2MW, offshore, moving parts	wind power	production of components	unit	OCE			797860	
2305	3910 wind power plant 30kW, fixed parts	wind power	production of components	unit	CH			24233	
2306	3911 wind power plant 30kW, moving parts	wind power	production of components	unit	CH			10210	
2307	3912 wind power plant 600kW, fixed parts	wind power	production of components	unit	CH			127750	
2308	3913 wind power plant 600kW, moving parts	wind power	production of components	unit	CH			201750	
2309	3914 wind power plant 800kW, fixed parts	wind power	production of components	unit	CH			205200	
2310	3915 wind power plant 800kW, fixed parts	wind power	production of components	unit	RER			205080	
2311	3916 wind power plant 800kW, moving parts	wind power	production of components	unit	CH			210840	
2312	3917 wind power plant 800kW, moving parts	wind power	production of components	unit	RER			210730	
2313	3918 cogen unit 6400kWth, wood burning, building	wood energy	cogeneration	unit	CH			307250	
2314	3919 cogen unit 6400kWth, wood burning, common components for heat+electricity	wood energy	cogeneration	unit	CH			40818	
2315	3920 cogen unit 6400kWth, wood burning, components for electricity only	wood energy	cogeneration	unit	CH			46734	
2316	3921 cogen unit ORC 1400kWth, wood burning, building	wood energy	cogeneration	unit	CH			246020	
2317	3922 cogen unit ORC 1400kWth, wood burning, common components for heat+electricity	wood energy	cogeneration	unit	CH			39636	

								Ecoinvent IPCC2007 GWP100	
	Name	Category	Subcategory	Unit	Country				
2318	3923 cogen unit ORC 1400kWth, wood burning, components for electricity only	wood energy	cogeneration	unit	CH			46734	
2357	3924 wood pellet manufacturing, infrastructure	wood energy	fuels	unit	RER			63869	
2359	3925 furnace, logs, hardwood, 100kW	wood energy	heating systems	unit	CH			2581.5	
2360	3926 furnace, logs, hardwood, 30kW	wood energy	heating systems	unit	CH			1304.1	
2361	3927 furnace, logs, hardwood, 6kW	wood energy	heating systems	unit	CH			274.89	
2362	3928 furnace, logs, mixed, 100kW	wood energy	heating systems	unit	CH			2581.5	
2363	3929 furnace, logs, mixed, 30kW	wood energy	heating systems	unit	CH			1304.1	
2364	3930 furnace, logs, mixed, 6kW	wood energy	heating systems	unit	CH			274.89	
2365	3931 furnace, logs, softwood, 100kW	wood energy	heating systems	unit	CH			2581.5	
2366	3932 furnace, logs, softwood, 30kW	wood energy	heating systems	unit	CH			1304.1	
2367	3933 furnace, logs, softwood, 6kW	wood energy	heating systems	unit	CH			274.89	
2368	3934 furnace, pellets, 15kW	wood energy	heating systems	unit	CH			2918.5	
2369	3935 furnace, pellets, 50kW	wood energy	heating systems	unit	CH			5568.8	
2370	3936 furnace, wood chips, hardwood, 1000kW	wood energy	heating systems	unit	CH			29875	
2371	3937 furnace, wood chips, hardwood, 300kW	wood energy	heating systems	unit	CH			20805	
2372	3938 furnace, wood chips, hardwood, 50kW	wood energy	heating systems	unit	CH			11243	
2373	3939 furnace, wood chips, mixed, 1000kW	wood energy	heating systems	unit	CH			33494	
2374	3940 furnace, wood chips, mixed, 300kW	wood energy	heating systems	unit	CH			23970	
2375	3941 furnace, wood chips, mixed, 50kW	wood energy	heating systems	unit	CH			13199	
2376	3942 furnace, wood chips, softwood, 1000kW	wood energy	heating systems	unit	CH			34785	
2377	3943 furnace, wood chips, softwood, 300kW	wood energy	heating systems	unit	CH			25282	
2378	3944 furnace, wood chips, softwood, 50kW	wood energy	heating systems	unit	CH			13950	
2442	3945 chopper, mobile, diesel	wooden materials	extraction	unit	RER			76961	
2443	3946 chopper, stationary, electric	wooden materials	extraction	unit	RER			5817.1	
2484	3947 planing mill	wooden materials	extraction	unit	RER			5374200	
2487	3948 preservative treatment, infrastructure	wooden materials	extraction	unit	RER			425090	
2498	3949 sawmill	wooden materials	extraction	unit	RER			8091300	
2518	3950 technical wood drying, infrastructure	wooden materials	extraction	unit	RER			11787	
2524	3951 wooden board manufacturing plant, cement bonded boards	wooden materials	extraction	unit	RER			2500600	
2525	3952 wooden board manufacturing plant, organic bonded boards	wooden materials	extraction	unit	RER			69232000	
0									
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	Gesamtsumme		3952						

## Annex 5 – Options for the treatment of co-products

### Options for Treating Co-Products in the RSB GHG Lifecycle Calculation Methodology

8 December 2010

#### Executive Summary

This document is adapted from the backgrounder Note sent to the Steering Board for its meeting of April 15, 2010. Having considered the various options for treating co-products in GHG accounting, the RSB Secretariat proposes an *allocation* methodology. Furthermore, it is proposed that allocation be done based on economic value. This document discusses the different GHG accounting options for co-products and explains the choice of economic allocation.

