Life Cycle Assessment in Green Star

Stakeholder Feedback Report

September 2013

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Introduction

In June 2012, the Green Building Council of Australia (GBCA) released a discussion paper inviting industry feedback on how Life Cycle Assessment (LCA) could be introduced within the Green Star rating system. This Stakeholder Feedback Report provides an overview of the 37 written submissions received and outlines the next steps in the progression of this project. For transparency, we requested permission to publish the feedback that we received from stakeholders in full. Where permission has been given, links to the individual reports have been included in Appendix 1 of this report.

General observations on stakeholder feedback

As can be expected, the GBCA received a feedback representing a diversity of views on how LCA should best be incorporated into the Green Star rating system. Despite this, we've identified three potential approaches for incorporating LCA methodology into the Materials Category that are generally favoured by stakeholders.

The first approach involves the conduct of whole of building, whole of life (50 or 60 year life of the building) LCAs. In this case, the assessment could take into account a wide range of impacts, including those arising from operation, maintenance and adaptability and the deconstruction of the building. This approach would be based on Australian agreed data and weightings and a reference case would need to be developed through stakeholder engagement and data collection.

A second approach follows the method detailed in the discussion paper. Stakeholders advocating this view were very keen to see some level of LCA use in Green Star but were less concerned with the fine detail of establishing such a methodology, for example the availability of some data or the need for weightings.

The third approach proposes an Environmental Product Declaration based approach, whereby the materials used in a building are compared on the basis of EPDs.

Stakeholders also suggest that in the first instance, Green Star should reward the provision of LCA data for building materials, products or buildings, thereby increasing the amount of data available and aiding the implementation of a comparison based LCA in Green Star in future.

Some other general observations can also be made:

- Almost all stakeholders are keen to see LCA incorporated in the Green Star Materials category. Many believe that the GBCA should take a lead role in establishing the necessary methodology through engagement with experts;

- As a starting point, a staged approach to the implementation of LCA may work better then attempting to create an all inclusive LCA methodology in the first instance. Clear future steps leading to a fully inclusive approach should be communicated from the start if a staged approach is implemented.

Where actual numbers of stakeholders advocating a particular position is provided in this document, this is provided as a guide only. Although a position may be shared, different stakholders may interpret or account for the position in different ways. The numbers are therefore provided only as a way of indicating overall support for one approach or another. It is also worth noting that many of the submissions received did not address all of the questions asked and may only include feedback on matters with which the submitter is familiar or directly involved with.

Summary of feedback

The following section includes the specific feedback questions listed by the GBCA in the *Lifecycle Assessment in Green Star Discussion Paper* (August 2012). Each section of the discussion paper which included a feedback request is listed followed by the request and a summary of the views expressed in feedback submissions.

Section 3: Provide your feedback

Stakeholders were asked to provide feedback on the following:

- *Is it appropriate for the GBCA to undertake this project or would any other organisation be better placed to do it. If yes, which organisation?*
- *Is the market in Australia ready for LCA as a tool for assessing the environmental impact of materials? If no, in how many years time do you think the market would be ready?*
- *What do you see as the main barriers to implementing LCA as an assessment methodology for materials in Green Star?*
- *If the GBCA decide to introduce the methodology described in this paper, how much notice would you recommend the GBCA give to the market?*

Many stakeholders (21) consider that GBCA should establish an LCA methodology in Green Star rating tools and take a leading role in the development of the required methodology, with the help of appropriate experts. Some stakeholders (3) believe this should be the role of government or other organisations which engage with, or are, LCA experts.

Stakeholders believe the market is ready for widespread use of LCA but that the implementation should be staged to allow the market to progress over time.

Stakeholders point to a complex mix of constraints and barriers which may be faced when establishing an LCA methodology. These include:

- the current lack of incentives for Australian building materials industry to provide data or undertake product LCA
- data availability, quality and consistency
- education on the benefits of LCA
- GBCA developing an LCA methodology that is appropriate and fair
- funding
- international collaboration and harmonisation
- a current shortage of expertise.

Some stakeholders (6) believe a staged approach is needed stretching from two to five years before a comprehensive LCA methodology should operate fully within the Green Star Materials category. This time is needed both for the methodology to be established and mature enough to allow the market to implement necessary changes.

