




Life Cycle Initiative



MENU



Life Cycle Terminology

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Glossary of Life Cycle Terms

Here, we list the typical life cycle terms and their definitions.

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Aggregation

The action of summing or bringing together information (e.g., data, indicator results) from smaller units into a larger unit. (e.g., from inventory indicator to subcategory). (Benoit and Mazijn 2009)

Allocation (partitioning)

Partitioning the input or output flows of a process or a product system between the product system under study and one or more other product systems. (ISO 2006)

Attributional approach

System modelling approach in which inputs and outputs are attributed to the functional unit of a product system by linking and/or partitioning the unit processes of the system according to a normative rule.

Average LCI dataset

LCI dataset obtained via averaging (producer-) specific LCI datasets. Typically referring to horizontally averaged data of complete product systems (e.g., global average steel billet data), unit processes (e.g., EU air transport fleet mix), or partly terminated systems (e.g., Australian average wastewater treatment plant). Also used for so-called “vertically averaged data,” i.e., LCI result datasets. (European Commission – Joint Research Centre – Institute for Environment and Sustainability 2009)

Background system

The background system consists of processes on which no or, at best, indirect influence may be exercised by the decision-maker for which an LCA is carried out. Such processes are called “background processes.” (Frischknecht 1998)

Carbon footprint**

A total product carbon footprint is a measure of the direct and indirect greenhouse gas (GHG) emissions associated with all activities in the product’s life cycle. Products are both goods and services. Such a carbon footprint can be calculated by performing (according to international standards) an LCA that concentrates on GHG emissions that have an effect on climate change (UNEP/SETAC, 2009)

Capability*

Capability signifies the capacity to perform a coordinated set of tasks, utilizing organizational resources to achieve a particular end result.

Capability maturity model*

A formal architecture of the evolutionary stages leading to a desired level of competency in a particular area of operation, such as software engineering, or life cycle management. The capability maturity model (CMM) is a service mark owned by Carnegie Mellon University, and was developed and is promoted by the Software Engineering Institute (SEI).



Consequential approach

System modelling approach in which activities in a product system are linked so that activities are included in the product system to the extent that they are expected to change as a consequence of a change in demand for the functional unit.

Cradle-to-gate

An assessment that includes part of the product's life cycle, including material acquisition through the production of the studied product and excluding the use or end-of-life stages. (WRI and WBCSD 2010)

Cradle-to-grave

A cradle→to→grave assessment considers impacts at each stage of a product's life cycle, from the time natural resources are extracted from the ground and processed through each subsequent stage of manufacturing, transportation, product use, recycling, and ultimately, disposal. (Athena Institute & National Renewable Energy Laboratory draft 2010)

Cut-off criteria

Specification of the amount of material or energy flow or the level of environmental significance associated with unit processes or product system to be excluded from a study. (ISO 2006)

Data management**

Administrative process by which the required data is acquired, validated, stored, protected, and processed, and by which its accessibility, reliability, and timeliness is ensured to satisfy the needs of the data users. (Business Dictionary no date)

Data mining**

Generally, data mining [...] is the process of analyzing data from different perspectives and summarizing it into useful information [...]. Technically, data mining is the process of finding correlations or patterns among dozens of fields in large relational databases. (Palace, 1996)

Dataset (LCI or LCIA dataset)

A document or file with life cycle information of a specified product or other reference (e.g., site, process), covering descriptive metadata and quantitative life cycle inventory and/or life cycle impact assessment data, respectively. (European Commission – Joint Research Centre – Institute for Environment and Sustainability 2009)

Decisional approach

System modelling approach in which activities in a product system are linked to anticipated future suppliers with which one may establish financial and contractual relations even if the said suppliers are constrained.

Elementary Flow***

Material or energy entering the system being studied that has been drawn from the environment without previous human transformation, or material or energy leaving the system being studied that is released into the environment without subsequent human transformation (ISO 14040, 2006).

Environmental product declaration (EPD)**

An EPD is a standardized (ISO 14025/TR) and LCA based tool to communicate the environmental performance of a product or system, and is applicable worldwide for all interested companies and organizations. <http://www.environdec.com>



Environmentally extended input-output data (environmentally extended input- output / environmentally extended input-output tables)

The data presented by national statistical agencies as supply-use tables (also known as “make-use tables”) and direct requirements tables. The environmental extension is an inventory of the elementary flows for each unit process in these tables.