#### Background

*Attributional* analysis involves the use of a methodology that assigns or attributes the environmental impacts to the biofuel and its co-products according a property, such as *mass, energy, economic value*, or other. .

*Consequential* analysis involves conducting a full assessment of the fate of the co-product, what products in the market it will likely replace, and what effects this *displacement* will have on other markets.

Example: Rapeseed

1. Consequential analysis (system expansion): Additional demand for rapeseed in Europe will generate extra rapeseed meal by-product, which will displace E.U. wheat and marginal U.S. soymeal as animal feed. This in turn results in creation of idle land in the E.U. and reduced export of soymeal from the U.S. to the E.U., which ends up resulting in increased export of soybean meal to Brazil/Argentina and avoided land expansion in those countries. This consequential analysis is called *system expansion* because the system analyzed is expanded beyond the borders strictly related to biofuel and its by-products.
2. Allocation: Rapeseed meal is a by-product of rapeseed oil production. For each 1 kilogram (or 1 megajoule) of rapeseed oil produced, X kg or Y MJ of rapeseed cake are produced. In addition, rapeseed oil has economic value of A and rapeseed meal has economic value of B. Using mass-based or energy-based allocation, the rapeseed meal would be allocated X% (or Y%) of the carbon emissions associated with producing the rapeseed. Using economic-based allocation, the rapeseed meal would be allocated B/A% of the carbon emissions. The carbon emissions associated with the rapeseed meal are then subtracted from those associated with the rapeseed oil.

A *multifunction process* is an activity that fulfils more than one function, such as a production process with more than one product. A methodological allocation problem arises in the LCI when a multifunctional process fulfils one or more functions for the product life cycle investigated and a different function, or set of functions, for other products. The problem is to decide what share of the environmental burdens of the activity should be allocated to the product investigated, i.e., included in the LCI of the product investigated (Ekvall & Finnveden, 2001).

The International Organisation for Standardisation (ISO) has presented a standard for LCI - ISO 14041, suggesting that the following procedure be used for allocation in multifunction processes<sup>18</sup>:

1. Allocation should be avoided, wherever possible, either through subdivision or system expansion, as follows:
  - a. Subdivision of the multifunction process into sub-processes, and collection of separate data for each sub-process. Or,
  - b. *Expansion of the systems* investigated until the same functions are delivered by all systems compared.
2. Where allocation cannot be avoided, the allocation should reflect the physical relationship between the environmental burdens and the functions, i.e. how the burdens are changed by quantitative changes in the functions delivered by the system. In other words, the environmental burdens should be partitioned among different functions of the system in a way that reflects the underlying physical causality. This could include allocation by mass or energy if these parameters reflect the physical relationship between the environmental burden and the biofuel/co-product.
3. Where such physical causal relationship alone cannot be used as the basis for the allocation, the allocation should reflect other relationships between environmental burdens and the functions. Allocation based on other causal relationships includes, e.g., allocation in proportion to the economic value of the products or functions. It can also include allocation by mass and energy when there is no physical relationship between the relative environmental burden of the biofuel-co-product system and its mass or energy; mass or energy can be used as a proxy of these burdens.

### **Consequential Analysis**

Consequential analysis of by-products requires a multiple-step analysis of displacement/substitution effects of by-products and the products they displace. This method can be used provided that the conventional production process for the co-product or by-product can be clearly identified and that sufficient information is available to determine the GHG emissions intensity of the conventional process (CDM Meth Panel 35<sup>th</sup> meeting report). In addition, to perform a consequential analysis of by-product impacts, the fate of the by-products must be known, including displacement effects and effects on regional and global markets.

The assumptions made in performing a consequential analysis can change over time as the markets change and the analysis is dependent on geography, i.e., the effect of increased rapeseed meal production in the E.U. will have different effects on the market than increased rapeseed production in a different geographic region and hence the substitution analyses will differ. In addition, each assumption made on the fate of the co-product and its impact on regional and global markets has an uncertainty associated with it.

