

Templates for LCA Reports and for Critical Reviews of LCA studies

Guideline 4 in the CSIR's LCA Guideline Series

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1 Introduction

This Guideline forms part of the **CSIR’s Life Cycle Assessment (LCA) Guideline series**.

Guideline 1 is the main guideline, providing information on how to conduct an LCA study in the South African context.

This accompanying guideline, **Guideline 4**, provides templates for compiling:

- the report of an LCA study and;
- the review report for critical peer reviews of LCA studies, when such a critical review is required. In particular, the template is based on the requirements of ISO 14044 (ISO, 2006b); although it should be noted that depending on the goal and scope of the LCA study, other relevant standards may apply (see *Guideline 2*).



2 Template for reporting of an LCA study

In this section, we provide a suggested template for reporting the results of an LCA study. The template follows the structure of the four stages of an LCA study as per ISO 14044 (2006). It is intended to provide guidance in terms of how an LCA report should be structured and how/where the various types of information should be reported. Please refer to ISO 14044 (ISO, 2006b) for more details.

Section 1: Introduction

[Add here an introduction to the specific project/study/context/client.]

[Add description of the specific product system of the study].

[Add some background on similar studies (if any)].

Section 2: Goal and Scope

The international standard on life cycle assessment, ISO 14044:2006, requires that the items in the following sub-sections be considered and clearly described when defining the goal and scope of an LCA study.

Sub-section 2.1: Goal of the Study

As per ISO 14044:2006 (ISO 2006b), the goal of an LCA study is defined through a consideration of the intended application, the reason for carrying out the study, and the intended audience. In the case of this study:

- The intended application: *[add description of the intended application].*
- The reason for carrying out the study: *[add description of the reason for carrying out the study].*
- The intended audience: *[add description of the intended audience]*¹

The goal of the study is thus to quantify (and/or compare) the life cycle environmental impacts of *[add description of the specific goal of the study].*

¹ If the study is intended for a wider audience, the following must be stated here:

- Further, the study will include peer review to ensure the results are unbiased and conform with appropriate standards.

Sub-section 2.2: Scope of the Study

The scope of the study covers decisions relating to the detail and accuracy of the study and related methodological decisions, including the choice of functional unit, system boundaries and data requirements.

Sub-section 2.2.1: The product system and the functional unit

The product system analysed is *[add description of the specific product system of the study]*.

The **functional unit (FU)** for the study, which is the product or service unit against which environmental impacts are measured, is: *[add description of the specific functional unit for the study]*.

Sub-section 2.2.2: The system boundary: life cycle stages and flows considered

The life cycle system is made up of all the life cycle stages (unit processes) making up the product system, enclosed by the system boundary. In line with the requirements of the EPR Regulations, a cradle-to-grave system boundary is applied to the study, to account for all stages of the product life cycle. The specific system boundary for the study is *[add description of the specific system boundary of the study]*.

The production of all raw materials and other inputs into the processes (e.g., electricity, water, fuels, etc.), are included in the system boundary.

State any other ancillary process(es) included in / excluded from the description of the system under study, depending on the Goal and Scope (e.g. transport of materials between stages of the value chain, infrastructure, etc.).

Sub-section 2.2.3: Allocation procedure

The LCA approach followed in this study is **Attributional**.

[Then describe the approach to allocation, for both:

- multi-product activities, and*
- recycling at end of life]*

Sub-section 2.2.4: Impact categories selected and methodology of impact assessment

[Describe here which Life Cycle Impact Assessment method(s) was/were chosen to conduct the study; Impact Categories covered; and why.]

Sub-section 2.2.5: Data requirements

Foreground data on *[add description of the specific stages of the production system of the study]* were provided by *[names of data provider(s)]; and/or* A blend of literature data and primary data were used to model the *[add description of the specific stages of the production system of the study]*.

Background processes are all those processes that provide materials and services into *[add the product system of the study]* production and its supply chain, including electricity generation and transmission, road and sea transport, production of fuels, production of ancillary materials, water and waste treatment etc. Data for background processes were sourced from *[add the source(s) of the background datasets]*.

Sub-section 2.2.6: Assumptions and limitations

[Describe all assumptions made in the study and the limitations. If those assumptions will have possible impacts on the results, discuss those in a dedicated section (add section number/name)].