Foreground system

The foreground system consists of processes which are under the control of the decision-maker for which an LCA is carried out. They are called foreground processes. (Frischknecht 1998)

Hotspot (used in the context of environmental assessment)

A life cycle stage, process or elementary flow which accounts for a significant proportion of the impact of the functional unit. See: [Hotspots Analysis: An overarching methodological framework and guidance for product and sector level application](#)

Hotspots Analysis

The rapid assimilation and analysis of a range of information sources, including life cycle based studies, market, and scientific research, expert opinion and stakeholder concerns. The outputs from this analysis can then be used to identify and prioritise potential actions around the most significant economic, environmental and social sustainability impacts or benefits associated with a specific country, city, industry sector, organization, product portfolio, product category or individual product or service. Hotspots analysis is often used as a pre-cursor to developing

more detailed or granular sustainability information. See: [Hotspots Analysis: An overarching methodological framework and guidance for product and sector level application](#)

Impact category**

Impact Categories are logical groupings of Life Cycle Assessment results of interest to stakeholders and decision makers. (UNEP/SETAC, 2009)

Inventory dataset

A set of input and output data of a process. All of them are related to the same reference of this process. Usually, an inventory dataset also contains metadata describing, for example, geography, time reference, and ownership of the dataset. The process can be a unit process or an aggregated process.

Life cycle

Consecutive and interlinked stages of a product system, from raw material acquisition or generation from natural resources to final disposal. (ISO 2006)

Life cycle approaches**

Techniques and tools to inventory and assess the impacts along the life cycle of products.

Life cycle assessment

Compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle. (ISO 2006)

Life cycle costing (LCC)**

Life cycle costing, or LCC, is a compilation and assessment of all costs related to a product, over its entire life cycle, from production to use, maintenance and disposal. (UNEP/SETAC, 2009)

Life cycle database registry

A global database in which quality life cycle databases can be registered.

Life cycle dataset library

A global database of registered and searchable life cycle datasets.

Life cycle impact assessment

Phase of Life Cycle Assessment aimed at understanding and evaluating the magnitude and significance of the potential environmental impacts for a product system throughout the life cycle of the product. (ISO 2006)

Life cycle interpretation

Phase of Life Cycle Assessment in which the findings of either the inventory analysis or the impact assessment, or both, are evaluated in relation to the defined goal and scope in order to reach conclusions and recommendations. (ISO 2006)

Life cycle inventory (LCI)**

The phase of Life Cycle Assessment where data are collected, the systems are modeled, and the LCI results are obtained. (UNEP/SETAC, 2009)

Life cycle inventory analysis

Phase of Life Cycle Assessment involving the compilation and quantification of inputs and outputs for a product throughout its life cycle. (ISO 2006)



Life cycle inventory database

A system intended to organize, store, and retrieve large amounts of digital LCI datasets easily. It consists of an organized collection of LCI datasets that completely or partially conforms to a common set of criteria, including methodology, format, review, and nomenclature, and that allows for interconnection of individual datasets that can be specified for use with identified impact assessment methods in application of life cycle assessments and life cycle impact assessments.

Life cycle management (LCM)*

Life cycle management is a product management system aiming to minimize environmental and socio- economic burdens associated with an organization's product or product portfolio during its entire life cycle and across its value chain. LCM is not a single tool or methodology, but a management system collecting, structuring and disseminating product- related information from various programs, concepts, and tools.

Life cycle sustainability assessment (LCSA)**

Life cycle sustainability assessment (LCSA) refers to the evaluation of all environmental, social and economic negative impacts and benefits in decision making processes towards more sustainable products throughout their life cycle. (UNEP/SETAC, 2011)

Life cycle thinking**

Taking into account the environmental, economic and social impacts of products and processes at each stage of their lifecycle and how decisions at one stage might impact consequences at another stage. (Life Cycle Initiative, 2022)

Primary data

Data determined by direct measurement, estimation or calculation from the original source. (Weidema et al. 2003)

NOTE: primary or original source is the source of initial physical or chemical appearance and not the initial literal appearance.

Product life cycle*

Product life cycle is a term that has different meanings for different functional groups. It can refer to the purchase, use and disposal of the product from the owner/ user perspective. The marketing product life cycle refers to the distinct stages every product goes through: introduction, growth in sales revenue, maturity, and finally, decline and withdrawal. The environmental product life cycle consists of all the direct and supporting processes (see product system) required to build, distribute, use, maintain, and retire a product, from extraction of raw materials to their final disposal or recycle, i.e. cradle to grave.

Product system*

ISO defines product system as a collection of materially and energetically connected unit processes, which perform one or more defined functions. The term “product” used alone includes not only product systems but can also include service systems.

Raw data

Data used in unit process inventory modelling to deliver inventory data at the end, which are extracted from various data sources, such as bookkeeping of a plant, national statistics, or journal literature.