While most experts in the RSB GHG EG agree that system expansion is, in theory, a preferable approach to treating by-products, some experts argue that system expansion is ridden with uncertainties, is variable with time and geography, and is therefore not a preferable methodology; such experts propose allocation as a preferable method. In addition, an argument that has been made by some members of the GHG EG and by EMPA is that system expansion widens the boundaries of the system analyzed beyond the scope of what is under the control of the operator.

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<sup>18</sup> ISO (1998): Environmental management - Life cycle assessment - Goal and scope definition and inventory analysis. ISO 14041:1998 (E). International Organisation for Standardisation, Geneva, Switzerland

## Allocation

One of the basic principles for allocation in ISO 14041 is that the sum of the allocated environmental burdens should equal the total, unallocated burdens. The allocation can then be expected to produce such additive results only for activities where the environmental burdens are linear and homogeneous function of the quantity of each of the different functions delivered by the activity (Ekvall & Finnveden, 2001).

Allocation based on physical properties of the products is the predominant allocation method in LCI practice because data on these properties are generally readily available and easily interpreted. In some cases, this allocation may coincide with allocation based on physical, causal relationships. However, when the allocation is not based on an accurate model of causal relationships, it will not provide reliable information on the consequences of the actions (Ekvall & Finnveden, 2001).

### *Allocation reflecting physical relationship between environmental burden and products*

Allocation based on physical properties of the products can be done using, for example, mass, volume or energy content of products, although such bases for allocation need to be justified satisfactorily, and this is only likely to be a valid option in specific circumstances (CDM Meth Panel 35<sup>th</sup> meeting report). For example, in cases where all products and by-products are used for their energy content (e.g., if they are fuels), allocation by energy content can be regarded as appropriate. However, allocation by this means for products that are not used for their energy content cannot be said to be based on physical properties.

Some experts in the RSB GHG EG have stated that using allocation is an arbitrary method given that neither economic nor mass or energy values have a physical relationship to the environmental burden of a co-product and the biofuel. These experts therefore argue that using mass/energy content/ or economic allocation in the RSB methodology would fall under Option (3) above, where “a physical casual relationship cannot be used as the basis for the allocation”.

### *Allocation reflecting other relationships between environmental burden and products*

Allocation by *market value* has been proposed (CDM Meth Panel 35<sup>th</sup> meeting report) as one option. The disadvantage is that market prices often fluctuate and vary regionally, and in such cases the results of the LCA will change. However, the market price reflects the value of the by-product in proportion to the main product, and thus, it is a valid measure of the proportional value society places on each (CDM Meth Panel 35<sup>th</sup> meeting report). It should be noted that the choice of mass/energy/value will have a potentially large effect on the results (Winrock, 2009)<sup>19</sup>.

## Treatment of co-products in different methodologies

Different policy-oriented LCA methodologies, have different ways of dealing with co-products:

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<sup>19</sup> From Winrock (2009): “The impact of co-product treatment is well illustrated in the case of corn. At an average 2007-2008 US spot price of \$468/t ethanol (FO Licht, 2009) and an illustrative DDGS price of \$100/tonne, DDGS from a dry mill process represents 27% of the overall economic output and therefore 27% of total emissions are attributed to DDGS. If emissions from the same process are allocated on an energy basis the emissions attributed to DDGS represent 65% of the total. For corn ethanol and any process that yields co-products with a high energy value, energy allocation results in a substantially more favorable net calculated carbon intensity of corn ethanol than a system expansion approach or allocation by market value. As the percentage of emissions allocated to the co-product increases the emissions associated with the biofuel decrease. In the case of biodiesel, the choice of co-product treatment can also significantly affect the results of calculations.”



- The E.U. JRC methodology use system expansion as well; however, the JRC methodology uses a simplified one-step analysis. I.e., rapeseed meal is assumed to displace U.S. soybean meal, which has a calculated environmental impact, which is deducted from the impacts associated with the biofuel. EMPA argues that the JRC methodology is not robust and consistent, and that the full consequential analysis methodology proposed by Bo Weidema (2009) and exemplified above for rapeseed meal should be employed;
- The E.U. RED GHG methodology uses energy-based allocation, except for electricity, where system expansion is used.
- The U.S. RFS2 LCA analysis of biofuels is a fully consequential analysis of the impact of increased bio-fuel production in the U.S. Hence, consequential system expansion is used to treat by-products (and all other system elements);
- The California Low Carbon Fuel Standard uses GREET as its GHG calculation methodology. GREET generally treats biofuel by-products using an allocation methodology, except for electricity, where system expansion is used.

In the GBEP "Common Methodological Framework for GHG Lifecycle Analysis of Bioenergy", the user is asked how co- and/or by-products are considered in the LCA, whether co- and/or by-products originate from biomass or non-biomass, what falls under the definition of co- and/or by-products and the methodology to take them into account, i.e., system expansion (and assumptions used) or allocation (and type of allocation used). The document states that "this is an area where different approaches in LCAs can potentially produce quite different results and therefore clarity of the approach is important for useful comparison of LCAs". Below is a summary of pros and cons of allocation vs. consequential analysis.

