How to complete LCA studies data collection in order to improve its quality?

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1. Introduction

LCA is a more and more widespread tool used to calculate the environmental impacts of products and services. This importance leads to an increasing need for reliability and transparency of data and results.

In parallel, the multiplication of LCA studies as well as the growing complexity of reference documents and analysed systems leads to an increasing need for temporal and human resources. Most of these are allocated to the collection and research of data.

The time needed to perform this collection is even greater as some data may be missing, hard to find or even false. It is necessary to define and use methods in order to fill out those gaps. Those choices are essential and must preserve the relevance and transparency of studies while limiting the need for resources.

This presentation aims at detailing the results of the study performed on behalf of the ScoreLCA association concerning how to answer this need for reliable methods of missing data gap completion [1].

2. Materials and methods

This study aimed at answering this need through three steps: description of existing reference documents requirements in terms of missing data, identification, description and application of current and ongoing methods aiming at solving the data missing gap, and determination of recommendations allowing the selection and application of chosen methods, depending on studied systems typology and LCA study goals.

3. Results and discussion

3.1. Requirements analysis

The analysis led to the identification of 23 documents. For each document, all requirements related to missing data have been noted and gathered in different categories based on their similarities. 72 requirements have been identified, assembled in 6 different categories: 11 checklists, 14 documentations, 6 missing data identification, 2 iterations, 17 cut-off rules, 22 substitutions with generic / average / penalizing data.

The analysis enlightened the different logical schemes (or the lack thereof) concerning the requirements implementation in the different documents, depending on:

The activity area: adaptation of some demands to specific sectors in order to reflect specific constraints

The age of documents: there is no apparent logic, but this point could evolve due to the current harmonization around two main reference documents: the ILCD handbook [2] and the EN 15804 [3].

Involved actors and documents objectives: there is an opposition between two main objectives: LCA applicability and democratization on one side, using low-constraint requirements in terms of resources, and the methodological relevance on the other. Another aspect is the importance given to requirements for databases. They often have many and strong demands. It mainly allows their users to exploit their data for many different applications using different reference documents, so they have to comply with all those requirements.

This study showed that the current methodological developments go towards a greater harmonization and complexity of requirements.

3.2. Methods analysis

In total, 20 methods have been identified,gathered in 7 different categories: 3 results relevance and coherence verification, 5 input / output balance, 3 checklists, 1 missing data quantity estimation, 3 data collection planning, 1 reverse engineering, 4 substitution with estimated / generic / average / penalizing data.

Each method has then been tested on three case studies covering different sectors in order to complete the theoretical approach with a practical view focusing on the effect of methods on the impact results, the study conclusions, their easiness of application and the associated resource needs.

This analysis led to the determination of advantages and drawbacks associated with each method, and on a more global scale with each method category. This work showed there are two sides to each methods: an inherent side concerning their ease of use, advantages and drawbacks and risks, and an external one, depending on studies constraints such as:

The application time phase: we differentiated 3 consecutive phases of LCA for which the application of methods related to missing data is relevant: upstream, during the LCA and downstream

The study type: LCA studies are concerned by missing data problematics, but it is also the case of other LCA-based studies and databases.

The objective type: for this analysis level, most methods can be used indifferently whatever the objectives are. Yet, there are specificities concerning some methods and objectives, particularly on the environmental declaration / communication, ecodesign and comparative assessments.

To conclude, many methods actually exist and cover the missing data identification, analysis and substitution needs quite well. Yet, those methods have different scopes and applications, as well as advantages and drawbacks from inherent or external reasons, which must be apprehended before performing an LCA.

3.3. Recommendations

Finally, this study included the elaboration of recommendation on the selection and use of methods depending on the LCA practitioners' different constraints. The objective was then to provide simple tools making this selection and use easier, and *in fine* to improve the LCA studies quality. The tools are:

A procedure sheet: It aims at giving to the practitioners, before they start LCA studies, a global overview on the relevant steps in terms of missing data, and for each step to indicate which are the appropriate methods, and the essential questions to answer in order to help with this choice.

Method choice matrices: During the methods analysis, several criteria have been identified as decisive for the selection and application of methods. This tool enables the practitioners to determine what the most relevant methods are, depending on their constraints.

Method sheets: Once the relevant methods are selected, this tool provides the practitioners with details and information related to each identified method, along with examples and explanations.

4. Conclusions

To conclude, methodological evolutions (reference documents, standards and regulations) are in progress. Each sector, each company has its own stakes and problematics, therefore a different use of the reference documents, requirements and methods. It is essential that each practitioner appropriates and capitalizes on their own methods and requirements practices, determined from the ones identified in the study.

To go further, it is important to gather and analyse feedbacks from the different stakeholders (practitioners, verifiers, study users), as well as the methods and requirements answers to studies objectives. This could provide a synthesis to be used as a basis for the development or update of future reference documents.

5. References

[1] SCORE LCA, Comment compléter la collecte des données d'une étude ACV pour en améliorer sa qualité, 2015, 56 pages, n°2014-06.
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[3] EN 15804:2012. Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products