

Life Cycle Assessment in Green Star: Discussion Paper Feedback from PE Australasia

15 August 2012

General comments and answers to the discussion questions are provided below.

1 Executive Summary

General Comments:

The highlighted point needs to be emphasised in the discussion:

- Second bullet point needs to be 'impacts'. Referring to just 'one' impact already implies the application of weighting.
- Fourth bullet point: It would be good to add here that re-use, recycling are to be increased 'where shown to be environmentally beneficial'.

The incorporation of LCA methodology into the Green Star Materials category may facilitate and encourage increased re-use of materials, and the use of materials containing recycled content, where shown to be environmentally beneficial using LCA.

2 Introduction

General Comments:

The ALCAS professional development committee is currently working to develop professional accreditation program for LCA practitioners. GBCA should coordinate with this program when addressing the qualifications for practitioners undertaking LCAs.

It is important to emphasise that the basic objective of a LCA approach into the Green Star materials category is to facilitate and encourage the quantification of the environmental impacts over the **whole life cycle** of the majority of materials used in Green Star project.

3 Provide Your Feedback

Discussion Questions, Page 6

- Yes, it is appropriate for the GBCA to undertake this project.
- Yes, the Australian market is ready for LCA as a tool for assessing the environmental impact of materials. The EU and JP have been doing this for many years as the zero energy buildings (zero use energy) targets are implemented. The market needs encouragement.
- A major barrier to implementing LCA as an assessment methodology for materials in Green Star is for GBCA to get advice from appropriate LCA practitioners that have

experience in setting up similar programs in other regions. PE International has unique experience in successful implementation of these programs in other regions.

- If the GBCA decides to introduce the methodology described in this paper, it is recommended to give 6-12 months notice to market. The exact amount of time depends on how it is phased in, how it is implemented and the level of requirements.

5 Objectives

General Comments, Page 8

A specific objective outlined for this project is to facilitate the use of ISO 14025, Environmental Product Declaration (EPD) for materials assessment in Australia. Studies done to the limited scope as suggested may not comply with the PCRs required to complete an EPD.

6 Methodology

General Comments:

The initial scope of assessment, proposed to simplify the task of conducting LCAs, limits the potential benefits of LCA.

What is the cut off criteria been calculated to be for the list of elements included (building structure, core services and façade materials)?

It would be useful to conduct a pilot study to help determine:

- The time vs benefits of conducting an LCA with limited scope
- What the limitations of such a scope would be
- Potential applications of such a study
- What the results of such a study could NOT be used for
- Whether such a LCA would meet EPD PCR requirements
- Compliance with the standards for LCA and EPDs

It is proposed that HVAC systems (including duct work), lift systems and light fittings are excluded from the scope. The use phase of these **should** be considered in operational energy, which would be significant over the life of the building. In particular, it is important to include HVAC systems due to the use of HFCs. Ceiling systems and internal walls should also definitely be included and paints, adhesives, grouts and sealants can also have a significant impact.

Discussion Questions, Page 10

- A limited scope will limit potential application and the benefits of a LCA study.
- The list of inclusions and exclusions is dependant on what impact categories are to be included in the study. Choosing inclusions/exclusions before the impact categories

are determined would lead to significant contributors to individual impact categories being left out.

- Is it intended that the LCA study be used for comparison of alternatives materials/ systems to lead to better environmental outcomes. This needs to be addressed in the document.

6.1 Boundary Definition

General Comment:

The current scope of the Materials category in not directly addressing post-construction impacts is one of the limitations of this existing approach. This is why LCA of the whole life is a much better approach.

Discussion Questions, Page 11

- The use of a 'cradle to constructed, sealed and serviced' building approach is not appropriate. The use phase of the building is significant so should be included. Excluding the use phase would penalise buildings that are built to have lower impacts over the full life cycle where the impact associated with the manufacture/production is greater than the benchmark, which has higher use phase impacts. The end of life phase should be included. This can be significant especially for recyclable materials such as aluminium window frames.
- It is not really practical to make qualified assumptions about the origin and the distance that materials must be transported in a Green Star design submission. If the assumptions are stated and corrected once the additional data is available then this approach may be more acceptable.

6.2 Functional Unit

Discussion Questions, Page 12

- A constraint to using the proposed unit is that functional units of individual components would be needed to compare alternative building materials/products.
- An alternative would be specific functional units and PCRs.