**Table: Summary of pros and cons of co-product treatment using allocation vs. consequential analysis**

Co-product treatment	Pros	Cons
Attributional (mass/energy/economic value)	<ul style="list-style-type: none"> <li>• Simpler analysis;</li> <li>• Implementation less time and resource intensive;</li> <li>• Sufficient to meet the needs for Study 1 and 2;</li> <li>• Includes factors that are under control of an operator.</li> </ul>	<ul style="list-style-type: none"> <li>• Not representative of real environmental impacts;</li> <li>• RSB risks being seen as having an overly simplistic LCA methodology.</li> </ul>

Co-product treatment	Pros	Cons
Consequential analysis of system expansion	<ul style="list-style-type: none"> <li>• More accurate portrayal of reality;</li> <li>• Assigns real environmental burden to biofuel &amp; co products;</li> <li>• RSB LCA tool will arguable be regarded more highly;</li> <li>• Sufficient to meet the needs for Study 1 and 2.</li> </ul>	<ul style="list-style-type: none"> <li>• Uncertainty associated with assumptions on product displacement and effects on regional &amp; international markets;</li> <li>• Results change over time and hence analysis would need to be reassessed every few years;</li> <li>• Results are dependent on geography, and hence for some pathways we would have to conduct various assessments (e.g., Brazilian and U.S. soy biodiesel);</li> <li>• Goes beyond the factors of control of an operator.</li> </ul>

### Implications for RSB Certification

The goal of Principle 3 is to cause a reduction in global GHG emissions through the use of biofuels that have significantly lower carbon footprints than the fossil fuels they replace. A second goal is to encourage individual producers to continuously improve their GHG performance.

Principle 3 requires to:

1. Requires calculation of the carbon footprint of a biofuel (Criterion 3b);
2. Requires calculation of the carbon footprint of baseline fossil fuels (Criterion 3b);
3. Sets a minimum GHG reduction threshold of the biofuel with respect to the fossil fuel (Criterion 3c);
4. Is meant to encourage individual producers to become better, i.e., to lower their GHG emissions, year by (not yet included in Principle 3, though continuous improvement is a requirement in Principle 2).

In order for Principle 3 to attain its goals, it can be said regarding the points above that:

1. The GHG calculation methodology should calculate the carbon footprint of a biofuel as accurately as possible;
2. The GHG calculation methodology should calculate the carbon footprint of baseline fossil fuels as accurately as possible;
3. The minimum GHG reduction threshold of the biofuel with respect to the fossil fuel should be ambitious enough to allow a *safety margin* for certain aspects that mitigate the positive effects of biofuel use, including, but not limited to: the rebound effect<sup>20</sup>; and other indirect effects (unless these will be addressed elsewhere in the P&C as a result of the analysis of the work on indirect impacts).
4. The GHG calculation methodology should reflect and credit GHG reduction measures implemented by the producer.

<sup>20</sup> Rebound effect: Increased biofuel use causes fossil fuel prices to drop, which in turn causes increased fossil fuel use and subsequent GHG emissions.

As a standard setting organization, the RSB is well advised to follow the ISO LCI - ISO 1404 procedure for allocation in multifunction processes:

1. **ISO Guidelines:** Allocation should be avoided, wherever possible, either through subdivision or system expansion.
  - a. **View of the RSB Secretariat:** *According to EMPA, the subdivision methodology does not apply to biofuel LCA assessments. While some GHG EG members postulate that system expansion is the preferred and more accurate methodology, other members have highlighted some of the shortcomings of system expansion (such as potentially high uncertainty and system boundaries that go beyond what the operator can influence). The RSB Secretariat believes that system expansion is potentially a more accurate way of treating by-products than allocation. However, system expansion involves a very detailed assessment and numerous assumptions, leading to potentially high inaccuracy in the framework of a certification system, and additionally requiring substantial time and resources beyond what is currently available to the Secretariat. The Secretariat has requested a quote to conduct a system expansion analysis and has determined that at present, it does not have the resources to conduct such an analysis for all feedstock pathways. EMPA has estimated that it would take roughly 3 weeks per pathway to conduct a system expansion analysis. Hence, the RSB Secretariat does not have the time to conduct such an analysis by May 2010.*
2. **ISO Guidelines:** Where allocation cannot be avoided, the allocation should reflect the physical relationship between the environmental burdens and the functions.
  - a. **View of the RSB Secretariat:** *Mass and energy content only reflect a physical relationship between products and their environmental impacts in certain instances (see discussion above), for example, if all products and by-products are used for their energy content. However, neither mass nor energy content or any other parameter can be select that reflects a physical relationship between the products and their environmental impacts for all biofuel pathways and all by-products, and in most instances mass or energy content will not reflect such a physical relationship. Hence it can be said that no parameter has been identified that meets this criterion.*
3. **ISO Guidelines:** Where such physical casual relationship alone cannot be used as the basis for the allocation, the allocation should reflect other relationships between environmental burdens and the functions.
  - a. **View of the RSB Secretariat:** *Mass, energy content, or economic value could be used as parameters that reflect a relationship (albeit not a direct, physical relationship) between environmental burden and the by-product and main product. The use of mass or energy makes only sense when the product and by-products have a value or a function that is related to their mass or energy content, respectively. This is only the case in some instances. Economic value reflects the value that society apportions to a specific product and can be used as a proxy of its impacts on the environment. However, economic value is time and geography-dependent.*

