

Official SPPC Definitions for LCA Terminology

The following definitions, component descriptions, and abbreviated terms are drawn from ISO standards 14040, 14041, 14042, and 14043. The intended scope of each of these is as follows:

- **14041: Goal and scope definition and inventory analysis**
- 14042: Life cycle impact assessment
- 14043: Life cycle interpretation
- **14040: Principles and framework**

This is a compilation of those definitions described in those four documents. SPPC publicly adopts this list for the purpose of clarifying the interpretation of any of its technical or policy documents, as well as descriptions that appear on its web site.

There are also several definitions from the documentation of SimaPro, a leading LCIA software tool.

(In some cases, descriptions and definitions have been drawn from multiple sections of the document, as needed to define all relevant terms.)

Definitions

allocation

partitioning the input or output flows of a unit process to the product system under study

preceding phases of an LCA or an LCI study is sufficient for reaching conclusions in accordance with the goal and scope definition

ancillary input

material input that is used by the unit process producing the product, but does not constitute a part of the product
EXAMPLE A catalyst.

consistency check

process of verifying that the assumptions, methods and data are consistently applied throughout the study and in accordance with the goal and scope definition
NOTE The consistency check should be performed before conclusions are reached.

category endpoint

attribute or aspect of natural environment, human health or resources, identifying an environmental issue of concern
NOTE Figure 2 illustrates this term in further detail.

coproduct

any of two or more products from the same unit process

characterization factor

factor derived from a characterization model which is applied to convert the assigned LCI results to the common unit of the category indicator
NOTE The common unit allows aggregation into category indicator result.

data quality

characteristic of data that bears on their ability to satisfy stated requirements

comparative assertion

environmental claim regarding the superiority or equivalence of one product versus a competing product which performs the same function

elementary flow

(1) material or energy entering the system being studied, which has been drawn from the environment without previous human transformation
(2) material or energy leaving the system being studied, which is discarded into the environment without subsequent human transformation

completeness check

process of verifying whether information from the

energy flow

input to or output from a unit process or product system, quantified in energy units

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NOTE Energy flow that is input may be called energy input; energy flow that is output may be called energy output.

environmental aspect

element of an organization's activities, products or services that can interact with the environment

environmental mechanism

system of physical, chemical and biological processes for a given impact category, linking the LCI results to category indicators and to category endpoints

evaluation

life cycle interpretation_ second step within the life cycle interpretation phase to establish confidence in the results of the LCA or LCI study
NOTE Evaluation includes the completeness check, sensitivity check, consistency check, and any other validation that may be required in accordance with the goal and scope definition of the study.

feedstock energy

heat of combustion of raw material inputs, which are not used as an energy source, to a product system
NOTE It is expressed in terms of higher heating value or lower heating value.

final product

product which requires no additional transformation prior to its use

fugitive emission

uncontrolled emission to air, water or land
EXAMPLE Material released from a pipeline coupling.

functional unit

quantified performance of a product system for use as a reference unit in a life cycle assessment study

impact category

class representing environmental issues of concern to which LCI results may be assigned

intermediate product

input to or output from a unit process which

requires further transformation

input

material or energy which enters a unit process
NOTE : Materials may include raw materials and products.

interested party

individual or group concerned with or affected by the environmental performance of a product system, or by the results of the life cycle assessment

life cycle

consecutive and interlinked stages of a product system, from raw material acquisition or generation of natural resources to the final disposal

life cycle assessment (LCA)

compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle

life cycle impact assessment

phase of life cycle assessment aimed at understanding and evaluating the magnitude and significance of the potential environmental impacts of a product system

life cycle interpretation

phase of life cycle assessment in which the findings of either the inventory analysis or the impact assessment, or both, are combined consistent with the defined goal and scope in order to reach conclusions and recommendations

life cycle inventory analysis

phase of life cycle assessment involving the compilation and quantification of inputs and outputs, for a given product system throughout its life cycle

life cycle impact category indicator

quantifiable representation of an impact category
NOTE The shorter expression "category indicator" is used throughout the text of this International Standard for improved readability.

life cycle inventory analysis result (LCI result)

outcome of a life cycle inventory analysis that

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includes the flows crossing the system boundary and provides the starting point for life cycle impact assessment

normalization

Many methods allow the impact category indicator result to be compared by a reference (or Normal) value. This means the impact category is divided by the reference. The reference may be chosen, but often the average yearly environmental load in a country or continent, divided by the number of inhabitants, is used as the reference.

After normalization, the impact category indicators all get the same unit (usually 1/yr), which makes it easier to compare them.

