

# Glossary

**Allocation:** finding a total and uniform measure for all the services to which the joint processes contribute, and on the basis of this partition the joint exchanges to each of the services to which they contribute

**Background load:** the contribution to a resource consumption or impact category from the reference area, expressed per person in the area. Used for normalization

**Bioconcentration:** tendency of a substance to accumulate in living organisms

**Biodegradability:** degradability by microorganisms in the environment. Assessed from standardized tests

**CAS number:** Chemical Abstracts Service Registry Number is a numeric designation assigned by the American Chemical Society's Chemical Abstract Service uniquely identifying a specific chemical compound regardless of name or naming system

**Co-products:** two or more products leading to a service for a user and deriving from or entering into a range of processes

**Data format:** a template for the three categories of information: a description of the process, an inventory of the process's exchanges with the environment, and a characterization of the information

**Elements:** defined tasks or "steps" in the LCA method. Each of the method's phases consists of one or more elements

**Environmental latitude:** the environmental impact acceptable on average for each person in a sustainable society

**Environmental diagnosis:** designating environmental points of focus in the product: designating which impact potentials are problematic, identifying improvement potentials and localizing where in the product they reside

**Environmental exchanges:** an exchange with the environment is defined as an input to a process, an output from the process or an internal interaction with an operator of the process

**Environmental impacts:** impacts on the external environment including human health

**Environmental specification:** retainment of the weighting of environmental considerations in the product's total commercial basis and determination of the specific requirements for the product's properties imposed by environmental considerations

**Environmental assessment of a product:** to define and quantify the service provided by the product, to identify and to quantify the environmental exchanges caused by the way in which the service is provided, and to ascribe these exchanges and their potential impacts to the service

**Exposure:** the degree to which a substance reaches parts of the environment where the impact can be exerted, e.g. the degree to which a toxic substance reaches an organism

**Functional unit:** the defined and quantified service provided by the product. The functional unit is the object of the environmental assessment

**Goal definition:** clarifies what the LCA shall and shall not be used for, including the decisions which it must support and the environmental consequences to which these decisions can lead. A phase of the LCA method

**Inventory:** collection of environmentally relevant information from processes identified during scope definition and included in the product system. A phase of the LCA method

**Joint environmental exchanges:** environmental exchanges from a joint process which can be ascribed to more than one service

**Joint processes:** processes which contribute to more than one service for a final user

**Key figures:** the environmentally most important data of the LCA, including both data on environmental exchanges from the processes and on the composition of the product system, i.e. data for the product life time, use patterns, disposal routes and other product system parameters

**Life cycle assessment:** see environmental assessment of products

**Manufacturing:** the processing of materials into the final product. Designates a stage in the product's life

**Material grade:** the utility value residing in the material expressed as a fraction of the initial utility value of the material. The material grade thus lies between 0 and 1

**MECO principle:** a method to structure and systematize the work of the LCA. M, E, C and O designate Materials, Energy, Chemicals and Others

**Non-renewable resources:** resources which cannot be regenerated or regenerated only within a time horizon beyond current interest, e.g. oil, coal, metals

**Normalization:** Relative scaling of the product's impact potentials and resource consumptions through comparison of each of them with a reference, which is the background contribution to the same impact potentials and resource consumption. In the EDIP method the average contribution from one person in 1990 is used as reference

**NO<sub>x</sub>:** Nitrogen oxides, i.e. NO and NO<sub>2</sub>

**Parts list:** (~ list of components) a hierarchic list of the product's composition from top level, which is the product itself, to bottom level, which is materials and components purchased externally

**PCBs:** Polychlorinated biphenyls - a group of highly persistent organic compounds

**Phases:** here used to subdivide the LCA-method into four: the goal definition phase, the scope definition phase, the inventory phase and the impact assessment phase

**Product service:** the service provided by the product; a definition of a product is that it is of benefit to the user: it provides a service

**Product system:** all processes into which the product enters are collectively termed its product system

**Projection:** assessing the future magnitude of key figures for the LCA

**Reference product:** the product selected to represent provision of the service

**Renewable resources:** resources which can be regenerated, e.g. wood, water, grain

**Resource consumption:** consumption of both renewable and non-renewable resources

**Resources:** the primary raw materials from which the materials, the ancillary substances and the energy in the product system derive

**Scope definition:** designates a phase of the LCA method and comprises the following elements: definition of the object of the study including specification of the functional unit, identification of the assessment criteria, definition of the scope of the product system, definition of the time boundaries of the study, definition of the technological level of the processes in the product system, and definition of allocation procedures