### Cost & time implications for the RSB

In order to meet the schedule set by the Steering Board, the number of pathways included in Study 1 needs to be reduced compared to the 29 pathways contained in the proposal of EMPA. Actual costs will reflect the reduced number of pathways calculated.

EMPA has determined that a *consequential analysis* would take 3 weeks per pathway to conduct. This would clearly delay the development of the GHG RSB methodology and result in a much larger expense.

### **Rationale of the RSB decision regarding to the treatment of co-products**

Taking into account the pros and cons of the different methodologies listed above, the RSB Secretariat recommended to the Steering Board to use an attributional approach with economic allocation.

The choice of the economic allocation allows taking into account all co-products, incl. such which have no mass (like electricity) or no energetic use (chemicals) in a consistent way. Furthermore, it creates an incentive for an optimal use of by-products and so reduce waste.

### **References**

Winrock, 2009: "The Impact of Expanding Biofuel Production on GHG emissions, White paper #1: Accessing and interpreting existing data", April 2009.

Weidema (2009) Chapter for CALCAS deliverable D18, 2009

Ekvall & Finnveden (2001) Allocation in ISO 14041—a critical review, Journal of Cleaner Production 9 (2001) 197–208

CDM Meth Panel, 35<sup>th</sup> Meeting Report, "Draft Guidance on Apportioning of Emissions to Co-Products and By-Products", [http://cdm.unfccc.int/Panels/meth/meeting/08/035/mp\\_035\\_an11.pdf](http://cdm.unfccc.int/Panels/meth/meeting/08/035/mp_035_an11.pdf)

## Annex 6 – Lower heating values

Source: Condensed list of standard values, version 2 – Public.doc, retrieved from <http://www.biograce.net/content/ghgcalculationtools/standardvalues>.

Diesel	43,1	MJ/kg (0% water)
Gasoline	43,2	MJ/kg (0% water)
HFO for marine transport	40,5	MJ/kg (0% water)
Ethanol	26,81	MJ/kg (0% water)
Methanol	19,9	MJ/kg (0% water)
FAME	37,2	MJ/kg (0% water)
Syn diesel (BtL)	44,0	MJ/kg (0% water)
HVO	44,0	MJ/kg (0% water)
PVO	36,0	MJ/kg (0% water)
n-Hexane	45,1	MJ/kg (0% water)
Hard coal	26,5	MJ/kg (0% water)
Lignite	9,2	MJ/kg (0% water)

Corn	18,5	MJ/kg (0% water)
FFB	24,0	MJ/kg (0% water)
Rapeseed	26,4	MJ/kg (0% water)
Soybeans	23,5	MJ/kg (0% water)
Sugar beet	16,3	MJ/kg (0% water)
Sugar cane	19,6	MJ/kg (0% water)
Sunflowerseed	26,4	MJ/kg (0% water)
Wheat	17,0	MJ/kg (0% water)
Animal fat	37,1	MJ/kg (0% water)
BioOil (byproduct FAME from waste oil)	21,8	MJ/kg (0% water)
Crude vegetable oil	36,0	MJ/kg (0% water)
DDGS (10 wt% moisture)	16,0	MJ/kg (10% water)
Glycerol	16,0	MJ/kg (0% water)
Palm kernel meal	17,0	MJ/kg (0% water)
Palm oil	37,0	MJ/kg (0% water)
Rapeseed meal	18,7	MJ/kg (0% water)
Soybean oil	36,6	MJ/kg (0% water)

Sugar beet pulp	15,6	MJ/kg (0% water)
Sugar beet slops	15,6	MJ/kg (0% water)

## **Annex 7 – Peer Reviewer Comments**

The RSB Greenhouse Gas Calculation Methodology (“RSB GHG calculation methodology Draft for Peer Review”, December 15, 2010) was submitted for peer review to the RSB GHG Expert Group. It was peer reviewed by individuals from these institutions and with the following areas of expertise:

