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INTERNATIONAL SURVEY ON CRITICAL REVIEW AND VERIFICATION PRACTICES IN LCA WITH A FOCUS IN THE CONSTRUCTION SECTOR

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ABSTRACT

Use of consistent and representative data is required to obtain reliable LCA studies. To do so, the LCA review is a key part. Yet, at the international level, few guidelines are provided to conduct a critical review. Only, few aspects are mentioned e.g. in ISO 14040 standard. In this paper, findings from an international survey are presented. The survey's objectives were to get feedbacks from LCA experts on important aspects they checked during their previous reviews with a focus in the European construction sector practices. Results show that most reviewers always check usual aspects of the LCA framework while more specific aspects requiring more background are not. This study can be viewed as a contribution for both general critical review guidelines and improvements of existing review checklist for EPD in the construction sector.

INTRODUCTION

The results of a Life Cycle Assessment (LCA) are highly relying on the quality of both data and the methodology used. To date, different data can be used e.g. for the LCA of building products and building as a whole. These data can come from generic LCA databases or from industry e.g. based on Environmental Product Declaration (EPD) schemes. In order to improve the reliability of LCA studies e.g. applied to the construction sector, users of building LCA tools need to obtain reliable data and results. To do so, data and results have to be clearly documented and consistently reviewed. Yet, at the international level, few guidelines are provided to conduct a critical review. Only, few aspects are mentioned e.g. in ISO 14040 (ISO, 2006; Klöpfer, 2012). This paper presents the findings on an international survey conducted in 2011 and 2012 to get feedbacks from experienced LCA experts and reviewers on the important aspects they checked during their previous reviews.

MATERIALS AND METHODS

An online survey has been established using both the European Commission ILCD review requirements (Chomkhamsri et al, 2011) and a review checklist used when reviewing a French EPD of building products (Chevalier, 2011). The last checklist is used in France by certified verifiers to harmonize the verification of data, calculation rules and results of an EPD. 135 experts from the LCA community were contacted by emails based on author's contacts within the LCA community but also through literature searches (web-based reports, scientific articles published in Int. Journal of LCA / Critical review section), LCA reports and reviews available on the website of the trade unions or companies. In addition, experts involved in EPD applied to the construction sector were contacted as the study has a particular focus in the construction sector. In that way, we gather a broader panel with people conducting reviews and verifications even if these two terms are different (Grahl et al, 2011). The survey is divided into four parts including: general information, critical review and verification expertise, type of criteria assessed during a critical review and the personal opinion of experts regarding the critical review. The use of both ILCD review requirements and the review checklist of French EPD for building products enable to have a broad scope of important aspects concerning the goal and scope definition, the inventory and impact assessment (including LCA methodology, representativeness, plausibility of values and results) and the interpretation stage (e.g. uncertainty analysis). Then, experts were asked to answer whether they always, sometimes or never review some aspects.

RESULTS

Only selective results looking at interesting outcomes are reported below. Out of 135 experts contacted, only 38 answered which means 28%. Even if the feedbacks were not as high as expected, useful results can be obtained as the panel comprises recognized international LCA experts. Generally speaking, for background and experiences, results show that few of LCA experts and reviewers passed an exam to prove their abilities for reviewing a LCA study. Only 5 out of the 38 experts that have replied to the survey actually took an exam (e.g. ACLCA exam, French EPD exam). In addition, most of them (~50%) usually perform full LCA critical review while only 5 experts are involved in the verification of EPDs. Looking at their experience in critical reviews, 42% have more than 10 years, 21% have between 5 and 10 years while 27% have less than 5 years of experience.

Results for LCA methodology, representativeness, plausibility criteria

Results show that a large number of reviewers always check usual aspects of the LCA framework while more specific aspects requiring more advanced knowledge and background are not. Feedbacks from the reviewers showed that they do not share a common view on specific aspects e.g. dealing with the review of an uncertainty assessment. In addition, the feedbacks of the different reviewers reinforce the level of the review depending on the scope of the study e.g. stand-alone LCA, comparative assertions or third party verified EPD. Some requirements from ILCD are not always checked e.g. the resources needed for the study. Looking at plausibility aspects (e.g. is the results of the LCA consistent with previous studies, if deviations can it be explained scientifically?), not all the experts check the general LCA criteria that are proposed based on the EPD checklist.

Results on the personal views on critical reviews and verification procedures

Table 1 presents an overview of experts' feedbacks concerning the aspects usually checked during a critical review. They are not representative of general opinions but much more as empirical knowledge and feedbacks based on their experiences. In addition, table 2 presents other feedbacks and remarks concerning the issues of using LCA for sector-specific applications (limitation in data transparency, availability). The feedback concerned the construction sector where a large number of EPD are available, these EPD being used for building LCA studies. Another general remark is the difficulty to access to the data and software during a critical review either because of time/cost constraints or due to confidentiality of datasets.

