

Life Cycle Assessment in Green Star

Discussion Paper

Feedback to GBCA

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The Green Building Council of Australia invites feedback from stakeholders on undertaking a project aimed at introducing LCA based assessment in the Green Star Materials category.

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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?	<ul style="list-style-type: none"> Appropriate for the GBCA to be undertaking the broad project, however it may be appropriate for organisations such as ALCAS or GECA or other suitably qualified expertly appointed panel to establish benchmarks, set scope boundaries etc.
Is the Australian market ready for LCA as a tool for assessing the environmental impact of materials?	<ul style="list-style-type: none"> Yes leaders and small to medium business are as they are seeking EPD's and ecolabelling in the market downturns.
What do you see as the main barriers to implementing LCA as an assessment method for materials in Green Star?	<ul style="list-style-type: none"> Industry self-interest in conventional more than green solutions. Added time and cost involved of adopting non building specific LCA software. Manual LCA is very slow and expensive. Effective and unbiased translation of the LCA results into credits/points in the Green Star tool.
- If the GBCA decided to introduce the methodology described in this paper, how much notice would you recommend the GBCA give to the market?	<ul style="list-style-type: none"> Market acceptance is essential. It is also essential to avoid adopting Eurocentric positions. High population density, cold climate, wet, nuclear and low biodiversity Europe versus arid, coal reliant, high biodiversity Australia. Key Australian impacts relate to water catchment and biodiversity protection. Realistically it would take at least 5 years from now to get all of the background work in place. This time would be needed to bring consultants up to speed and to get manufacturers producing the required information about their materials and products to allow LCA to be effectively undertaken. A phase in period, in which certain aspects of the building are assessed, leading to more comprehensive assessment down the track An alternative approach as a phase in over time. I.e. materials credits can be assessed via traditional Green Star route or LCA route.
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on the objectives of the project to:	
Develop transparent and consistent methodology for assessing the environmental impact of construction materials using LCA	<ul style="list-style-type: none"> In line with existing international standards that focus on the whole building not cradle to gate. Focusing on cradle-gate may fit in with the current categories in Green Star, but may cause conflicts between LCA results and other aspects of the environmental assessment of the building. LCA doesn't lend itself easily to a points based systems such as Green Star. Direct comparability of LCA criteria is not easy.
Continue to assist and facilitate the uptake of best environmental practice product and materials selection in the Australian construction market	<ul style="list-style-type: none"> Yes. Green needs to apply Quantitative as well as Qualitative assessments methods.
Facilitate the use of ISO 14025 EPD for materials assessment in Australia.	<ul style="list-style-type: none"> In line with existing international standards that focus on the whole building not cradle to gate.
Deliver better environmental outcomes	<ul style="list-style-type: none"> Need to be able to quantify as well as qualify these.
Deliver these in a cost effective manner	<ul style="list-style-type: none"> Yes so probably best to adopt latest building LCA technology.
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the following questions	
Is it appropriate to start with a limited List	<ul style="list-style-type: none"> Not when existing international standards focus on the

of inclusions scope of assessment in order to simplify the LCA?	whole building not cradle to gate. Most C2Gr building LCA show in-use operations and recurrent fitout impacts are higher than base building impacts.
feedback on inclusions	<ul style="list-style-type: none"> All relate to structural performance in use. Will run into trouble where there are inclusions and exclusions, if a design includes a 'multifunctional' design strategy, e.g. exterior walling systems with integrated sun shading, structural integration of ceiling systems, particularly if those excluded elements are not picked up elsewhere by Green Star materials credits.
columns	<ul style="list-style-type: none"> recyclability and re-engineering for use is critical
beams	<ul style="list-style-type: none"> recyclability and re-manufacture is most important
slabs	<ul style="list-style-type: none"> Use of PC recycled aggregates and pozzolans Potential to impact operational savings must be considered.
Exterior walls incl curtain walls	<ul style="list-style-type: none"> Use phase impacts are much greater than embodied. Essential to capture operational energy saved
Windows incl framing & glazing	
Interior load bearing walls	<ul style="list-style-type: none"> Durability & recoating most important over building life
Roofs	<ul style="list-style-type: none"> Rain, solar & wind catchment are most significant
All others	<ul style="list-style-type: none"> Agree
feedback on exclusions	<ul style="list-style-type: none"> Durability and modularity are key in recurrent fitout. Much of what is proposed to be left out are elements that would be replaced most frequently and therefore have the potential to have the highest impact. Excluding elements may cause perverse outcomes if those elements are not picked up elsewhere in Green Star materials considerations.
Non loaded inner screens/partitions/ceilings	<ul style="list-style-type: none"> Hi churn is high impact. Need fitout screens & partitions
Interior fitout, flooring, joinery	<ul style="list-style-type: none"> Hi churn is high impact. Need fitout flooring & joinery
Landscaping	<ul style="list-style-type: none"> Best opportunity to create oxygen & habitat - potential positive development and offsets for other impact categories.
Outdoor furniture & materials	<ul style="list-style-type: none"> Best opportunity to design for flora & fauna habitat
All others	<ul style="list-style-type: none"> Generally agree - services items are more easily distinguished from other elements - easy to set a boundary around.
Page 11	the proposed system boundary:
- Is 'cradle to constructed, sealed and serviced' building approach appropriate?	<ul style="list-style-type: none"> No. Existing international standards focus on the whole building life. Gate to the end design of life is critical. Excluding operational/recurring/end of life phases may lead to perverse outcomes. E.g. with a focus on only cradle to constructed - May encourage the selection of systems with only low embodied impact and that are not designed for longevity, designed for deconstruction/re-use and or for max operational efficiency (not withstanding that these may be covered by other credits in Green Star).
- 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?	<ul style="list-style-type: none"> Yes. Most are well documented in any case
Page 12	LCA based in the Green Star Materials category.
- Is 1m2 of GFA an appropriate unit?	<ul style="list-style-type: none"> Yes
- Are there constraints to using this unit?	<ul style="list-style-type: none"> Minor