Section 5: Objectives

Stakeholders were asked to provide feedback on the following:

- *The Green Building Council of Australia invites feedback from stakeholders on the objectives of the project.*

Many stakeholders (12) agree with the project objectives, while some suggested other objectives should also be pursued.

Stakeholders point out that the nature of the LCA method which may eventuate from the development process will determine whether these objectives are achieved. Some of the objectives outlined in the paper are said to be in contrast to the methodology proposed in the discussion paper; mainly the suggested limitations to the scope and boundary of the LCA.

Section 6: Methodology, Scope of Assessment

Stakeholders were asked to provide feedback on the following:

- *The list of inclusions may be expanded in the future, is it appropriate to start with a limited scope of assessment in order to simplify the LCA?*
- *Please provide feedback on the list of inclusions and exclusions.*
- *Which additional materials should be addressed by the inclusions and exclusions?*

There are a wide variety of opinions in relation to exclusions and inclusions.

Many stakeholders (13) agree a limited scope in the initial stages of implementation of an LCA methodology within the Green Star rating tools is appropriate. Some stakeholders (7) believe the scope suggested in the discussion paper is good and encompass the bulk of materials in base buildings. Others (7) consider this scope should be expanded to include at least some fitout items and better define the range of materials and elements that make a base building. Over time and as conditions change, for example increased data availability, maturity of the market in relation to LCA, the scope should be expanded to eventually encompass the whole building.

Many stakeholders (12) indicated that the scope should be 'whole of building', all building elements or materials which are addressed in the Building Code of Australia, or those up to a nominated percentage of the contract value of the project. The main criticism of limiting the scope of elements of the building included in the LCA is that it will likely reduce the reliability of the results.

Other proposals suggest the scope should be determined by a panel of relevant experts, that the scope should rely on established data quantifying the bulk of materials in buildings, or that the scope should be determined on the basis of the availability of lifecycle inventory data and expanded over time as data availability improves.

Section 6: Methodology, Boundary Definition

Stakeholders were asked to provide feedback on the following:

- *Is the use of a 'cradle to constructed, sealed and serviced' building approach appropriate?*
- *Is it practical to make qualified assumptions about the origin and the distances that material must be transported in a Green Star design submission, i.e. at a tender stage when some the specific materials are unknown?*

Overall there is limited stakeholder support (2) for the proposed boundary at the constructed serviced and sealed building. Most (20) believe this should be expanded to include at least the 60 year life of the building, i.e. 'cradle to grave'. Such a boundary may accommodate the longevity of materials, maintenance and operational impacts as well as other impacts beyond the performance of material.

Other stakeholders (3) propose a 'cradle to gate' approach, meaning that the focus of the LCA would be the manufacture of the materials, not how they are subsequently transported, assembled, used and disassembled within the building.

In relation to transport impacts many stakeholders (15) agree it is appropriate to make assumptions about transport modes and distances, when the methodology is applied in a Green Star Design rating, and that these should be clearly prescribed.

A limited number of stakeholders (2) disagree such assumptions should be made. Those that support transport related assumptions suggest these should be made on the basis of reference to established environmental impact data for various transport modes.

Section 6: Methodology, Functional Unit

Stakeholders were asked to provide feedback on the following:

- *Is 1m2 of GFA an appropriate unit?*
- *Are there constraints to using this unit?*
- *If there are constraints or reservations about the proposed functional unit, what are the alternatives?*

Many stakeholders (10) consider that the most appropriate functional unit is 1 square metre of the relevant area of the building or fitout project over the life of that building or fitout; 1m2 of ‘Gross Floor Area’ for an office building per year, 1m2 of ‘Net Lettable Area’ for a fitout project per year, 1m2 per year of ‘Gross Dwellable Area’ for a residential buildings, etc.

Many point to some shortcomings of this unit, particularly how it applies to a range of buildings or even buildings of similar use.

Other proposals include the type and use of building (office, Industrial, public housing, etc.) and occupancy rate and pattern. Other stakeholders (2) proposed a Product Category Rules approach which means that each building element is compared with like alternatives on the basis of Environmental Product Declarations in accordance with ISO 14025.