Normalization can be applied on both characterization and damage assessment results. (SimaPro 5 Reference Manual)

output

material or energy which leaves a unit process
NOTE : Materials may include raw materials, intermediate products, products, emissions and waste.

practitioner

individual or group that conducts a life cycle assessment

process energy

energy input required for a unit process to operate the process or equipment within the process excluding energy inputs for production and delivery of this energy

product system

collection of materially and energetically connected unit processes which performs one or more defined functions

NOTE : In this International Standard, the term "product" used alone includes not only product systems but can also include service systems.

raw material

primary or secondary material that is used to produce a product

reference flow

measure of the needed outputs from processes in a given product system required to fulfill the

function expressed by the functional unit

sensitivity analysis

systematic procedure for estimating the effects on the outcome of a study of the chosen methods and data

sensitivity check

process of verifying that the information obtained from a sensitivity analysis is relevant for reaching the conclusions and giving recommendations

system boundary

interface between a product system and the environment or other product systems

transparency

open, comprehensive and understandable presentation of information

uncertainty analysis

systematic procedure to ascertain and quantify the uncertainty introduced into the results of a life cycle inventory analysis due to the cumulative effects of input uncertainty and data variability
NOTE Either ranges or probability distributions are used to determine the uncertainty in the results.

unit process

smallest portion of a product system for which data are collected when performing a life cycle assessment

waste

any output from the product system which is disposed of

weighting

Some methods allow weighting across impact categories. This means the impact (or damage) category indicator results are multiplied by the weighting factors, and are added to form a total score. Weighting can be applied on normalized or non-normalized scores, as some methods, like EPS, does not have a normalization step. (SimaPro 5 Reference Manual)

Abbreviated terms

LCA life cycle assessment
LCI life cycle inventory analysis
LCIA life cycle impact assessment

Additional long definitions from the ISO documents

From INTERNATIONAL STANDARD ISO 14041, First edition, 1998-10-01 (Environmental management — Life cycle assessment — Goal and scope definition and inventory analysis)

4 LCI components

4.2 *Product system*

A product system is a collection of unit processes connected by flows of intermediate products which perform one or more defined functions. Figure 1 shows an example of a product system. A product system description includes unit processes, elementary flows, and product flows across the system boundaries (either into the system or out of the system), and intermediate product flows within the system. The essential property of a product system is characterized by its function, and cannot be defined solely in terms of the final products.

4.3 *Unit process*

Product systems are subdivided into a set of unit processes (see Figure 2). Unit processes are linked to one another by flows of intermediate products and/or waste for treatment, to other product systems by product flows, and to the environment by elementary flows.

Examples of elementary flows entering the unit process are crude oil in ground and solar radiation.

Examples of elementary flows leaving the unit process are emissions to air, emissions to water and radiation. Examples of intermediate product flows are basic materials and subassemblies.

Dividing a product system into its component unit processes facilitates the identification of the inputs and outputs of the product system. In many cases, some of the inputs are used as a component of the output product, while others (ancillary inputs) are used within a unit process but are not part of the output product. A unit process also generates other outputs (elementary flows and/or products) as a result of its activities. The boundary of a unit process is determined by the level of modeling detail that is required to satisfy the goal of the study. Because the system is a physical system, each unit process obeys the laws of conservation of mass and energy. Mass and energy balances provide a useful check on the validity of a unit process description.

4.4 *Data categories*

Collected data, either measured, calculated or estimated, are utilized to quantify the inputs and outputs of a unit process. The major headings under which data can be classified include:

- energy inputs, raw material inputs, ancillary inputs, other physical inputs;
- products;
- emissions to air, emissions to water, emissions to land, other environmental aspects.

Within these headings, individual data categories shall be further detailed to satisfy the goal of the study. For example, under emissions to air, data categories such as carbon monoxide, carbon dioxide, sulfur oxides, nitrogen oxides, etc. can be separately identified. Further description of such data categories is provided in 5.3.4.

4.5 *Modeling product systems*

LCA studies are conducted by developing models that describe the key elements of physical systems. It is often not practical to study all the relationships between all the unit processes in a product system, or all the relationships between a product system and the system environment. The choice of elements of the physical system to be modeled is dependent on the definition of the goal and scope of the study. The models used should be described and the assumptions underlying those choices should be identified. Further description is provided in 5.3.3 and 5.3.5.

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From **INTERNATIONAL STANDARD ISO 14042** First edition 2000-03-01: Environmental management — Life cycle assessment — Life cycle impact assessment

4.1 *Aim of LCIA*

LCIA aims to examine the product system from an environmental perspective using impact categories and category indicators connected with the LCI results. The LCIA phase also provides information for the life cycle interpretation phase.

4.2 *Key features of LCIA*

Key features of the LCIA are listed below.

The LCIA phase, in conjunction with other LCA phases, provides a system-wide perspective of environmental and resource issues for one or more product system(s).

LCIA assigns LCI results to impact categories. For each impact category, the category indicator is selected and the category indicator result, hereafter referred to as indicator result, is calculated. The collection of indicator results, hereafter referred to as the LCIA profile, provides information on the environmental issues associated with the inputs and outputs of the product system.

LCIA is different from other techniques such as environmental performance evaluation, environmental impact assessment and risk assessment as it is a relative approach based on a functional unit. LCIA may use information gathered by these other techniques.

From **INTERNATIONAL STANDARD ISO 14043** First edition 2000-03-01 (Environmental management — Life cycle assessment — Life cycle interpretation)

4.1 *Objectives of life cycle interpretation*

The objectives of life cycle interpretation are to analyze results, reach conclusions, explain limitations and provide recommendations based on the findings of the preceding phases of the LCA or LCI study and to report the results of the life cycle interpretation in a transparent manner. Life cycle interpretation is also intended to provide a readily understandable, complete and consistent presentation of the results of an LCA or an LCI study, in accordance with the goal and scope definition of the study.