

Attachment 1: Specific Feedback from Timber Development Association on the *Discussion Paper: Life Cycle Assessment in Green Star*

Page 2 – General matters	
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?	The GBCA is well placed to undertake this project as its Green Star tools are widely used in the property sector, particularly the commercial property sector.
Is the Australian market 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?	<p>Yes the market is ready. The Australian building and construction sector, including the Australian timber industry, has made significant progress in understanding the environmental impacts of their building materials in recent years. The timber industry in North America and Europe, which supply Australian market with a significant volume and range of timber products have made similar progress.</p> <p>The international forest and wood products sector has been a supporter of an LCA approach for over a decade. The Australian wood products sector was the first major Australian building products sector to undertake a detailed ‘cradle to gate’ LCI data collection R&D program. In 2009 the sector engaged the CSIRO to develop and publish LCI data for forest processes, and the manufacturing of the following timber and wood products which are all used in the construction sector:</p> <ul style="list-style-type: none"> ○ sawn timber ○ veneered product ○ panel products ○ engineered beams
What do you see as the main barriers to implementing LCA as an assessment methodology for materials in Green Star?	We do not consider there to be barriers significant enough to stop implementing LCA within Green Star. In fact we think there are some excellent opportunities for the GBCA.
If the GBCA decided to introduce the methodology described in this paper, how much notice would you recommend the GBCA give to the market?	While the forest and wood products sector is well-placed for an early introduction not all in the supply chain are ready for immediate implementation. The market would need at least 18-24 months for education and implementation.
Page 8 - Objective	
The Green Building Council of Australia invites feedback from stakeholders on the objectives of the project.	The objectives are reasonable and should continually be referenced as a framework to measure the development, structure and direction of this project.

Page 10 - The methodology	
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?	It is appropriate to start with a limited scope.
Please provide feedback on the list of inclusions and exclusions.	<p>The inclusions appear to be sound. Other items suggested for inclusion in a structural and fixtures context are:</p> <ul style="list-style-type: none"> • reinforcing steel in reinforced and precast concrete • permanent formwork (i.e. Bondek or similar) • internal partitions and wall and ceiling finishes (where provided on commissioning) • flooring / floor coverings (were provided on commissioning) • mortar in brickwork • stairs, handrails & balustrades • shading structures on the exterior skin of the building.
Are there additional materials should be addressed by the inclusions and exclusions?	Ultimately, as the LCA process is implemented and accepted and better tools for design and assessment become available, fittings and furnishings should be incorporated.
Page 11 - Boundary definition (system boundary)	
Is the use of a 'cradle to constructed sealed and serviced' building approach appropriate?	<p>Yes, as an introductory staged approach this is reasonable. However, ultimately all life cycle stages of a building should be included. I.e. cradle to gate, operational and end-of-life.</p> <p>While operational impacts are relatively easy to measure, they provide only part of the picture and can be misleading. The importance of environmental impacts embodied in building materials (embodied impacts) are significant and are often misunderstood or understated, especially when compared to the operational impacts (such as greenhouse gas emissions from heating, ventilation and cooling).</p> <p>Studies (such as RMIT (2011) – Comparative LCA of alternative constructions of a typical Australian House Design) have shown it is important especially in an Australian context. As a result choices in materials resulting in improvements in embodied impacts can yield benefits as significant as those from operational improvements.</p>
Is it practical to make qualified assumptions about the origin and the distances that material	Yes, this would appear appropriate at a 'tender stage'.

must be transported in a Green Star design submission	
Page 12 - Functional unit	
Is 1m2 of GFA an appropriate unit?	Yes, per m2 of gross floor area (GFA) as the “functional unit” seems appropriate for this first stage introduction. Further functional units might be identified for different elements of a building at a later stage.
Are there constraints to using this unit?	None that we are aware of.
If there are constraints or reservations about the proposed functional unit, what are the alternatives?	No feedback.
Page 13 - Environmental Impact Categories	
Is it appropriate to limit the number of environmental impact categories to six?	Yes, it is appropriate to commence with a limited number of environmental indicators. We consider the following categories listed by GBCA appropriate: <ul style="list-style-type: none"> • Climate change • Mineral and fossil fuel depletion (Abiotic Depletion) • Eco-toxicity (to land and water) • Human toxicity.
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?	Guidance provided by ALCAS and BPIC on the impact categories to be applied should be used to determine the environmental indicators. To that effect the following LCA impact assessment categories are commonly reported and feature in many standards and initiatives and as such could quite easily be included: <ul style="list-style-type: none"> • Ozone layer depletion • Eutrophication • Acidification.
If fewer categories are to be included which categories do you recommend be removed?	<p>We do not consider the following environmental indicators appropriate at the initial stage:</p> <ul style="list-style-type: none"> • Land transformation and use • Water depletion. <p>The ALCAS <i>Best Practice Guide to Life Cycle Impact in Australia</i> notes that Land Transformation and Water Use are ‘provisional methods that need development’. Unlike other indicators, these do not indicate environmental impact as they are simple summation approaches (total volume of water, total area of land).</p> <p>If GBCA were to include these indicators, we would expect further consultation as methods that incorporate them into LCA may be developed in the next couple of years.</p>
If six impact categories are appropriate, are the	We consider the following environmental