In relation to inclusion of fitout items, stakeholders believe at least some fitout items should be included, with many respondents (8) specifically mentioning flooring, ceilings and internal walls. Stakeholders challenged and corrected the GBCA’s assumption that establishing a functional unit for fitout items is a barrier to their incorporation in the LCA proposal, with stakeholders (11) believing that the same unit can apply to the entire building, including the fitout.

Section 6 - Methodology, Environmental Impact Categories

Stakeholders were asked to provide feedback on the following:

- *Is it appropriate to limit the number of environmental impact categories to six?*
- *If more categories are to be included, which categories do you recommend be included? What method should be applied to determining the impact categories the LCA will take into account?*
- *If fewer categories are to be included which categories do you recommend be removed?*

- *If six impact categories are appropriate, are the six categories above the most appropriate?*
- *Is it appropriate to refer to the AusLCI impact categories? Is there an alternative which should be used? Why*?

Many stakeholder (16) refer to the 14 impact categories listed in the *Building Product Innovation Counci's A Life Cycle Impact Assessment Method for the BPIC/ICIP Project – Part 1: Classification and Characterisation*. Alternatively Stakeholders (8) propose the number and type of impacts should be selected on the basis that they are established and well understood in LCA. Other stakeholders (6) agree a limited number of categories will simplify the LCA and is appropriate for the methodology's first implementation in Green Star. Others (2) consider that the selection of impacts should be based on the aspirations of Green Star and the impact categories the rating tools seek to influence.

Stakeholders (8) point out that the use of two of the categories listed in the discussion paper in LCA is limited - 'Land Transformation and Use' and 'Water Depletion', as the measurement of these impacts is still being debated among experts. Others suggest all 14 categories listed are appropriate.

Stakeholders agree (6) that any environmental impact categories included should be well known, well understood, and well defined.

Some (6) suggest other LCA methodologies in use globally such as ISO 21930, EcoIndicator 99 and ReCiPe should be the reference for impact categories.

Section 6: Methodology, Weightings of Impact Categories

Stakeholders were asked to provide feedback on the following:

- *Is it appropriate to reference the BC LCI weightings? If not, what should be used instead?*
- *Is it appropriate to have separate credits for each of the environmental categories or should the total score be weighed together and assessed in one credit?*

Stakeholder views are varied in relation to weightings, many (11) point out this is a controversial aspect of LCA and that weightings are not necessarily needed. Some (5) also expect that for LCA to operate within Green Star, weightings will be necessary in order to calculate a final score and to determine point allocation. Stakeholders' suggestions can be summarised as follows:

- undertake a specific buildings related weighting exercise, building on existing weightings
- use the Building Products Weighting for Environmental Impact Categories (developed by the Building Product Innovation Council);
- use ecoindicator 99 egalitarian
- use Green Star weightings;
- government work should determine weightings.

Some stakeholders encourage the use of the BPIC weightings (5) whilst the same number (5) consider that these are inappropriate to use. Others (7) consider no weightings should be applied.

Stakeholders (7) challenged the GBCA's statement that weightings are essential for LCA. These stakeholders state that weightings are an optional part of an LCA.

Section 7: The Assessment Model, The Standard Practice Reference Case

Stakeholders were asked to provide feedback on the following:

- *Is it practical to establish a standard practice reference case for low-rise, mid-rise and high-rise buildings of different classes? If not, what other methods could be used to establish a reference case?*
- *Should the reference case distinguish between new building on a green field site, refurbishment of existing buildings and fitouts? How can an equitable system be developed which acknowledges the advantages of the options from an environmental impact perspective?*
- *If the reference case is constructed in a similar manner to that described above, would you be able to provide your interpretation of how this may operate in practice?*
- *Can an LCA methodology in the Green Star Materials category operate without a reference case? If so, how do you see this working?*
- *Is it practical to conduct two iterations of the LCA with different inputs for the project?*
- *How much additional time would it take to do the second iteration of the LCA having completed the first one? Is it 25% more, 50% more, 100% more etc?*
- *Does the intended content of Table 1 include enough data to determine the input parameters for the standard practice case LCA? If not, what is missing?*

Many stakeholders (15) agree with the 'standard practice reference case' approach, though some (6) warn this approach is likely to be difficult to create. Some stakeholders suggested alternatives.