Section 3: The Life Cycle Model

Sub section 3.1: Inventory Analysis

[The most important issue in this context is the way data are gathered (data sources), modelled and aggregated. Thus, the following must be clearly stated:

- *Data sources:*
 - *Use of background datasets vs foreground datasets*
 - *In the case of foreground datasets, whether secondary or primary data collection occurred, and what the procedure was to gather the data*
 - *If background datasets were used, how they were adapted to the local context*
 - *What background datasets were used as proxies, and why.*
- *The justification for the system model and approach to allocation*
- *The data pedigree and data uncertainty, assessed at the level of unit processes*
- *The validity of the methods used for calculations].*

Reference flows of materials, energy and other resources linked to the Functional Unit defined *in [add section number/name]* are listed in the table below, which also details the data sources used to model the specific flows.

| Process/Material | Amount (unit) | Source | Adaptation |
|------------------|---------------|--------|------------|
| | | | |
| | | | |
| | | | |

Sub section 3.2: Impact Assessment Method(s)

[Describe here which Life Cycle Impact Assessment method(s) was/were chosen to conduct the study; the rationale for choosing that method(s); and correctly reference it. In addition, the approach to normalisation, weighting and aggregation (if applicable) must be specified].

Section 4: Life Cycle Impact Assessment – Presentation and discussion of results

[Report here on the study results. Results can be presented in various different ways (see Guideline 1), according to the aims of the study.]

Section 5: Interpretation – what are the findings of the study and what conclusions can be drawn?

[Discuss here the findings of the study and what conclusions can be drawn. In terms of interpretation, the following should be discussed:

- *Results interpretation (according to the goal and scope)*
- *Data Quality Assessment*
- *Sensitivity Analysis*
- *Public disclosure of the study.]*

Section 6: Conclusion

References

[Add a full list of references cited in the report.]



3 When is a Critical Review required?

Reviews of Life Cycle Assessment (LCA) studies are conducted in accordance with ISO 14044 (ISO, 2006b and ISO/TS 14071:2024). Specifically, it is stated that *“In order to decrease the likelihood of misunderstandings or negative effects on external interested parties, a panel of interested parties shall conduct critical reviews on LCA studies **where the results are intended to be used to support a comparative assertion intended to be disclosed to the public.**”* Thus, critical reviews of LCA studies are **mandatory in cases when results will be communicated to the public domain, particularly when making comparative assertions or environmental claims.**

The objective of the critical review process is to ensure that the LCA study is consistent with the standard to which the study refers. This will in most cases mean the ISO 14040-series, although other national, product-specific or case-specific standards may also apply (Weidema, n.d.) (see *Guideline 2* for a comprehensive list of applicable standards).

Usually the need for a critical/peer review of the study is stated in the Goal and Scope definition, where it is required to clearly define:

- *The intended application;*
- *The reason for carrying out the study;*
- *The intended audience* – here it must be clearly stated if the LCA study is for internal use only, or if it is intended for public communication (including for environmental claims). If the latter, then a critical review is required; and the need for a Critical Review step must also be clearly stated in the report.

4 Who can review an LCA Study?

On the selection and qualification of an appropriate reviewer for the study, the reviewer has to have adequate professional knowledge of both the LCA framework and the specific product type / sector which is investigated by the LCA study. The reviewer should also be independent, meaning that he/she *“should not have business ties with the practitioner and/or any commercial interests in the topic of the study”* (Weidema, n.d.). Similarly, ISO/TS 14071:2024 refers to an *“independent internal expert (3.1) or independent external expert (3.2) performing a critical review, or interested party (3.9) taking part in a critical review panel”*.

5 Template for the critical review

This template follows the requirements of ISO 14044 (ISO, 2006b) and ISO/TS 14071 (ISO, 2024); although it should be noted that depending on the goal and scope of the LCA study, other relevant standards may apply (see *Guideline 2*).

Section 1: Introduction

This review is conducted on the Draft Report *[date]* prepared by *[add consultant's name]* for *[add producer/commissioner's name]*, as part of a Life Cycle Assessment study of *[product(s)]* produced by *[producer/commissioner of the study]*.

Reviews on Life Cycle Assessment (LCA) studies are conducted in accordance with ISO 14044:2006, especially when results will be communicated to the public.

The objective of the critical review procedure is to ensure that the life cycle assessment study is consistent with the standard to which the study refers, in this case *ISO 14044:2006 (or other relevant standard if applicable/needed)*.

This document reports on the critical review of the above-mentioned study, and therefore the main objective is to ensure that the study is consistent with *ISO 14044:2006 and ISO/TS 14071:2024 (or other relevant standard if applicable/needed)*.

