Navigating the LCA Critical Review Process

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1. Introduction

Carrying out a Life Cycle Assessment (LCA) is a complicated undertaking involving many technical and methodological assumptions, along with analysis of large, complex data sets. LCA results can also be difficult to interpret, as there can be a lot of nuance involved in understanding the environmental impact categories and the applicability of the results to other products or processes. Given all of this complexity, and the increasing importance of LCA as a tool to inform corporate and government policy decisions, it is necessary that published LCA studies undergo some form of critical review by experts and stakeholders to ensure that a high level of quality is upheld, and that LCA studies are done in a rigorous, transparent manner.

At present, the majority of LCA studies are either published in academic or industry journals, or released publicly by government departments or private corporations. Journal publications are subject to a mandatory peer-review process set-up and administered by each individual journal and will generally involve two to three subject matter experts chosen by the journal editor. Although referees may refer to the ISO standards for LCA, this is not a requirement in the journal peer-review process. On the other hand, LCA studies published in other forums are not subject to any mandatory review processes; however, an increasing number of private corporations are submitting their LCA studies to a third-party critical review process set-up in accordance with ISO 14040 and 14044 guidelines for critical review.

The ISO critical review process for LCAs is intended to provide assurance to the study's commissioner that the analysis was completed in compliance with the ISO guidelines for LCA. Beyond this, critical reviews also serve as a tool for readers when determining if the methodology used for the study was rigorous, transparent and defensible, bringing solid substantiation against claims of false advertising or "greenwashing."

To date, critical review in LCA is undertaken primarily by corporations who intend to use their studies to support marketing claims (e.g. comparative studies with competing products), and this process is supported by the ISO guidelines for LCA. In particular, ISO 14044 section 5.1 states: "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." Completing the critical review process gives corporations more confidence in their findings and lends credibility to their study.

Given the increasing importance of the ISO critical review process, the objective of this article is to provide guidance on how to successfully navigate the critical review process and emerge with an improved study document that is complete, transparent and appropriate for the intended audience.

Completing a third-party critical review is not unlike completing an LCA: failure to anticipate and plan for certain pitfalls can result in wasted time and resources and an undesirable outcome. Sometimes just knowing what to look out for can mean the difference between an efficient, positive review and a frustrating one. The strategies provided in this paper will set you on the path to a successful and meaningful critical review process.

2. Overview of the ISO Critical Review Process

According to the ISO standards, the objective of the critical review process is to ensure that:

- The methods used to carry out the LCA are consistent with ISO 14044
- The methods used to carry out the LCA are scientifically and technically valid (Ensure there is no environmental burden shifting)
- The data used are appropriate and reasonable in relation to the goal of the study
- The interpretations reflect the limitations identified and the goal of the study
- The study report is transparent and consistent

In EarthShift's experience, most critical review panels adhere to this checklist as a minimum set of objectives for the review, and then may develop additional objectives to suit the nature of the study, the technical expertise required and the intended audience.

There are two primary ways that the critical review process can occur: an "after-the-fact" review where the critical review process is initiated after the study has been completed and documented; or a concurrent review process where the critical review panel is involved in the early stages of the LCA, usually after the goal and scope have been documented.

The advantages and disadvantages of these two approaches will be explored later; however, in general, the four steps involved in completing a critical review are the same in either case, and include:

1. Selection of the chair and panel
2. Preparation of study documents for review
3. Responding to panel recommendations

4. Documentation of the review process

The structure of the critical review panel may vary depending on the nature of the study and the intended use of the study results, ranging from a single reviewer to a three or four member panel. Regardless of the size of the review panel, it must always include an experienced LCA practitioner and sufficient technical expertise from the relevant sectors or fields of study.

Members of the panel should have appropriate expertise and/or be what the ISO guidelines refer to as "interested parties." Interested parties are individuals who have a vested interest in the results of the study, for business or other reasons. In general, an external independent expert should be selected by the original study commissioner to act as chairperson of the review panel, and the chair will then select an appropriate number of panel members, usually 2-3 LCA and/or technical experts. Based on the goal and scope of the study, the chairperson may select other independent qualified reviewers. The ISO guidelines also indicated that the panel may include other interested parties affected by the conclusions drawn from the LCA, such as government agencies, non-governmental groups, competitors and affected industries.

3. Strategies for Successful Critical Reviews

A successful critical review process generally has the following outcomes:

- The study methodology is found to be compliant with the ISO standards
- The technical information and assumptions are found to be appropriate and defensible
- The conclusions are found to be supported by the data and results of the impact assessment
- The study report is found to be transparent and suitable for the intended audience

In addition, a successful critical review process will achieve these objectives in a timely and efficient manner; however, one of the most common issues in working towards a successful review is stalling of the process. This can occur due to issues related to the study team or to the review panel and can happen as a result of a number of common pitfalls in the process.

