

Normalization and Weighting in ISO standards

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Normalization and weighting as optional elements in LCIA

Normalization and weighting are introduced into ISO 14044 as optional elements of LCIA after classification and characterization

After classification and characterization, LCA results include

- a compilation of the LCIA category indicator results for the different impact categories referred to as an LCIA profile,
- a set of inventory results that are elementary flows but have not been assigned to impact categories e.g. due to lack of environmental relevance, and
- a set of data that does not represent elementary flows.

Category indicator results undergo normalization and weighting

Normalization and weighting in ISO 14044

- **Normalization** - calculation of the magnitude of category indicator results relative to some reference information
- **Weighting** - converting and possibly aggregating indicator results across impact categories using numerical factors based on value-choices.
- Weighting, as described in 4.4.3.4, shall not be used in LCA studies intended to be used in comparative assertions intended to be disclosed to the public.

ISO 14044 – a strong document

- ISO 14044 supersedes four ISO standards on LCA which have been published between 1997 and 2000.
- This standard has been well accepted and is used as a basis of many normative documents on LCA methodology.
- Following the vote of member countries the standard has been confirmed in 2011 and 2016.
- However, there was some follow-up

Follow-up ISO 14044:2006

- Since 2012, proposals how to update ISO 14044 have been collected by the responsible subcommittee ISO/TC 207/SC 5
- In a vote, majority of ISO members did not want significant technical changes in the form of a revision
- A first amendment, a normative annex on footprints, has been prepared in 2016 – 2018, now published
- Following further update proposals, the following steps have been decided by SC5:
 - a second amendment, mainly an informative annex on allocation
 - the preparation of a new Technical Specification (TS) on normalization, weighting and interpretation

ISO/TS 14074 – Normalization – weighting - interpretation

- NWIP prepared since 2017 by a task group of ISO/TC 207/SC 5
- NWIP approved in spring 2019
- First working draft has been prepared in a meeting of ISO/TC 207/SC 5/WG12, based on comments on the seed document
- Two further meetings of WG 12 are planned for 2020 to improve the document
- Publication planned for the end of 2020

What is an ISO/TS?

- A TS is a normative document, addressing work still under technical development,
- A TS is published for immediate use, but the aim is that it will eventually be transformed into an International Standard.
- A TS needs 2/3 majority by vote and needs to be revised after 3 years: only one confirmation is possible
- As an example ISO 14067 on carbon footprinting has initially been published as a TS, but, after revision been up-graded to an ISO Standard

How to participate at ISO standardization

- Identify a standardization issue and find out the working group at ISO where this issue is dealt with: here: ISO/TC 207/SC 5/WG12
- Participate in the relevant national mirror group of the relevant national standardization body (NSB), e.g. INB/NK174 of the SNV for Switzerland
- Upon request, NSB delegates you as an expert into the relevant working group of ISO, and you get direct access to all the relevant documents of the WG. No obligation to participate at the WG meetings
- Interventions of a national expert, e.g. comments to draft documents, have to be agreed by other members of the NSB
- Alternatively, you only participate as a member of the mirror group at the elaboration of national comments to draft documents without being registered as an expert

1 Environmental management – Life cycle assessment – Principles, 2 requirements and guidelines for normalization, weighting and 3 interpretation

4 1 Scope

5 This document provides principles, requirements and guidelines for normalization, weighting and life
6 cycle interpretation, in addition to the requirements and guidelines given in ISO 14040 and ISO 14044.

7 The document relates to LCA studies and footprint quantification studies.

8 In particular, this document addresses:

- 9 – the use of normalisation and weighting and their limitations ;
- 10 – the selection or development of weighting factors ;
- 11 – the generation of single scores.

12 This document further contains requirements that relate to documentation and procedures.

13 For the interpretation phase it provides, in addition to ISO 14044, procedures and guidance for:

- 14 – performing completeness, sensitivity and consistency checks;
- 15 – addressing uncertainties and limitations;
- 16 – Documenting conclusions and recommendations.

17 This document does not intend to define Panel set-up nor to define multi-criteria decision analysis .

Example of a comments template with decisions

Template for comments and secretariat observations

Date:2019-04-16

Document: ISO/TC 207/SC 5 N 617

Project: ISO/TS 14074

MB/ NC ¹	Line number	Clause/ Subclause	Paragraph/ Figure/Table	Type of comment ²	Comments	Proposed change	Observations of the secretariat
CH 025	28	02	Normative references	te	the use of ISO 14040 and ISO 14044 as normative reference is evident	please change: ISO #####-#, General title — Part #: Title of part to: ISO 14040, Environmental management — Life cycle assessment — Principles and framework ISO 14044, Environmental management — Life cycle assessment — Requirements and guidelines	<u>Accepted</u>
IT 026	28	02	Normative references	Te	Considering the comment of Italy on the expression of uncertainty	Add: “JCGM 100:2008, Evaluation of measurement data – Guide to the expression of uncertainty in measurement”	<u>Not accepted, as it is not referred to in the text in a normative way</u>
FR 027	29	03	Terms and definitions	te	Weighting and normalization definitions are approved: they are in good accordance with existing sentences in ISO 14044.	No change	<u>noted</u>
CH 028	30	3		te	It should be made clear that this document uses identical terms and definitions as in ISO 14044	please change: Note1 to entry: weighting may or may not result in a single score. to: Note1 to entry: weighting can result in a single score or in multiple scores.	<u>accepted</u>

Text of the new document

1 **Environmental management – Life cycle assessment – Principles,**
2 **requirements and guidelines for normalization, weighting and**
3 **interpretation**

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17 This document does ~~not not intend to define specify Panel~~ set-up of panels for weighting nor does it
18 specify to define multi-criteria decision analysis.