<p>six categories above the most appropriate?</p>	<p>indicators well-developed and appropriate for Australian conditions:</p> <ul style="list-style-type: none"> • Climate change • Mineral and fossil fuel depletion (Abiotic Depletion) • Eco-toxicity (to land and water) • Ozone layer depletion • Eutrophication • Acidification.
<p>Is it appropriate to refer to the AusLCI impact categories? Is there an alternative which should be used? Why?</p>	<p>Yes – it is appropriate to utilise the AUS LCI indicators.</p>
<p>Page 14 - Weightings of Environmental Impacts</p>	
<p>Is it appropriate to reference the BC LCI weightings? If not, what should be used instead?</p>	<p>The question of weightings is particularly contentious among LCA professionals and users. The BPIC LCI weightings are no exception. It must be stated however that use of weightings will occur if GBCA adopt LCA within the Green Star tools. It is strongly therefore suggested that the GBCA undertake a specific Buildings Related Weighting Exercise with their own broad membership group building on the previous BPIC work.</p>
<p>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?</p>	<p>Yes it is appropriate to have separate credits for each of the environmental categories. If the score is assessed as one credit then the 'richness' of information is lost and there is no indication as to what environmental categories have improved or by how much.</p>
<p>Page 17 - Assessment model</p>	
<p>Is it practical to establish a standard practice reference case for low-rise, mid-rise and highrise buildings of different classes? If not, what other methods could be used to establish a reference case?</p>	<p>Yes it is practical to establish a standard practice reference case for the first introduction of an LCA 'Base Building' assessment in Green Star.</p>
<p>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?</p>	<p>Yes the reference case should distinguish between new building on a green field site, refurbishment of existing buildings and fit-outs. In refurbishments and fit-outs reuse of existing structure and materials should be encouraged and credit given accordingly.</p>
<p>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?</p>	<p>The reference case approach seems relatively straightforward, however it is unclear from the discussion paper whether the GBCA is planning to do one single standard benchmark case for each of the low/medium/high-rise categories which all future 'improved' projects are compared against; or whether a reference case, using the standard practices, would be required to be developed for each individual project for comparison with the 'improved' building. GBCA</p>

	needs to be clearer on the approach it is proposing.
Can LCA methodology in the Green Star Materials category operate without a reference case? If so, how do you see this working?	Yes an LCA methodology in the Green Star Materials category could operate without a reference case. It is envisaged that in the very near future LCA design tools will be available that allows designers to quite easily and rapidly undertake life cycle assessments of the buildings they are designing. In this instance the designer could undertake a sensitivity analysis with arrange of different design options to determine the most effective approach that could then be optimised along with other design considerations.
Is it practical to conduct two iterations of the LCA with different inputs for the project?	Yes it is practical. Conducting two iterations of the LCA with different inputs for the project is the necessary minimum iterative design process. One needs to do this to make the assessment of the interactive and interdependent impact of alternatives designs and materials.
How much additional time would it take to do the second iteration of the LCA having completed the first one? Is it 25% more?	Accurate advice should be obtained from a professional life cycle consultant experienced in assessing building structures. TDA notes however that in the future with commercial design tools it is anticipated that additional iteration times would be dramatically reduced and would simply be a normal part of the design process.
Does the intended content of Table 1 include enough data to determine the input parameters for the standard practice case LCA? If not ...	No feedback.
What would be the best way to determine the rules for the input parameters in Table 1?	The setting up of a representative (and paid) LCA Expert Review Panel is suggested as a way of determining rules on issues such as input parameters.
Page 17 - The use of ISO 14025 EPDs:	
Is it appropriate to nominate ISO 14025 as the reporting mechanism?	In the absence of an Australian Standards (developed by an accredited Australian Standard development body) then the use of an ISO standard is appropriate.
Is there an alternative that is preferred or should be considered?	No feedback.
Page 18 - Allocation of points:	
Is percentage reduction in impact an appropriate way to award points for improvement?	Percentage 'reduction in impact' is an appropriate way to award points for improvement but the GBCA needs to look at each environmental indicator and set appropriate levels/targets.
Is it appropriate to have separate credits for each of the environmental categories or should the total score be weighed together and assessed in	Yes it is appropriate, and important, to have separate credits for each of the environmental indicators rather than a total score weighed