The following sections will describe some other common pitfalls and provide strategies for avoiding them on your way to a successful critical review.

3.1 After-the-Fact vs. Concurrent Review Processes

While it is common for the commissioner of an LCA study to wait until the study is almost complete before initiating the critical review process, the critical review experience can be improved tremendously by initiating the process in the early stages of the study. The greatest risk of an after-the-fact review process is that the review panel may identify significant methodological issues or issues with key

assumptions that could require major revisions to the analysis and to the study document. These types of changes are more difficult to make once the study has already been completed and the study report has already been prepared. Other challenges that can arise are related to the work involved in getting the panel up-to-speed on the study, and dealing with requests from the panel for particular study information that may not have been previously compiled. In a concurrent review process, these issues can be raised and addressed prior to completion of the analysis and the study report.

***Best Practice**: Arranging for a concurrent review process can lead to a more efficient and effective critical review process.*

The best approach for a concurrent review process is to bring the critical review panel onboard during the development of the goal and scope of the study. The review panel can then review the goal and scope and provide comments and recommendations on key methodological issues and assumptions. At this point, you could also develop a plan for the study documents required by the panel for the review and a plan for documenting the critical review process itself. Beyond the goal and scope definition, the critical review panel could also be enlisted to review the results of a phase I screening (if applicable), and could be consulted periodically with respect to key methodological decisions or technical assumptions.

3.2 Selection of the Chair and Panel

Selecting the chair of the panel is an important decision, since this individual will be responsible for overseeing the entire process, including the review of study documents, selection and coordination of the panel members, communications between the panel and study team and documentation of the review process.

The chair of the panel should be a strong LCA expert with good communication skills, and ideally some familiarity with the subject matter of the study, although this is not essential. Good communication and project management skills are more important for the panel chair than specific technical expertise.

***Helpful Hint**: In selecting the chair, consult with colleagues for recommendations of good candidates that they have worked with in the past.*

The selection of review panelists is the responsibility of the panel chair, although the commissioner of the study is free to suggest candidates for panelists. The ISO guidelines do not provide specific guidance on how many panelists are required, or what qualifications they should have. In general, the panel chair will select the panel based on the technical expertise required to adequately review the study. This may only require one panelist, or up to three or four panelists. For example, appropriate panelists for an LCA of paper packaging products might include a technical expert from the pulp and paper industry who can address the production stage of the life cycle, and a technical expert from the waste management industry who could assess assumptions related to end of life for the paper products.

3.3 Preparation of Study Documents for Review

LCA reports take many forms depending on their intended use, and the review panel will take this into consideration. Whatever form your document takes, it is critically important to prepare a well-organized, well-documented study report that is transparent in its assumptions and other reporting requirements specified by the ISO 14044 guideline.

For example, if you are asking the panel to review study results that you intend to release publicly in the form of marketing claims, you cannot have the panel review a study report that was written for an internal audience. ISO 14044 specifies particular reporting requirements for studies intended to support comparative assertions in a public forum, and the review panel will be looking for these elements in your report. As another example, a study report written for publication in an academic journal is not likely to contain enough detail to satisfy an ISO panel review. If you have not done so, you should make yourself familiar with Sections 5.2 and 5.3 of ISO 14044, which specify reporting requirements.

> ***Best Practice****: A well-organized, well-documented, transparent study document is one of the keys to a smooth, successful critical review.*

In addition to your main study report, the critical review panel will want to see more specific details such as detailed LCI tables, key background documents and information on how you modeled the studied production systems. For example, if you used SimaPro to build your LCA model, the critical review panel will likely want to see a list of the SimaPro processes that you used to see which database processes you used or to see how particular life cycle stages were modeled (e.g. recycling). This can be a very important part of the review, as it will allow the panel to see if you have used appropriate processes and the best-available data.

You may or may not have already listed these items in an appendix, so you should be prepared to share this information with the review panel. If there are confidentiality issues associated with the LCI data, it is common for the critical review panel to sign NDAs before undertaking a review.

In addition to providing the required documentation, particular emphasis should be placed on producing a study report that is transparent and complete. In particular, it is important to clearly document your assumptions, even those by your internal subject matter experts; don't assume your assumptions are well known.

LCAs are always based on a set of key assumptions that allow us to model the complexities of a production system in a more simplified manner. While these assumptions may seem very logical to you and your study team, they likely will not be so obvious to the critical review panel.

As such, you should clearly outline all of your key assumptions and provide references to the documentation or expert opinions that your assumption is based on.