- If there are constraints or reservations about the proposed functional unit, what are the alternatives?	<ul style="list-style-type: none"> All alternatives have issues e.g. Nett Lettable Area is good only for commercial space.
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- Is it appropriate to limit the number of environmental impact categories to six?	<ul style="list-style-type: none"> Yes - limiting of impact categories initially and then potentially broadening them out in the future is probably a better way of phasing in a less complex LCA (as opposed to limiting building elements or
- 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?	<ul style="list-style-type: none"> EcoIndicator 99 is the widest used Impact assessment method but it is based on European metrics. Still there is nothing better yet although ReCiPe is coming. Ref www.lcia-recipe.net. Whatever the selection it must be based on standards accepted by LCA bodies internationally, given the globalised nature of the construction industry today.
If fewer categories are to be included which categories do you recommend be removed?-	<ul style="list-style-type: none"> Land transformation is inapplicable to most building materials being suggested in Australia. It applies mostly to agricultural and forestry transformation from native to managed processes.
- If six impact categories are appropriate, are the six categories above the most appropriate?	<ul style="list-style-type: none"> Ecosystem Quality which is a measure of loss of quality in biodiversity, species or habitat is much more relevant as Australia highest value biodiversity and habitats.
- Is it appropriate to refer to the AusLCI impact categories? Is there an alternative which should be used? Why?	<ul style="list-style-type: none"> The AusLCI impact categories follow the European approach which has limitations for Australia. We need to move to balance impacts with benefit assessment i.e. express positive gains not lower negative losses. People are sick of all the negativity. If a given reduced death and disability rates is true then the equally increased life years and ability rates is also true. People need to know of benefits as well as impacts. As with costs there are benefits. It is time for green to become positive.
Page 14	Weightings and points:
- Is it appropriate to reference the BC LCI weightings?	<ul style="list-style-type: none"> No.
If not, what should be used instead?	<ul style="list-style-type: none"> EcoIndicator 99 egalitarian is OK.
- 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?	<ul style="list-style-type: none"> Separate - it is very difficult to combine LCA impact categories
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- 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?	<ul style="list-style-type: none"> Yes it is practical
- 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?	<ul style="list-style-type: none"> Yes. The metric is a build creating habitat with local native flora and fauna species richness/GFA. Includes roof, wall and window gardens and ponds etc around e.g. recreation and eating space.
- If the reference case is constructed in a similar manner to that described above, would you be able to provide your	<ul style="list-style-type: none"> Yes. The Evah Institute Associates can provide a full consultancy probono to GBCA