one credit?	together and assessed in one credit.
Page 19 - Data inventory	
Should the Aus LCI Building Product inventory dataset be used in a LCA methodology within Green Star rating tools?	Yes the AusLCI datasets should be used. It is noted that the AusLCI database is currently light on data, but it is understood that it will be populated with average industry building product data over the next twelve months.
Should a European LCI be used?	European or North American LCI data should not be used unless it is specific to a European or North American product. Australian data should always be used for Australian building products where it is available.
Are penalties needed?	Penalties should not be needed.
What data sources would be acceptable for a credible LCA to be conducted.	<p>Data should be sourced from those described by the BPIC LCI Protocol hierarchy of data sources, but with AusLCI at the top of the hierarchy.</p> <ol style="list-style-type: none"> 1. From the ALCAS AusLCI national database 2. From the BPIC/LCI database 3. From other acknowledged Australian data sources (documented for source, age, representativeness and data quality assessment) 4. From other authoritative sources (e.g. Ecoinvent, USNLCI) adapted for relevance to Australian conditions (energy sources, transport distances and modes and so on, and documented to show how the data is adapted for relevance in Australia) 5. From other sources with sensitivity analysis reported to show the significance of this data for the results and conclusions drawn.
Page 20 - Applicable Green Star rating tools	
Is it appropriate to exclude fitouts based on the lack of an agreed functional unit for Fitout items?	A range of major fit-out items should be included – in particular internal partitions, wall & ceiling finishes and flooring / floor coverings. Other fitout items should be excluded initially. The functional unit could still remain m2 of gross floor area (GFA).
Page 21 - Other matters	
Will the proposed LCA methodology accommodate existing LCA systems and tools?	There appears no major reason why the proposed LCA methodology would not 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?	ALCAS certification approach for Australian LCA practitioners (or equivalent) should 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	TDA is not experienced in this area to provide feedback.

demonstrating compliance with the current Materials Category in Green Star?	
Is the requirement to adhere to international standards necessary?	In the absence of relevant accredited Australian standards appropriate ISO standards should be used. Adherence to credible standards is necessary to ensure ongoing credibility of the Green Star ratings tools if it incorporates LCA.
Which are the relevant standards that Green Star related LCAs should adhere to?	ISO 14040 and ISO 14020 series, PAS 2050, Green House Gas Protocol standards.
Is the requirement to use recognised software necessary?	Use of appropriate and benchmarked computer based design tools and software will no doubt speed up any LCA assessment process and reduce the reliance on more expensive LCA consultants during the design process.
Should the GBCA recognise particular software?	Yes, it is suggested that building LCA design software needs to be accredited, just as LCA practitioners will need to be.
Which software should be recognised, and why?	Assessment of software needs to be undertaken by an appropriately skilled and qualified body.
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?	No feedback
Is the requirement for peer review necessary?	Yes – if comparative assertions are to be made between products then a peer review is necessary.
What other requirements are necessary to ensure best practice LCA modelling?	<p>In life cycle assessment it is important that reasonably accurate quantities of building materials be used in an LCA. While a material or product LCI should include, and account for, wastage to the factory gate, onsite wastage as a result of construction is not usually included. All builders include allowances for waste and commonly over order concrete, bricks, timber, floor coverings etc to account for it however some LCA's have not included waste allowances.</p> <p>GBCA should consider requiring site waste allowances of key materials to be included in any LCA eligible for Green Star points. Wastage can be significant (ranges between 5-35%) and this may have significant impact on environmental indicators such as global warming potential if it is a material that has used a lot of fossil fuel to produce. If waste factors are not included in an LCA the decision making process for choosing materials and building techniques to minimise such impacts may be distorted.</p> <p>There is already information in the public domain (E.g.</p>

	<p>http://www.concrete.net.au/publications/pdf/V olume.pdf ,</p> <p>http://www.fwpa.com.au/sites/default/files/PN 07.1058dynamics_carbon_stocks.pdf) and quantity estimation tools such as Cordell estimate include allowances for waste so information in this is not a problem.</p> <p>We acknowledge that Waste is accounted for in the Management category of the Green Star tools however this is in terms of volume and/or weight, not contribution to environmental indicators.</p>
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