- University of California, Berkeley – Experience: LCA, biofuels, land use
- National Wildlife Federation – Experience: Agricultural production & methods
- Michigan State University – Experience: Biofuels, land use, LCA
- Shell Oil – Experience: LCA, fossil fuels

The Secretariat received four reviewers’ comments. The comments generally consist of suggestions for making the methodology more robust. The reviewers do not have any fundamental criticism of the methodology as a means to measure the direct GHG emissions of biofuel production using attributional LCA methodology. However, one reviewer does bring up the issue of uncertainty associated with calculating LCA emissions from biofuels without taking indirect land use change into account and without taking the rebound effect (increased used of fuel caused by a decrease in fuel prices caused by an increased supply of biofuels in the market) into consideration. ILUC and the rebound effect are examples of consequential LCA. In addition, one reviewer points out the lack of an uncertainty analysis, that is, the absence of a calculation of a margin of error.

The RSB Secretariat, together with EMPA, addressed each comment from the reviewers. All comments and the response to each comment are recorded in a summary document, which is included in this Annex.

**Peer Reviewers:**

<b>Name</b>	<b>Title &amp; Contact</b>
Bruce Dale	Bruce E. Dale, PhD, Professor Department of Chemical Engineering and Materials Science DOE Great Lakes Bioenergy Research Center Editor in Chief: Biofuels, Bioproducts and Biorefining Michigan State University 3815 Technology Boulevard, Lansing, MI 48910  Website: <a href="http://www.everythingbiomass.org">www.everythingbiomass.org</a>  Office phone: 517-353-6777 Fax 517-337-7904
Rick Malpas	Project Leader, Greenhouse Gas Intensity Analysis Team Projects & Technology Retail Fuels Technology Shell International Petroleum Company Limited
Richard Plevin	Energy & Resources Group University of California Berkeley
Eliav Bitan	Agriculture Advisor Climate and Energy Program National Wildlife Federation



Peer reviewer: Rick Malpas

Feedback (R. Malpas)	RSB Response
<p>· As an overall comment there are several areas where the RSB has taken a different approach to all others in this field and I would question the need for this, as it is likely to confuse and add complexity. Things have moved on somewhat since our last GHG telecom and I would suggest taking developments, particularly in Europe, into account in the methodology, which would make the calculations simpler while not altering the results materially. Some of these issues are addressed below</p>	<p>na</p>
<p>· I don't see the need to quote results based on HHV. LHV is accepted and adding HHV can confuse.</p>	<p>This change has been made.</p>
<p>· The system boundary appears to include infrastructure (tractors, buildings etc). This is inconsistent with other methodologies. It is not clear how emissions associated with such infrastructure will be amortised and the contribution is likely to be extremely low if this is done over the infrastructure's useful life. This seems a lot of effort for little added value and I suggest removing this element.</p>	<p>Chemical production, e.g., includes infrastructure. This is also true for use of machinery (entered as practices such as harvesting, tilling, etc.) For the chemical plant, it is included in the chemical use, but not in the equipment, only building of the plant. In agriculture, machinery is important. In the chemical plant, it is less relevant.</p>
<p>· It is mentioned in section 2.4 that the tool will not provide default values for material and energy usage. I would recommend providing conservative values as options. Some bio-fuel producers, for example, could purchase raw material (e.g. vegetable oil) from a range of different suppliers and entering actual data would be difficult, if not impossible.</p>	<p>Each supplier will enter data pertaining to their own operations. We are not providing defaults for energy and chemical usage because it requires defining conservative values and they are pathway-dependent.</p>
<p>· The GHGs included are much wider than the typical CO<sub>2</sub>/CH<sub>4</sub>/N<sub>2</sub>O considered by others (and by regulations). While academically this may be correct, it adds to complexity – does it make much difference to the final result?</p>	<p>All the GHGs are included (embedded) in the EcoInvent factors and it is not possible to take them out. These GHGs are embedded in EcoInvent factors related to chemicals, energy, and machinery (materials) production. SF<sub>6</sub> can indeed make a difference, and it shows up in electricity as it is used in electrical transmission. This said, the <i>direct</i> emissions calculated by the methodology are restricted to CH<sub>4</sub>, N<sub>2</sub>O and CO<sub>2</sub> (and in the case of fires, NO<sub>x</sub> and CO as well).</p>
<p>· One of your reasons for choosing allocation for co-product treatment is the <u>attributitional</u> nature of the methodology. However, you have then included foregone sequestration, which is a very <u>consequential</u> consideration (e.g. how long would the trees have remained if biofuels were not grown?) I think you should be consistent in your approach here and, for an attributitional methodology, you should exclude foregone sequestration.</p>	<p>FS looks at the difference in the carbon accumulation rates between the original and transformed land used. FS is indeed a consequential perception. EMPA's opinion is that it is <i>not</i> consistent from a methodological point of view. In principle we agree with this comment so the decision is to eliminate FS.</p>