Table 1: Overview of expert's feedbacks concerning the representativeness criteria

Criteria	Summary of some expert's personal views taken from the full survey results		
Representativeness aspects	"Intensity of checks should be in relation to the goal and scope. It is impossible to check all data, but only random samples and/or suspicious values..."	"References as well as description of models that are used as data sources should be clearly described and commented. Experience is needed, if three reviewers, different roles are often assigned (e.g. involvement of both LCA data and technology experts."	"Consistency of generic data used in the study e.g. if a data is documented it does not mean that it fits. When generic data are relevant for the result of the study, crosscheck with other sources. It also depends on the source, is it reliable in general?"

Table 2: Additional expert's feedbacks concerning the LCA critical review and verification practices

Issue	Summary of some expert's personal views taken from the full survey results
Conducting a critical review (generally speaking)	"I try to keep the rules given in ISO 14040 7.3.3 and 14044 6.2 as closely as possible. In addition I advise clients to perform the review in an interactive way, as proposed by SETAC A code of practice 1993 (useful booklet). I also propose at one face to face meeting with the full review panel, practitioner and commissioner."
Pre-defined datasets/tools (construction sector)	"In the area of LCA and constructions a lot of LCA's are not done as detailed and transparent as desired. This has often to do with the fact that most studies are not made by LCA experts. Architects using LCA are mainly focusing on the comprehensive list of input materials (e.g. building component or full building) which then are connected to mainly generic LCIA data."

DISCUSSIONS

According to Baitz et al (2013), verification of LCI datasets and the critical review of LCA data in studies are both essential for checking, validating, and reviewing data, results, and conclusions. ISO TC 207 is working on a technical specification to supplement the 'critical review' section of the current ISO standards (ISO, 2013). In the same time, sector-specific actions are in progress to set up verification checklists e.g. the ECO EPD Platform that aims at increasing the mutual recognition of EPD programs of the European construction sector (ECO Platform, 2013). In that platform, works are looking at guidelines for conducting

harmonized EPD verifications for consistency purposes across the different national schemes based on the new EN 15804 standard for EPD of construction products (CEN, 2012) and building LCA (EeBGuide, 2013). The results of this survey can thus contribute to set up guidelines and to create a forum of exchange of reviewers at the international level.

CONCLUSIONS

The outcomes of this international survey provide several insights for current and future works e.g. for defining general guidelines for conducting a critical review. It can also support improvement of the verification checklists for EPD that are being developed e.g. in the European construction sector (ECO Platform) linked to the new EN 15804 standard for EPD.

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REFERENCES

Baitz, M. et *al* (2013) *LCA's theory and practice: like ebony and ivory living in perfect harmony?* The International Journal of Life Cycle Assessment, January 2013, Vol 18, Issue 1, pp 5-13

CEN (2012) EN 15804 - Sustainability of construction products - Environmental product declarations - Product catagory rules. Mars 2005, 47 p.

Chevalier J. (2011) Checklist for the verification of Environmental Product Declaration of the French EPD program for construction products, CSTB, France.

Chomkhamsri K., Wolf M. A., Pant R. (2011) *International Reference Life Cycle Data System (ILCD) Handbook: Review schemes for Life Cycle Assessment*. Proceedings of the LCM 2011 conference, Berlin, 2011.

EeBGuide (2013) *Operational Guidance for Life Cycle Assessment Studies of the Energy Efficient Buildings Initiative,* Online Info Hub, European Project of the 7th Framework, accessed on 24/05/2013: www.eebguide.eu .

ECO Platform (2013) ECO Guidance Paper Verification, Internal draft document from the WG II of ECO Platform project to initiate the development of a uniform European core EPD for the construction sector.

Grahl B., Schmincke E. (2011) *"Critical review" and "Verification" cannot be used synonymously. A plea for a differentiated and precise use of the terms*. Proceedings of the LCM 2011 conference, Berlin, 2011.

ILCD (2010) European Commission – Joint Research Centre – Institute for Environment and Sustainability (Ed.): *ILCD Handbook. General guide for life cycle assessment: detailed guidance*. First edition. Luxembourg: Publications Office of the European Union 2010. ISBN: 978-92-79-19092-6.

ISO (2006) *Environmental management - Life Cycle Assessment - Requirements and Guidelines - EN ISO 14044*. Genève: International Organization for Standardization (ISO), 2006, 33 p.

ISO (2013) ISO / TC 207 / SC 5 / WG 9 Critical Review, accessed on 24/05/2013: www.iso.org/iso/home/standards_development/list_of_iso_technical_committees/iso_technical_committee.htm?commid=54854

Klöpffer, W. (2012) *The critical review of life cycle assessment studies according to ISO 14040 and 14044*, The International Journal of Life Cycle Assessment, November 2012, Volume 17, Issue 9, pp 1087-1093