Those who support a 'standard practice reference case' suggested the reference case should be created by GBCA. In this scenario, the GBCA would conduct LCA studies, or collate the existing studies of a representative number of buildings and building types and create benchmark reference case against which the assessed building would be compared. Alternative proposals for how the reference case could operate include:

- projects create a reference case LCA based on standard practice construction practices as outlined in the Building Code of Australia and another LCA of the proposed building.
- Green Star should initially reward the submission of building LCA and develop an ever evolving reference case based on the data collated.
- Green Star should initially reward the governance processes that provide evidence that iterative design optimisation has been undertaken to reach the 'best' result, then create a reference case on the basis of data collated over time.

Whether the building is on a green field site or not should be taken into account by the LCA as well as the reuse of any existing building elements on site.

Stakeholders (11) agree that it is practical to conduct two iterations of an LCA. The feedback on how much extra resources would be needed to conduct both ranged between 25% and 100% of the initial design timeframe. This depended on many variables, including the nature of the project and the final LCA methodology that is applied. With time and through automation, the complexity of conducting the second iteration of the LCA could be reduced.

Few stakeholders (2) agree table one in the discussion paper should be the basis for the reference case once populated and developed. Others (6) considered this table, when actually populated, will not provide most of the required information required to perform an LCA. The latter also stated that a considerable amount of development work will be required by the design team to create the reference case to compare against the proposed project.

Section 7: The Assessment Model, Reporting Mechanism

Stakeholders were asked to provide feedback on the following:

- *Is it appropriate to nominate ISO 14025 as the reporting mechanism?*
- *Is there an alternative that is preferred or should be considered?*

Many stakeholders (15) agree that the use of ISO 14025 is appropriate. Others (5) suggest other standards such as ISO21930:2007 *Sustainability in building construction - Environmental declaration of building products*.

Stakeholders pointed out the work that is currently being undertaken by National Standards, ALCAS, BRANZ and others in Australia and New Zealand to create an ISO 14025 framework for the region.

Some stakeholders (2) were concerned with the costs that may be associated with the requirement to prepare EPD's for products, and asked the GBCA avoids prescribing such a requirement.

Section 7: The Assessment Model, Allocation of Green Star Points

Stakeholders were asked to provide feedback on the following:

- *Is percentage reduction in impact an appropriate way to award points for improvement?*
- *Is it appropriate to have separate credits for each of the environmental categories or should the total score be weighed together and assessed in one credit?*

Stakeholders (11) prefer that performance against the impact categories is reported separately if weightings are applied to form a single score. A single credit is also preferred by some stakeholders (5).

In the short term, percentage improvement would be workable, but as the reference case in tightened there may be a need for a different system, as achieving reductions in impacts across the categories will inevitably become more challenging (law of diminishing returns).

Other proposals for how points can be awarded include statistical differences between the reference case and the building, the award of Green Star Innovation points where a net positive impact is achieved, the deduction of points where not all impact categories are addressed, or the inability to claim points where any impact increase is recorded over the percentage prescribed in the reference case.

Section 8: Data Inventory

Stakeholders were asked to provide feedback on the following:

- *Should the Aus LCI Building Product inventory dataset be used in a proposed LCA methodology in Green Star rating tools?*

- *Should a European LCI be used?*
- *Are penalties needed?*
- *What data sources would be acceptable for a credible LCA to be conducted?*

There were a range of views in relation to data sources. Many stakeholders (11) encourage the GBCA to seek the use of Australian data BP methodologies for data hierarchy which primarily emphasises Australian data (for example in Aus LCI and BP LCI) followed by other reliable sources of data. Some (6) encourage this, but point out that Aus LCI or BP LCI are yet to be sufficiently developed. Others (3) suggest that this LCI should not be used at all. Some suggested (3) that the GBCA should take the lead and help complete these LCIs or create a GBCA LCI on the basis of the work already undertaken. Others (3) suggest the use of Australian adjusted European based data is the only current option (which includes some of the above).

Many stakeholders (14) suggested penalties are not needed, while some respondents (2) suggested penalties are needed where data is substituted outside an agreed hierarchy, or where data is not being reported in all relevant impact categories. Others suggest that in place of penalties, limits should be set on the percentage of data which falls outside of approved levels of acceptability. Some suggest the GBCA will need to set what is an approved level of data acceptability.