**Scope definition of the product system:** identifying and including the most significant processes from an environmental perspective, thus excluding the insignificant ones

**Screening:** an introductory rough environmental assessment used to plan the data collection for the actual environmental assessment. See also scope definition of the product system

**Sensitivity analysis:** identification of the key figures of the LCA and analysis of the overall variability of results and conclusions as a consequence of uncertainties in these figures

**Service:** see product service

**Sustainable development:** development that meets the needs of the present generation without compromising the ability of future generations to meet their needs with focus on material resources, biological diversity and the health of the environment

**Technological scope:** the technological level which must be met by the processes which comprise the product system

**Uncertainty analysis:** assessment of the uncertainty of the total results and conclusions due to uncertainties in the data used (in the scope definition, the inventory and the impact assessment)

**Unit process:** data for a process expressed per unit of process in a generalized form; for materials a unit will typically be weight, for a painting process typically surface area

**Working environment, impacts on:** negative influence on safety and health to which the operator is exposed during work. All impacts on the working environment are expressed as duration of exposure in hours or millihours except for accidents, which are expressed in numbers

**Use stage:** a stage of the product life comprising all processes related to use and maintenance of the product

**Utility value:** a measure of the total potential for use of the material, substance or component in question

**Weighting:** a quantitative comparison of the seriousness of the different resource consumptions or impact potentials of the product

## Variables and parameters

B <sub>b</sub>	Meat transfer factor	EP(hs)	Environmental impact potential for human toxicity on exposure via soil
BCF	Bioconcentration factor	EP(hw)	Environmental impact potential for human toxicity on exposure via water
BIO	Biodegradability factor	EP(i)	Environmental impact potential for impact category (i)
B <sub>m</sub>	Milk transfer factor	EP(j) <sub>i</sub>	Environmental impact potential for impact category (j) from substance (i)
EF(ac)	Equivalency factor for acidification potential	EP(N)	Environmental impact potential for nutrient enrichment (N only)
EF(et)	Equivalency factor for potential for ecotoxicity	EP(ne)	Environmental impact potential for nutrient enrichment (N and P together)
EF(etp)	Equivalency factor for potential for ecotoxicity in waste water treatment plant	EP(od)	Environmental impact potential for ozone depletion
EF(etsc)	Equivalency factor for potential for chronic ecotoxicity in soil	EP(P)	Environmental impact potential for nutrient enrichment (P only)
EF(etwa)	Equivalency factor for potential for acute ecotoxicity in water	EP(po)	Environmental impact potential for photochemical ozone formation
EF(etwc)	Equivalency factor for potential for chronic ecotoxicity in water	EP(pt)	Environmental impact potential for persistent toxicity
EF(gw)	Equivalency factor for global warming potential	ER(i) <sub>90</sub>	Normalization reference for environmental impact category (i) based on emissions in 1990
EF(ht)	Equivalency factor for potential for human toxicity	ER(i) <sub>T2000</sub>	Society's target contribution in the year 2000 for environmental impact category (i) based on political reduction targets
EF(ha)	Equivalency factor for potential for human toxicity on exposure via air	ETF <sub>p</sub>	Ecotoxicity factor for effects in waste water treatment plant
EF(htg)	Equivalency factor for potential for human toxicity on exposure via groundwater	ETF <sub>p</sub>	Ecotoxicity factor for chronic effects in soil
EF(hs)	Equivalency factor for potential for human toxicity on exposure via soil	ETF <sub>sc</sub>	Ecotoxicity factor for acute effects in water
EF(htw)	Equivalency factor for potential for human toxicity on exposure via surface water	ETF <sub>wa</sub>	Ecotoxicity factor for chronic effects in water
EF(i) <sub>i</sub>	Equivalency factor for potential contribution from substance (i) to environmental impact category (j)	ETF <sub>wc</sub>	Loss of material grade
EF(N)	Equivalency factor for potential for nutrient enrichment (N only)	f(loss)	Material grade of new material
EF(ne)	Equivalency factor for potential for nutrient enrichment (N and P together)	f(new)	Material grade of scrap
EF(od)	Equivalency factor for ozone depletion potential	f(scrap)	That portion of the emission which contributes to toxicity via air
EF(P)	Equivalency factor for potential for nutrient enrichment (P only)	f <sub>a</sub>	That portion of the emission which contributes to toxicity via groundwater
EF(po)	Equivalency factor for photochemical ozone formation potential	f <sub>g</sub>	That portion of the emission which contributes to toxicity via soil
EP(ac)	Environmental impact potential for acidification	f <sub>s</sub>	That portion of the emission which contributes to toxicity via surface water
EP(et)	Environmental impact potential for ecotoxicity	f <sub>sc</sub>	That portion of the emission which contributes to chronic toxicity in soil
EP(etp)	Environmental impact potential for ecotoxicity in waste water treatment plant	f <sub>w</sub>	That portion of the emission which contributes to toxicity via surface water
EP(etsc)	Environmental impact potential for chronic ecotoxicity in soil	f <sub>wa</sub>	That portion of the emission which contributes to acute ecotoxicity in water
EP(etwa)	Environmental impact potential for acute ecotoxicity in water	f <sub>wc</sub>	That portion of the emission which contributes to chronic ecotoxicity in water
EP(etwc)	Environmental impact potential for chronic ecotoxicity in water	H	Henry's law constant
EP(gw)	Environmental impact potential for global warming	HRC	Human reference concentration
EP(ht)	Environmental impact potential for human toxicity	HRD	Human reference dose
EP(ha)	Environmental impact potential for human toxicity on exposure via air	HTF <sub>a</sub>	Human toxicity factor for exposure via air
EP(htg)	Environmental impact potential for human toxicity on exposure via groundwater	HTF <sub>g</sub>	Human toxicity factor for exposure via groundwater
		HTF <sub>s</sub>	Human toxicity factor for exposure via soil
		HTF <sub>w</sub>	Human toxicity factor for exposure via surface water
		I <sub>a</sub>	Intake factor for air
		I <sub>g</sub>	Intake factor for groundwater
		I <sub>s</sub>	Intake factor for soil
		I <sub>s,b</sub>	Intake factor for soil via meat