***Helpful Hint**: When preparing your study report, put yourself in the reviewer's seat. The tone of the review is set by the quality of your report and how you've documented the various elements of your study.*

3.4 Responding to Panel Recommendations

The critical review process should ultimately be a discussion between the study team and the review panel. As such, the responses of the study team are just as important as the comments and recommendations provided by the panel.

It is important to respect the expertise of the panelists; however, it is also important to recall that, despite their expertise, there are still potential misunderstandings on their part due to the nuance of the particular industry, or due to lack of documentation. Therefore, the study team must carefully consider and respond to each comment or recommendation.

In your responses to the review panel, you should indicate if you agree or disagree with the comment, and then clarify your position. Did the panel simply misunderstand due to a lack of clarity in the writing, or because of a lack of information? If so, point this out with specific page and paragraph references, or by referring them to background documents that will clarify the point.

You may simply not agree with the panel recommendation, and if so, you should clearly explain your position in both written form and a direct discussion with the panel. It is much easier to work through methodological issues via discussion than via emails and documents. If you accept the recommendation and revise the report accordingly, your response to the review panel should indicate your acceptance and also specify where revisions were made in the report (page #, section #, etc.).

***Best Practice**: Don't simply provide written responses to the panel recommendations. You should also arrange for a conference call or face-to-face meeting to directly discuss the issues in detail.*

There are no specifications on how many rounds of review should be carried out. Given the timing and cost implications, you should specify the number of reviews in the contract. You must be sure to account for this in your budget and your timeline.

Ultimately, you can have as many rounds of review as your panel is willing to complete, and as many as you are willing to pay for.

In most cases there are two rounds of review, which means the review team comments on the original study document and the revised study document. This is followed by the issuance of a final critical review statement. It is best to avoid critical reviews that involve more than two rounds of review. This can make for a very long process (over a year in some instances).

If there are outstanding issues after the second review, then there are two potential paths ahead. You can either make further revisions and have another review, or

agree to disagree and have the outstanding issues documented in the final critical review statement.

3.5 Documentation of the Review Process

The ISO guidelines do not specify which elements of the critical review process should be documented or how they should be documented. In general, you should ensure that the following steps in the process are documented:

- Review panel comments to the study team
- Study team responses to the review panel
- Final critical review statement
- Correspondence between the panel and the study team

Since no specific guidance is provided on how these elements should be documented, you may choose to organize your responses in many different ways, just as the review panel may organize their comments and recommendations in different formats. The key is that you should discuss documentation with the panel chair in advance of any documents being produced and ensure that you come to an agreement on the specific elements that you plan to include for each item.

Ultimately these documents will be appended to your study, so they should be clear and well organized. In particular, review comments should provide references to the location in the study document, references to guidance in ISO where the study may not be in compliance, and should refer the study team to any other guiding documents (e.g. methodological papers). The study team responses should include a response to each panel recommendation, a clarification or explanation of their rationale for that response, and direct reference to any revisions made in the study report.

> ***Best Practice****: Documentation of the critical review process should be appended to your study report, so make sure that it is clearly organized and formatted and provides the essential details.*

Final Critical Review Statement

The final critical review statement is likely to be the one piece of documentation that is most visible and most frequently accessed by people who want to learn about the critical review. There are no guidelines or specifications on what should be included in the critical review statement or how it should be formatted, and you are likely to see numerous approaches from different review panels.

The contents and format of the final critical review statement should be discussed with the review panel chair in advance, and it is important that the final critical review statement includes:

- The date of issuance and the name of the study
- The name and affiliations of all review panel members

- A brief summary of the review process
- A final decision on ISO compliance by the panel
- Documentation of any outstanding issues that were not resolved during the review
- A summary of the comments/responses from the review process

The final critical review statement will be appended to your study report along with other supporting documentation from the review process.

> ***Helpful Hint****: It is likely that the review panel chair has been involved in previous critical reviews, so ask for samples of formats for final critical review statements from previous studies.*

4. Summary

A poorly executed critical review can be very costly and time consuming, so it is in your best interest to be proactive to ensure that the process runs smoothly. Some forward thinking and good communication with the review panel can go a long way towards a successful critical review. Many common pitfalls can be avoided by simply taking the following three pieces of advice:

1. Set up a concurrent review process instead of an after-the-fact review
2. Prepare a well-organized, well-documented, transparent study report and supporting documentation
3. Communicate clearly with the review panel throughout the process and discuss key issues such as timing and documentation in advance

By following these and other strategies provided in this white paper, you can ensure that the critical review process is an effective, constructive process that results in an improved LCA study supported by methods and assumptions that are in accordance with the ISO standards for LCA.