Section 9: Applicable Green Star rating tools

Stakeholders were asked to provide feedback on the following:

- *Is it appropriate to exclude fitout based on the lack of an agreed functional unit for fitout items?*

Some stakeholders (6) agree that in the initial implementation of LCA in Green Star at least, building elements that are included should be limited so as to exclude some fitout items, but that other fitout items can and should be included, such as flooring, walls and ceilings. Other stakeholders (10) think fitout must be included if the results are to represent the overall impact of the building project.

Some stakeholders (11) challenged the GBCA's assumption that there are functional unit constraints that mean fitouts should be excluded. Stakeholders (7) suggest the functional unit which applies to the whole building can incorporate the interior fitout as well as the base building.

Section 10: Other Matters for Discussion

Stakeholders were asked to provide feedback on the following and any other matters they believed should be addressed:

- *Will the proposed LCA methodology accommodate existing LCA systems and tools?*
- *What constitutes an LCA practitioner, what qualifications should be required, and should the system ALCAS are developing be referenced?*
- *How much would you estimate it would cost to complete the assessment outlined in this paper? And how does that cost compare to the cost of demonstrating compliance with the current Materials Category in Green Star?*
- *Is the requirement to adhere to international standards necessary?*

- *Which are the relevant standards that Green Star related LCAs should adhere to?*
- *Is the requirement to use recognised software necessary? Should the GBCA recognise particular softwares?*
- *Which software should be recognised, and why?*
- *The requirements of the Energy category within Green Star rating tools, stipulate that any energy simulation software used are BESTEST compliant. Does equivalent software exist for LCA?*
- *Is the requirement for peer review necessary?*
- *What other requirements are necessary to ensure best practice LCA?*

Stakeholders considered the proposal outlined in the *Life Cycle Assessment in Green Star Discussion Paper* (August 2012) as compatible with existing LCA systems and tools. The same applies to a situation where this methodology was expanded, for example a greater scope and boundary. Stakeholders indicated that at this time, there is no need for the GBCA to recognise particular software.

Stakeholders acknowledged the Australian Lifecycle Assessment Society (ALCAS) as the recognised industry body for LCA in Australia and that the LCA practitioner certification that ALCAS is currently developing should be considered for inclusion in the credit as a practitioner requirement when final. In the meantime, the CV's of individuals and their previous experience in undertaking LCAs, should be taken into account when evaluating the ability of a practitioner or organisation to undertake an compliant assessment. Peer review is agreed as an essential part of LCA.

Stakeholders estimated that an initial detailed LCA including comparison against a standard reference case would be in the order of $30,000 to $50,000. However, this may reduce over time as the work becomes more commoditised. Current compliance costs are estimated at $20,000+.

Relevant standards for LCA are those contained in the ISO 14000 series of international standards, as well as EN standards.

Summary and Next Steps

After considering stakeholder feedback on how to best accommodate LCA into the Materials category of Green Star rating tools, we have now developed two draft LCA-based credits. These credits were released as Innovation Challenges in August 2013 and are now available for use by project teams using the Green Star Design, As Built and Interiors rating tools.

The GBCA is now opening a second round of stakeholder consultation on the approach taken to incorporating LCA methodology into the Green Star rating system through these credits via a second discussion paper: *Life Cycle Assessment in Green Star Discussion Paper 2.* Stakeholders can download the paper from the GBCA website and are invited to provide their feedback during the consultation period from 18 September to 15 November 2013.

Appendix 1: Detailed Stakeholder Feedback

Australian Furnishing Research and Development Institute
Australian Life Cycle Assessment Society
Arup
Australian Forest Products Association
Building Products Innovation Council
Built
Cox Richardson
Eco Lateral
Edge Environment
Energetics - Rob Rouwette
E-Tool
Evan Atkinson
Engineered Wood Products Association
Forest and Wood Products Australia
Forest Industries Association of Tasmania
Gypsum Board Manufacturers of Australia
Global Mark
Lend Lease
Livos
Norman Disney & Young
PE International
Quasar
RMIT University Centre for Design
Timber Development Association