Reference flow

Measure of the outputs from processes in a given product system required to fulfil the function expressed by the functional unit. (ISO 2006)



Reference product

Product of an activity for which a change in demand will affect the production volume of the activity (also known as the determining products in consequential modelling). (Weidema et al. 2011)

Social life cycle assessment (S-LCA)**

A social and socio-economic life cycle assessment (S-LCA) is a social impact (real and potential impacts) assessment technique that aims to assess the social and socio-economic aspects of products and their positive and negative impacts along their life cycle encompassing extraction and processing of raw materials; manufacturing; distribution; use; reuse; maintenance; recycling; and final disposal. (UNEP/SETAC, 2009)

Stewardship*

Stewardship refers to a responsibility to take care of something that is owned by someone else that has been entrusted to your care. It is an ethic that embodies cooperative planning and management of environmental resources with organizations, communities and others to actively engage in the protection of the natural environment. It implies a willingness to accept responsibility for situations where we may not have direct control and/ or influence.

Supply chain*

A supply chain is a system of organizations, people, technology, activities, information and resources involved in moving a product or service from supplier to customer. Supply chain activities transform natural resources, raw materials and components into a finished product that is delivered to the end customer.

Sustainability*

Sustainability is the capacity to endure. In ecology, the word describes how biological systems remain diverse and productive over time. For humans, sustainability is the potential for long-term maintenance of well-being, which has environmental, economic, and social dimensions.

Sustainable consumption and production*

The UN Commission on Sustainable Development (UNCSD) defined sustainable consumption and production as the use of goods and services that respond to basic needs and bring a better quality of life, while minimizing the use of natural resources, toxic materials and emissions of waste and pollutants over the life cycle, so as not to jeopardize the needs of future generations. It is increasingly recognized that efficiency gains and technological advances in products and their associated production processes alone will not be sufficient to

bring global impacts to a sustainable level; changes will also be required to consumer lifestyles, including the ways in which consumers choose and use products and services.

Substitution*

Solving multi-functionality of processes by expanding the system boundaries and substituting the non-reference products with an alternative way of providing them, i.e., the processes or products that the non-reference product supersedes. Effectively the non-reference products are moved from being outputs of the multi-functional process to be negative inputs of this process, so that the life cycle inventory of the superseded processes or products is subtracted from the system, i.e., it is "credited." Substitution is a special (subtractive) case of applying the system expansion principle. (Definition prepared by merging the definitions from ISO 14040ff and the European Commission – Joint Research Centre – Institute for Environment and Sustainability 2010)

Sustainable development*

The Brundtland Commission (Our Common Future, 1987) defined sustainable development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. The concept was a compromise between rich economies pushing for stronger environmental protection and developing economies focused on poverty alleviation. Sustainable development attempts to achieve equitable development within the current generation, while also protecting the rights of future generations.

System boundary

Set of criteria specifying which unit processes are part of a product system. (ISO 2006)

Terminated (partly or fully) aggregated process datasets



A fully terminated aggregated dataset is a dataset that comprises within its boundaries an entire product system, such that the only flows crossing the system boundaries are the reference flows and elementary flows. All other intermediate exchanges are generated and consumed within the system boundaries and hence are not represented in the terminated aggregated dataset. These datasets are equivalent to (cradle-to-gate or cradle-to-grave) LCIs.

A partly terminated aggregated process dataset, on the other hand, purposely does not link some of the intermediate flows to a dataset (in other words, the processes that produce these intermediate flows are outside the aggregation boundaries). As such, these partly terminated aggregated process datasets do not represent a life cycle inventory. In order to calculate a life cycle inventory, these intermediate flows must be linked to fully terminated aggregated

process datasets or systems of linked unit processes that allow the calculation of life cycle inventories.

Uncertainty

Quantitative definition: Measurement that characterizes the dispersion of values that could reasonably be attributed to a parameter. (adapted from ISO 1995)

Qualitative definition: A general and imprecise term which refers to the lack of certainty in data and methodology choices, such as the application of non- representative factors or methods, incomplete data on sources and sinks, lack of transparency, etc. (WRI and WBCSD 2010)

Unit process

Smallest element considered in the life cycle inventory analysis for which input and output data are quantified. (ISO 2006)

Value chain*

A value chain is a high- level model describing the activities that a firm operating in a specific industry conducts to receive raw materials as input, add value to the raw materials through various processes, and deliver finished products to customers. Michael Porter popularized the concept in his 1985 best seller, *Competitive Advantage: Creating and Sustaining Superior Performance*. He suggested that the activities of a business could be grouped under two headings: (1) Primary Activities – those that are directly concerned with creating and delivering a product; and (2) Support Activities – those not directly involved in production, but may increase effectiveness or efficiency (e.g. human resource management).

Sources:

Global Guidance Principles for Life Cycle Assessment Databases

*Vibrant Communities and Sustainable Value Chains – A Life Cycle Management Capability Framework for Business

** Greening the Economy Through Life Cycle Thinking – Ten Years of the UNEP/SETAC Life Cycle Initiative

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