$I_{s,d}$	Intake factor for soil on direct ingestion
$I_{s,m}$	Intake factor for soil via milk
$I_{s,p}$	Intake factor for soil via plants
$I_w$	Intake factor for water
$K_d$	Coefficient of adsorption in soil
$L$	Life span
$NEP(i)$	Normalized potential for environmental impact category (i)
$NP(i)$	Normalized impact potential or resource consumption (i)
$NR(i)$	Normalized resource consumption (i)
$NWP(i)$	Normalized potential for working environment impact category (i)
$P(i)$	Impact potential or resource consumption (i)
$PNEC$	Predicted no-effect concentration, the highest concentration assessed not to produce ecotoxic effects in the environment
$PNEC_{sc}$	The highest concentration assessed not to produce chronic ecotoxic effects in the soil compartment
$PNEC_{wa}$	The highest concentration assessed not to produce acute ecotoxic effects in the water compartment
$PNEC_{wc}$	The highest concentration assessed not to produce chronic ecotoxic effects in the water compartment
$P_{ow}$	Octanol-water partitioning coefficient
Product $\overline{NN}$	Average of products which draw on the material pool
$Q_i$	Environmental exchange of substance (i)
$Q_{i,p}$	Exchange of substance (i) from process (p)
$Q_{i,up}$	Environmental exchange of substance (i) from the use process and its non-terminal exchanges
$Q_p$	Quantity emitted to waste water treatment plant
$R(i)$	Normalization reference for impact potential or resource consumption for one year
$R(i)$	Consumption of resource (i)
$RR(i)_{90}$	Normalization reference for resource consumption (i) based on consumption in 1990
SCF	Stem concentration factor
$SF(i)_p$	Site factor for process (p) for use in computation of environmental impact potential for environmental impact category (i)
$T$	Duration of service as defined in the functional unit
$T_a$	Transfer factor from air
$T_g$	Transfer factor from groundwater
$T_s$	Transfer factor from soil
$T_{s,b}$	Transfer factor from soil via meat
$T_{s,d}$	Transfer factor from soil on direct intake
$T_{s,m}$	Transfer factor from soil via milk
$T_{s,p}$	Transfer factor from soil via plants
$T_w$	Transfer factor from water
$WEP(i)$	Weighted potential for environmental impact category (i)
$WF(i)$	Weighting factor for impact potential or resource consumption (i)
$WP(i)$	Weighted impact potential or resource consumption (i)
$WP(i)$	Potential for contribution to impact (i) on the working environment

$WR(i)$	Weighted consumption of resource (i)
$WR(i)_{90}$	Normalization reference for working environment impact category (i) for the years circa 1990
$WWP(i)$	Weighted potential for working environment impact category (i)
$\mu$	Mean
$\sigma$	Standard deviation
$\sigma/\mu$	Coefficient of variation (standard deviation divided by mean)