ISO/WD 14074 – What is laid down in this very first draft?

- Existing text preliminary, will possibly be modified/extended in subsequent drafts
- Many clauses/subclauses need to be filled up with text

Normalization in ISO/WD 14074

- Normalization transforms an indicator result by dividing it by a selected reference information
- Possible uses for normalization include:
 - An intermediate step before weighting;
 - Assessment of the relative magnitude of different impact category results;
 - Assistance for communication of results.
- The uncertainty of the normalization factors shall be evaluated and documented
- The quality of the normalization factors shall be sufficient to apply weighting afterwards

Weighting in ISO/WD 14074

- Weighting is based on value-choices and is not scientifically based
- weighting can result in a single score or in multiple scores
- All indicator results of the study, before weighting, shall be included in the LCA report
- The approaches of weighting include:
 - distance-to target weighting ;
 - panel-based weighting ;
 - monetary weighting;
 - combination of approaches.

Distance-to-target weighting in ISO/WD 14074

- Distance-to-target (DTT) weighting values the importance of indicators by applying weighting factors that depend on the distance between the existing impact level and a target level
- Results are multiplied by weighting factors which typically are based on policy goals and regulatory limits.
- Results after weighting can be added up to obtain a single score or multiple scores for a given product system.
- It needs to be clarified if DTT weighting only applies to indicator results, according to present definition of weighting.
- Swiss ecopoints can be considered as DTT weighting

Example of a weighting factor (WF)

$$WF = (E_i - E_{i,T}) / E_{i,T} * z_i ,$$

where

- E_i is the present emission/resource use of substance i ,
- $E_{i,T}$ is the target emission/resource use and
- z_i a possible weighting factor for the substance i target relative to other targets.

All data refer to a specified geographical area

Panel based weighting

- Panel based weighting values the importance of indicators by applying weighting factors determined by a panel
- The panel can involve the practitioner of the study, the commissioner of the study and any other interested parties.
- The panel shall declare transparently its underlying value choices and the way in which known bias are avoided or treated.
- For each weighting factor, the panel shall determine ranges which reflect the differences of value choices of the different members of the panel.
- Scores resulting from weighting will have ranges

Monetary weighting

- Monetary weighting values the importance of impact categories by applying weighting factors (currency unit) that are proportional to the maximum amount of money which the affected population is prepared to spend to reduce the impact.
- The monetary values are obtained from market prices, as revealed preferences, or as stated preferences.
- Stated preferences are survey methods, similar to panel methods, but with panels that are representative of the affected human population.

Weighting at different points in the impact pathway

- Weighting can be applied at different points of the impact pathway, e.g. for mid-point indicator results and for end-point indicator results.
- Open question: ***When the LCIA profile consists of 15 mid-point indicator results and they are transformed into three end-point indicator results, e.g. ReCiPe – is this weighting?***
- No clear answer at the Berlin meeting

Comparative assertion

Definition in ISO 14044:

comparative assertion

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

- Environmental claims are outside the scope of ISO/TC 207/SC5
- In the standard on self-declared environmental claims, i.e. ISO 14021, many different forms of comparative claims are mentioned
- The comparative assertion is mentioned only once as one specific form of comparative claim.

Weighting and comparative assertions

The standard requires under 4.2.2:

- *In defining the goal of an LCA, it shall be unambiguously stated **whether** the results are intended to be used in comparative assertions intended to be disclosed to the public*

This means that ISO 14044 requires such a statement for **all** studies which want to be in conformance.

Furthermore, the standard requires under 4.2.3.7:

- *In a comparative study, the equivalence of the systems being compared shall be evaluated before interpreting the results... If the study is intended to be used for a comparative assertion intended to be disclosed to the public, interested parties shall conduct this evaluation as a critical review.*

This means that that it is not mandatory that all comparative studies are intended to be used for comparative assertions intended to be disclosed to the public.

Comparative studies with a disclaimer - General

If there is an unambiguous statement (disclaimer) in a comparative study that results are not intended to be used in comparative assertions intended to be disclosed to the public, then the special requirements, e.g.

- that the critical review is mandatory
- that weighting is not permitted in that study

do not apply.

ISO 14044 and ISO/TS 14074 do not formulate any requirements how conclusions of a comparative LCA study with a disclaimer should be formulated (to avoid the smell of a comparative assertion)

Comparative LCA studies with a disclaimer

- ... can be used for informed decision-making, e.g.
 - political decisions
 - decisions between design options
- ... can be in conformance with ISO 14044 even if they include weighting