interpretation of how this may operate in practice?	
- Can LCA methodology in the Green Star Materials category operate without a reference case? If so, how do you see this working?	<ul style="list-style-type: none"> No a reference case is essential. It can be generic i.e. a compilation of worst cases of high toxicity, short-life heavy mass, High GGE intensity options or one specific case e.g. asbestos.
- Is it practical to conduct two iterations of the LCA with different inputs for the project?	<ul style="list-style-type: none"> Always options for improvement need at least two iterations
- 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?	<ul style="list-style-type: none"> 1 to 100% - depends on the variation of the specific design from the base case scenario.
- 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?	<ul style="list-style-type: none"> Table 1 content is irrelevant for LCA. It is also prescriptive, conventional and distances insignificant. None of the items listed are cradle to gate input parameters.
- What would be the best way to determine the rules for the input parameters in Table 1?	<ul style="list-style-type: none"> Leave it to LCA practitioners working within existing ISO standards and using building LCA software developed by LCA specialists. GBCA is too ignorant of LCA to set such rules
Page 17	on the use of ISO 14025 EPDs:
- Is it appropriate to nominate ISO 14025 as the reporting mechanism?	<ul style="list-style-type: none"> Yes
- Is there an alternative that is preferred or should be considered?	<ul style="list-style-type: none"> Mechanisms as good or better than ISO 14025
Page 18	Allocation of points:
- Is percentage reduction in impact an appropriate way to award points for improvement?	<ul style="list-style-type: none"> Yes + must be allowance for additional points to promote net positive impact - not just reduction of impact.
- 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?	<ul style="list-style-type: none"> Separate credits, or separate points within one credit - will provide greater transparency - either would potentially work. However, points could be deducted as well to encourage all categories to be addressed. So that if there was good performance in a number of credits and points are gained - but this was at the expense of another environmental impact category in which the performance was worse than the benchmark, then points could be deducted to get the overall no of points for the credit.
Page 19	The proposed Data inventory:
Should the Aus LCI Building Product inventory dataset be used in a LCA method within Green Star rating tools?	<ul style="list-style-type: none"> No. The AusLCI does not exist yet and may fail through lack of funding. There are many good LCI databases to choose from. After AusLCI becomes established this may become preferred but not yet. In any case AusLCI will focus first on conventional practice whereas GBCA is focussed on green practice.
Should a European LCI be used?	<ul style="list-style-type: none"> There is no alternative for imported components.
Are penalties needed?	<ul style="list-style-type: none"> Rather than penalties - set limits on % of data falls outside of the approved levels of acceptability - if data not available credit becomes n/a - or there is a non- LCA route to compliance (at least for a transition period) because initially there will be a lot of potentially non-approved data around.
What data sources would be acceptable for a credible LCA to be conducted?	<ul style="list-style-type: none"> Third party audited with comparison to benchmark of results to e.g. the U of Bath, Plastics Europe and Industry Averages.

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- Is it appropriate to exclude fitouts based on the lack of an agreed functional unit for fitout items?	<ul style="list-style-type: none"> No. Recurrent fitout generates more impacts than base building over 60 years on average based on government asset investment rates. The functional unit can still be GFA and e.g. for usual occupancy 10 to 13m²/person, student, patient or customer. Fitout means GBCA market extends to all extant buildings which is essential for sustainable development.
Page 21	Other matter to be addressed:
- Will the proposed LCA methodology accommodate existing LCA systems and tools?	<ul style="list-style-type: none"> No it excludes new tools and favours Eurocentric tools e.g. land use criteria is not universal or more applicable in this instance than ecosystem quality..
- What constitutes an LCA practitioner, what qualifications should be required, and should the system ALCAS be referenced?	<ul style="list-style-type: none"> No. ALCAS does not represent many LCA practitioners and is dominated by Building Innovation Council and Materials Industry representatives and their self interests as producers/suppliers.
- How much would you estimate it would cost to complete the assessment outlined in this paper?	<ul style="list-style-type: none"> \$3000 to \$6000 for a whole building best practice versus ecopreferred practices off a BIM / CAD model is the 2011 price for hospitals, supermarkets, warehouses, tunnels hi-rise etc. Using an LCA BIM take-off program such as LCADesign. If all information is entered into the BIM model during the standard documentation process
And how does that cost compare to the cost of demonstrating compliance with the current Materials Category in Green Star?	<ul style="list-style-type: none"> Affordable
- Is the requirement to adhere to international standards necessary?	<ul style="list-style-type: none"> Essential
- Which are the relevant standards that Green Star related LCAs should adhere to?	<ul style="list-style-type: none"> All ISO LCA, Building ecolabelling and EPD standards
- Is the requirement to use recognised software necessary?	<ul style="list-style-type: none"> No. It is anti Innovation. Setting up a set of performance parameters for software to achieve would be appropriate - similar to the requirements for certifications systems for timber set up under the Timber credits.
- Should the GBCA recognise particular softwares?	<ul style="list-style-type: none"> No - setting up performance parameters would be preferable.
- Which software should be recognised, and why?	<ul style="list-style-type: none"> Software that is building specific. Because it uses building industry supply chain modelling. Otherwise if non building specific LCA software is used there is likely to be problems with material supply chain info e.g. container glass not float glass,
- 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?	<ul style="list-style-type: none"> No
- Is the requirement for peer review necessary?	<ul style="list-style-type: none"> Yes
- What other requirements are necessary to ensure best practice	<ul style="list-style-type: none"> Avoidance of economic allocation and if used only after showing results using mass and or energy based allocation. Avoidance of allocating zero impacts to byproducts.