## Abbreviations

ABS	Acrylonitrile-butadiene-styrene copolymer	TD <sub>Lo</sub>	Toxic dose low. The lowest dose which results in injurious effects in test organisms
CEN	Comité Européen de Normalisation	UNCED	United Nations Conference on Environment and Development
CFC	Chlorofluorocarbon	UNECE	United Nations Economic Commission for Europe
D	Statistical distribution	VOC	Volatile organic compound
EAA	European Aluminium Association		
EDIP	Environmental Design of Industrial Products, acronym for the LCA method presented in this book		
	Global warming potential		
GWP	Hydrochlorofluorocarbon		
HCFC	High density polyethylene		
HDPE	Hydrofluorocarbon		
HFC	High impact polystyrene		
HIPS	Intergovernmental Panel on Climate Change		
IPCC	International Organization for Standardization		
ISO	Lethal concentration 50%. Concentration lethal to 50% of test organisms		
LC <sub>50</sub>	Life cycle assessment		
LCA	Lethal concentration low. The lowest concentration which causes death among test organisms		
LC <sub>Lo</sub>	Lethal dose 50%. Dose lethal to 50% of test organisms		
LD <sub>50</sub>	Low density polyethylene		
LDPE	Linear low density polyethylene		
LLDPE	Lowest observed adverse effect concentration. The lowest concentration observed to result in injurious effects in test organisms		
LOAEC			
LOAEL	Lowest observed adverse effect level. The lowest dose observed to result in injurious effects in test organisms		
LOEC	Lowest observed effect concentration. The lowest concentration observed to result in effects in test organisms		
logN	Log(arithmetic) normal distribution		
NMHC	Non-methane hydrocarbons. Hydrocarbons except methane		
NOAEC	No observed adverse effect concentration. The highest concentration observed to result in no injurious effects in test organisms		
NOAEL	No observed adverse effect level. The highest dose observed to result in no injurious effects in test organisms		
NOEC	No observed effect concentration. The highest concentration observed to result in no effects in test organisms		
ODP	Ozone depletion potential		
OECD	Organization for Economic Co-operation and Development		
PCBs	Polychlorinated biphenyls		
POCP	Photochemical ozone creation potential		
PP	Polypolyethylene		
PS	Polystyrene		
PU	Polyurethane		
PVC	Polyvinyl chloride		
REPA	Resource and environmental profile analyses		
SETAC	Society of Environmental Toxicology and Chemistry		

## Units

C <sub>2</sub> H <sub>4</sub> -eq	Ethylene equivalents. Unit for potential contribution to photochemical ozone formation
CFC11-eq	Unit for potential contribution to stratospheric ozone depletion
CO <sub>2</sub> -eq	Carbon dioxide equivalents. Unit for potential contribution to global warming
dB(A)	Decibels: unit of sound pressure ('A' weighting)
m <sup>3</sup> air	Unit for potential contribution to human toxicity via inhalation
m <sup>3</sup> soil	Unit for potential contribution to chronic ecotoxicity in soil or human toxicity via soil
m <sup>3</sup> water	Unit for potential contribution to acute ecotoxicity in water or waste water treatment plant, chronic ecotoxicity in water or human toxicity via water
N-eq	Nitrogen equivalents. Unit for potential contribution to nutrient enrichment
NO <sub>3</sub> <sup>-</sup> -eq	Nitrate equivalents. Unit for potential contribution to nutrient enrichment
P-eq	Phosphorus equivalents. Unit for potential contribution to nutrient enrichment
PET <sub>WDK2000</sub>	Target person-equivalents. Unit for weighted environmental impact potentials expressed via weighting relative to society's target impacts for the year 2000. Given as PET <sub>W2000</sub> or PET <sub>DK2000</sub> depending on whether the weighting factors are based on global (W) or Danish (DK) emission targets in the year 2000
PE <sub>WDK90</sub>	Person-equivalent computed as the average resource consumption or impact potential per person in the world (W) or in Denmark (DK) in 1990. Unit for normalized resource consumption or normalized potentials for environmental impacts or impacts on the working environment
ppbv	Parts per billion by volume. Unit for concentration in air
PR <sub>W90</sub>	Person-reserve. Unit for weighted consumption of resources which is expressed via weighting as the fractions of the person-reserve computed in 1990. Given as PR <sub>W90</sub> as the reserve is computed for the world (W) in 1990
RW <sub>L<sub>DK90</sub></sub>	Expected number of reported work injuries based on figures for Denmark in the years circa 1990. Unit for weighted impact potentials on the working environment
SO <sub>2</sub> -eq	Sulphur dioxide equivalents. Unit for potential contribution to acidification

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