Feedback (R. Malpas)	RSB Response
<p>· I agree with your use of allocation for co-product treatment on the grounds of simplicity, but question use of allocation by economic value rather than by energy. These are, after all, fuels, and other methodologies and regulatory requirements all use allocation by energy – so why be different?</p>	<p>Co-products, even more in refineries, are not always used for energy purposes (e.g. glycerine in pharma/cosmetics). In this case, energy does not make any sense, whereas economic allocation at least can be used in a consistent way over all products which leave a facility.</p>
<p>· The LUC section follows the IPCC Guidelines extremely closely (please check the equation numbers in this section – p 17 in particular seems to have IPCC numbers). However, the IPCC Guidelines are really intended as a carbon inventurisation method and in some places I don't think it is clear how these translate into the calculation of LUC emissions. For example, how does a producer predict what the net carbon stock growth or loss will be over the 20 years amortisation period due to a perennial biofuel crop such as oil palm? I would like more discussion on this.</p>	<p>Oil palm and coconut are indeed the only bioenergy crop that are assigned a net growth over 20 years. The net growth was determined from average data from IPCC. Peatland is treated in a special way as well</p>
<p>· Likewise the methodology includes the IPCC carbon stock tables but these only cover some cases (IPCC does not consider energy crops for example) and some of the entries have ranges – which is not very useful. If these have been modified or augmented in the tool (as seems to be implied by section 4.1.6) then, again, more discussion would help. The EU methodology has now made some pragmatic modifications and simplifications to the IPCC methodology including filling the gaps in the carbon stock tables for relevant biofuel crops and I suggest making use of this in your methodology.</p>	<p>The RSB methodology follows generally the modified LUC methodology described in the last LUC Guideline document.</p>
<p>· Following on from this, I find the section on carbon sequestration in harvested wood products confusing. Again this is relevant to an IPCC inventurisation but how do you decide how long furniture (for example) will last and continue to sequester carbon? More discussion would again help.</p>	<p>As stated in the methodology "carbon sequestration in biomass is not taken into account in the methodology"</p>
<p>In general I suspect that some of these points have been addressed in the GHG tool if it is to be practically useable, but, if this is so, it would be good to see the document reflect what has been done.</p>	<p>The methodology, esp. The land use portion, has been rewritten to provide more transparency about the calculations done in the Tool and comparison with EU RED.</p>

Peer reviewer: Eliav Bitan

Feedback (E. Bitan)	RSB Response
<p>First, land management practices are the most important determinant of GHG impacts, if land use change is not allowed. Therefore, I think a greater focus on land management is appropriate in this tool, as it is meant (I think) to distinguish among biofuels that have not caused land use change.</p>	<p>This is certainly true, and accurately incorporating ag management practices in the methodology is a way to promote good practices. There is a resource and time constraint limit and hence not all ag management practices have been incorporated into the calculations.</p>
<p>Second, this tool uses IPCC tier 1 methodology (tier 1= global or national emissions factors) for land management (the table on page 70). While this methodology may be appropriate in the developing world, where regionally or locally specific data is not available, in the developed world tier 2 or 3 is appropriate (Tier 2= local or regionally derived emissions factors. Tier 3= local measurements, calibrated process based models, or a combination). IPCC chapter 2 figure 2.4 directs developers of GHG inventories to use the highest tier possible, and in the USA (the place I know most about) Tier 2 is always possible, and Tier 3 is generally possible.</p>	<p>The methodology allows for the use of Tier 2 or 3 as well.</p>
<p>Third, attached please find a comprehensive literature review USA ghg impacts of various practices. Based on that data, I would submit that cover crops and crop rotation should give you a land management factor of about 1.2 EACH. (about 1 metric ton per year, times 20 years= 20 metric tons, with an average of about 75 metric tons of SOC already present.) This is about the same size factor as tillage.</p>	<p>Cover crops and tillage are taken into account as having an impact on carbon emissions, but not crop rotation. It would be good to integrate crop rotation.</p>
<p>Fourth, Nitrogen application is over simplified in the tool. Timing of N application makes a difference just as big as N type (which is included in the tool). Similarly, injecting N vs. surface applying it makes a difference that is the same order of magnitude. Both timing and method of application are questions farmers know the answer to, and science knows that there is a significant GHG reduction possible by moving timing closer to crop needs and application deeper into the soil.</p>	<p>For the moment we will not integrate these considerations but it would be a good idea to integrate these in the future in order to make the cultivation calculations more accurate, which would also better incentivize good practices.</p>