Hence, the following has been carefully examined:

- *Goal and Scope Definition of the study,*
- *Inventory Analysis,*
- *Impact Assessment,*
- *Interpretation, and*
- *Final Report.*

Section 2: Critical Review of the Goal and Scope Definition of the study

As per the requirements of *ISO 14044:2006*, the goal and scope must be clearly defined and consistent with the intended application. Thus, the review focused on checking:

The Goal of the study – The Goal of the study should be clearly stated, following the structure below.

- *The intended application:*
- *The reason for carrying out the study:*
- *The intended audience:*

The Scope of the study - The scope of the study should be clearly described, with at least the following main aspects taken into account:

- *The product system and functional unit:*
- *The system boundaries and life cycle model:*
- *Allocation:*
- *Impact categories and methodology for interpretation of results:*
- *Data requirements and Data quality requirements, assumptions and limitations:*
- *Type and format of the report:*

[Add relevant considerations on the points above].

Section 3: Critical Review of the Inventory Analysis

As per the requirements of *ISO 14044:2006*, for the inventory phase, the most important issue is the way in which data are aggregated (where applicable). Thus, the review focused on checking:

- The scientific justification for aggregating data (if applicable), and
- The validity of the methods used for calculations.

[Add relevant considerations on the two points above].

Section 4: Critical Review of the Impact Assessment

As per the requirements of *ISO 14044:2006*, in terms of the Impact Assessment, the review focused on checking that:

- The methods used to carry out the life cycle assessment are scientifically and technically valid, and;
- The value-choices and assumptions made during the selection and definition of impact categories were identified and justified.

[Add relevant considerations on the two points above].

Section 5: Critical Review of the Interpretation

In terms of interpretation, for an LCA study to comply with *ISO 14044:2006*, the following has to be assessed:

- Results are interpreted according to the Goal and Scope, by also including a data quality assessment,

- Whether the study included a Sensitivity Analysis, and
- Whether the study will be disclosed to the public.

[Add relevant considerations on the following:

- *Results interpretation:*
- *Data Quality Assessment:*
- *Sensitivity Analysis:*
- *Public disclosure of the study:]*

Section 6: Critical Review of the Final Report

As per Weidema (n.d.): *“The ISO standards require the results, data, methods, assumptions and limitations to be clearly, fairly, and accurately reported in sufficient detail to allow the intended audience to comprehend the complexities and trade-offs inherent in the study”.*

For life cycle assessments which are to be communicated to a third party, the report must cover:

- *Name of the commissioner and the practitioner, and Date:*
- *Reference to the ISO standards:*
- *Goal and scope definition, including target audience, functions, functional unit, omissions of additional functions and qualities in comparative studies*
- *Inventory analysis: data sources, data collection and calculation procedures, treatment of missing data, descriptions of unit processes, quantification of energy flows in energy units (including inherent energy), assumptions on electricity production, allocation procedures:*
- *Impact assessment:*
- *Sensitivity analysis:*

Possible concluding statements for this section are as follows:

“All the main points of an LCA study which is to be communicated to a third party have been carefully checked and assessed to ensure that, should the report (or some information) be shared, it meets the requirements.

Thus, this LCA study is, in my professional opinion, (well/fairly/poorly) executed; and results (are / are not) presented according to accepted formats, following the norms in the standards of reference (ISO 14040 and 14044:2006).”

[Add any additional remarks regarding the specific study].

Section 7: Overall Consideration and Conclusion

The aim of the study was to *[add aim of the study]*.

All the requirements of *ISO 14044:2006 (or other relevant standard)* for LCA studies were assessed. The LCA study *[meets / partially meets / doesn't meet]* a major part of the criteria. It *[provides / partially provides / doesn't provide]* a thorough explanation and justification for the choices and decisions made, as well as evidence-based results.

Remarks / recommendation for consideration *(if any): E.g.* In order to improve the study, it is recommended that *[add accordingly if any major/crucial gaps have been identified]*.

Once the above has been addressed, the conclusions and recommendations provided by the study are sound and reasonable.



References

- B. Weidema, Guidelines for Critical Review of product LCA, available on-line at [critical_review.pdf \(lca-net.com\)](#)
- ISO 14044:2006. Environmental Management - Life Cycle Assessment - Requirements and Guidelines. *International Organization for Standardization*. Geneva. Switzerland.
- ISO /TS 14071:2024 Environmental management — Life cycle assessment — Critical review processes and reviewer competencies.

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