6.3 Environmental Impact Categories

General Comments:

Methodologies for a number of the 14 categories listed are still under development. Mature methodologies are available for GWP, Eutrophication, Acidification, Photo-chemical smog, Ozone depletion, Abiotic depletion. It is strongly recommend not to include the other categories at this stage.

Of the six impact categories possibly proposed to be included at the initial stages note that:

- Land transformation purely in ha is not meaningful. It depends on how the land was used before.
- Water depletion, without proper water footprinting methodology is not meaningful. The ISO standard for water footprinting is currently under development.
- Indoor environmental quality is listed as an environmental impact category (pg 12). VOC from furniture and paint would be significant here but would have previously been excluded due to the limited scope.
- Impact categories such as 'nuisance' cannot be measured in an LCA.
- For human toxicity there is there is no Australian model for toxics.
- The precision of the current USEtox™ characterization factors is within a factor of 100–1,000 for human toxicity and 10–100 for freshwater ecotoxicity. Therefore toxicity characterization factors should only be used to identify key contributors within product life cycles that influence that product's toxicity potential, but not contribute to the overall environmental impact.

Discussion Questions, Page 13

- Yes, it is appropriate to limit the number of environmental impact categories. It is recommended to follow the IBU program, which follows the European Standard EN 15804, and is also in line with ISO 14040 and 14044, as well as 14025.
- See general comments about appropriate impact categories.
- An International approach should be adopted and followed rather than reinventing the wheel.

6.4 Weightings of Environmental Impacts

General Comments:

The statement "weightings are essential for LCA results to be calculated" is incorrect. ISO 14040 and 14044 provide a good background on weightings.

We understand that the weighting factors were part of BPIC project and not AusLCI.

Discussion Questions, Page 14

- It is not appropriate to reference the BC LCI weightings. An EPD approach and no weightings should be used.
- It is appropriate to include separate categories.

7 The Assessment Model

Discussion Questions, Page 17

- Use phase. If excluded this would not be a valid comparison.

- If the reference case is constructed in a similar manner to that described we could provide limited interpretation of how this may operate in practice.
- The LCA methodology in the Green Star Materials category could operate through the use of EPDs.
- Yes, it is practical to conduct two iterations of the LCA with different inputs for the project.
- It would take 50% more additional time to do the second iteration of the LCA having completed the first one. Depending on the changes this could also be around 25%.
- The content of Table 1 includes enough data to determine the input parameters for a very simplistic streamlined LCA only.
- The best way to determine the rules for the input parameters in Table 1 is industry averages.

7.1 Reporting Mechanism

Discussion Questions, Page 17

- Yes, it is appropriate to nominate ISO 14025 as the reporting mechanism as it an international standard and therefore combatable with the countries from where products will be imported.
- There is no alternative that should be considered. Alternatives would be incompatible with existing international programs that are already in operation.

7.2 Allocation on Green Star Points

General Comments:

For Mat-3 'Ecotoxicity to Land and Water' there is no agreed method nor AU tox models available. For Mat-5 'Water Footprint' there is no standard for calculating yet and for Mat-6 'Human Toxicity' there are no AU Tox models.

There is no agreed method for calculating the number of points awarded for green house gas emission emission reductions (Table 2).

8 Data Inventory

General Comment:

The statement, "However, the building products inventory dataset, has been published and is available for use" is only partly correct as it still needs to be revised, consistency issues clarified and gaps need to be closed.

Discussion Questions, Page 19

- Yes, the Aus LCI Building Product inventory dataset should be used in a LCA methodology within the Green Star rating tools once the data has been thoroughly revised and the gaps completed.
- European LCI should not be used. Australian data or data developed for Australian boundary conditions should be used. If European data is used it needs to be demonstrated that its use is appropriate and its relevant for Australian conditions.
- The approach of penalising the use of non-approved data will limit LCA practitioners to use the best data available which could lead to adverse outcomes.

10 Other Matters for Discussion

Discussion Questions, Page 21

- Yes, the proposed LCA methodology will accommodate existing LCA systems and tools.
- Yes, the accreditation system ALCAS are developing should be referenced.
- The relevant standards that Green Star related LCAs should adhere to are ISO 14040, 14044, 14025.
- No, the requirement to use recognised software is not necessary. This would limit the ability for practitioners to choose and lead to market distortion.
- It might be required for the GBCA to recognise particular softwares if poor software is used.
- No, equivalent software does not exist for LCA.
- Yes, the requirement for peer review is necessary.
- To ensure best practice LCA modeling, it is a requirement that full life cycle assessment is used and not limited to the construction phase.