Peer Reviewer: Richard Plevin

Feedback (R. Plevin)	RSB Response
<p>I understand that for the sake of simplicity, RSB would choose to use allocation. I disagree with this, but I understand it. However, the Annex has a few statements that really should be adjusted for the sake of clarity and scientific honesty.</p>	<p>It should be noted that the "Optional for Addressing Co Product Treatment" originally included in the Annex was an older document that had been drafted as a Steering Board backgrounder to talk about this issue, and before the choice of an allocation method was used. The RSB agrees that the document should be updated in order for it to be more relevant. Hence, the document was modified and updated in December.</p>
<p>1. "Some experts in the RSB GHG EG have stated that using allocation is an arbitrary method given that neither economic nor mass or energy values have a physical relationship to the environmental burden of a co-product and the biofuel."</p> <p>Saying "some experts" implies that this point is disputed. Can anyone show that these methods are predictive of environmental burdens? Of course not: it's easy to show the opposite. The only honest justification for allocation is expediency.</p>	<p>Please note that "some experts" refers only to the RSB GHG EG. It is generally accepted by LCA practitioners that allocation is an arbitrary allocation method to a degree.</p>
<p>2. "However, the market price reflects the value of the by-product in proportion to the main product, and thus, it is a valid measure of the proportional value society places on each (CDM Meth Panel 35th meeting report)."</p> <p>With all due respect to the meth panel, LCA is not a measure of the value society places on a product; it's a tool to estimate environmental burdens. Is there any evidence that the environmental burdens associated with co-products relate to their relative prices? No, this method is just as arbitrary as using energy or mass. That it uses prices suggests market analysis, but it's nothing of the sort.</p>	

Feedback (R. Plevin)	RSB Response
<p>3. The table lists uncertainty as a "Con" for consequential analysis. Uncertainty is a feature of the problem, not of the method. If we agree that system expansion, in theory, correctly estimates the environmental effect of a co-product, and we recognize that this is uncertain, then we must accept that the environmental burden of the main product is uncertain. Substituting a method that produces crisp results that are demonstrably unrelated to the environmental effects does not reduce this uncertainty, it merely submerges it.</p>	<p>The uncertainty that we referred to, as it applies to consequential analysis, is the uncertainty about the fate of the co product. In many instances, this fate is not known to the operator. The RSB built a Tool for operators to use to calculate their emissions; allowing system expansion and consequential analysis means that the Tool would have to be able to accommodate all possible fates of the product (one of which would be selected by the operator). At least in the initial version of the Tool and the methodology, this was seen as an impractical and resource intensive option which was not possible to implement.</p>
<p>Also, some of the "Cons" listed for consequential analysis also apply to economic value: prices also vary regionally and temporarily.</p>	<p>This is true; however, the Tool asks the operator the actual economic data that are relevant to them (the price they have paid/received).</p>
<p>4. Economic allocation is said to create "an incentive for an optimal use of by-products". How is this? (For that matter, optimal for <i>what</i>? Profits? GHG reduction?)</p> <p>Presumably biofuel producers are price takers, so price provides incentives only to processes for which co-product ratios are flexible, i.e. the producer can make more biofuel and less co-product, or vice-versa (e.g., cellulosic ethanol and electricity). For cases with fixed co-product ratios (e.g., DDGS, glycerin, soybean meal) what incentives are provided by price that affect optimality? The environmental benefits of exported electricity are clearly a function of what is displaced from the grid, which varies regionally and temporally. It is as clearly <i>not</i> a function of the relative price of ethanol and electricity. The price of ethanol rises with the price of oil, increasing its value relative to electricity. Does this mean the environmental benefit of co-produced electricity is getting lower? The environmental benefits of glycerin depend on what it displaces in the market, not its market value. Methods that credit biodiesel producers for the actual avoided GHG provide incentives to avoid those GHGs. Price-based allocation offers no incentive to find high GHG displacement opportunities.</p>	<p>Note that we are only saying that economic allocation "creates an incentive", not that it actually leads to better use of resources. If a coproduct has low economic value then the burden is allocated to the main production process and the operator has an incentive to lower the GHG emissions associated with their operations. We do agree that economic allocation (and any allocation method) has important limitations in attributing impact to coproducts.</p>

<b>Feedback (R. Plevin)</b>	<b>RSB Response</b>
<p>If RSB decides to go this way, so be it. But don't justify the decision with nonsensical arguments. The statement in the table that allocation is "not representative of real environmental impacts" is key. Let's be clear that allocation (in any of its forms) trades environmental relevance for expediency. That's the bottom line.</p>	<p>Allocation was indeed chosen for practical reasons, as explained in the Annex, and it was understood consequential analysis is, if all (co)product fates are known, a more accurate way to treat coproducts.</p>

Peer Reviewer: Bruce Dale

Was in general agreement with the methodology.