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The General Manager
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Discussion Paper: Life Cycle Assessment in GreenStar

I am pleased to provide the following submission to you in response to the call for submission on the *Discussion Paper: Life Cycle Assessment in GreenStar*.

The consideration of life cycle assessment in an important matter to BPIC and our members, given the extensive efforts they have made over the last 5 years to establish the first Australian inventory of life cycle data for building products and materials – the Building Products Life Cycle Inventory (BP LCI).

The accurate use of the BP LCI, and any other LCA data that is available to professionals working in the area of life cycle assessment, is integral to the successful application of the BP LCI. On this basis, BPIC would like to submit the attached responses to the Discussion Paper.

BPIC members would be pleased to participate in the ongoing discussion about LCA and its use in GreenStar and hence I would appreciate being kept inform on the progress of this work.

If you would like to discuss any of these issues, please do not hesitate to contact me on glenn.simpkin@boral.com.au.

Yours sincerely
BUILDING PRODUCTS INNOVATION COUNCIL

Signed on behalf of
Glenn Simpkin
Chair

ATTACHMENT A

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?

Yes. GBCA is well placed to undertake this project and, of course, the only organisation that can do this for Green Star.

The GBCA have a high degree of trust and engagement of stakeholders from government and both the supply and demand side of the Property industry whilst maintaining independence from any particular interest.

It could demonstrate a credible, leading and scientific approach to measurement of the impact of materials on buildings. We are interested in how the GBCA plans to access sufficient expertise to undertake this work and link and leverage current and emerging initiatives.

For example, National Standards (NS) is also developing a suite of PCR's, which has the support of BPIC members. These build from the work of BPIC members to develop the Building Products Life Cycle methodologies, protocols and consistent datasets (121 published LCI's). The NS work goes further to establish the criteria for Environmental Product Declarations (EPD's) compliant to ISO14025 and the thresholds for environmentally preferable performance required by ISO14024 compliant ecolabels. National Standards is seeking ABSDO accreditation as an Australian standard writer for this work and the resulting PCR's and ecolabel criteria will be available to any organisation to adopt and use. This initiative may also provide a valuable basis in the creating of a LCA based Green Star materials and design optimisation credits.

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?

This type of project will not be led by the market in the short-term and it is appropriate for the GBCA to lead this initiative. BPIC and its members have a strong commercial stake and wish to be fully involved in the development of the proposed LCA based credits for Green Star.

As an example of the success of this type of project BPIC have shown leadership in completing the Building Product Life Cycle Inventory (BP LCI) project which has achieved a hard-won cross-sector consensus between strongly competing industries to establish a scientific basis for methodologies, protocols, impact assessment and weightings and compile the key baseline data for 121 materials/products. This data represent over 99% of the mass of all buildings and have already been used in the design of materials and resources credits for the Australian Green Infrastructure Council's recently launched "Infrastructure Sustainability" (IS) rating tool.

What do you see as the main barriers to implementing LCA as an assessment methodology for materials in Green Star?

The main barriers to implementing LCA based credits for Green Star are the complexity and costs of conducting an LCA for "whole-of-building, whole-of-life", as well as the lack of mandated requirements by government for their use.

These barriers might be overcome by using accepted, accessible and user friendly tools to automate the process. The BP LCI Protocol describes in detail the key requirements that BPIC would have for tools of this nature:

http://www.bpic.asn.au/_literature_79924/BP_LCI__Protocol

National Standards is also developing draft Australian Standard on what constitutes a good building design optimisation tool (or collection of tools) based on LCA.

If the GBCA decided to introduce the methodology described in this paper, how much notice would you recommend the GBCA give to the market?

There is a need to carefully define the methodology and benchmarking approach, retaining focus on life cycle thinking rather than oversimplification: whole-of building, whole-of-life, multi-metric. Defining and agreeing to the methodology will be the most difficult step for the GBCA. BPIC and AusLCI have spent many years on this area.

It is critical to consider carefully the risks of oversimplification – to restrict the boundary and criteria for the assessment can result in a skewed result that is in opposition to the concept of sustainable development.

The GBCA should be looking to developing the parameters and outcomes it wants and use existing or emerging design optimisation tools to deliver the detail.

The notice needed by the industry is dependent on the method used. The method needs to be introduced sensitive to cost and using tools that have a good uptake and are well accepted by the industry. Greater notice is needed if the industry is required to up-skill in a complex implementation of LCA into Green Star credit ratings.

This consultation has put the industry on-notice and BPIC consider that a "best case" scenario would be to see a final scheme at the end of 12 to 18 months, with a further 18 to 24 months to bed down the scheme and achieve full stakeholder participation.

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?

The GBCA needs to consider the whole life of a building in the scope of assessment or it will risk a conflict with the objective of delivering better environmental outcomes.

A careful consideration of what the existing/developing tools will deliver is recommended. Developing a completely new tool is not only time consuming but expensive and should be avoided if possible.

Limiting the physical scope of the assessment to the building structure, probably would significantly reduce the time and cost of an assessment.

Equally though, concentrating, as proposed, on core services and façade materials may put excessive scrutiny on the large mass of low impact materials compared to the smaller mass of high impact, frequently replaced (high churn) fit-out items. Prior work in the UK has revealed that these can accumulate over the life of a commercial building to greater gross impacts than those for the base building and therefore significantly reduce the reliability of the assessment (Precious Joules, Howard and Sutcliffe, Building 18 March 1994)

BPIC believe that it may be better to have two parts, one section dealing with the structure and the second to address the sustainability of fit-out elements. This would allow the more durable items in the structure of the building to be separated from the short life fit-out elements. A model for such arrangement can be found in the BCA for consideration by broader stakeholders.

Please provide feedback on the list of inclusions and exclusions.

BPIC believe that fit-out elements should not be excluded from the scope of the assessment, but may be addressed as a separate tool

Are there additional materials should be addressed by the inclusions and exclusions?

BPIC believe that fit-out elements should not be excluded from the scope of the assessment, but may be addressed as a separate tool

Is the use of a 'cradle to constructed, sealed and serviced' building approach appropriate?

BPIC believe that a building can only be properly assessed on the basis of 'whole-of-building, whole-of-life' i.e. cradle-to-grave. Limiting the temporal scope to 'cradle to constructed, sealed and serviced' would be too limited to reliably rate LCA based environmental performance.

It is generally accepted that in most climates and for most buildings, the operational impacts are the key contributor to the whole-of-life impacts of buildings. BPIC recognise that other parts of the Green Star rating tools address operational energy and water, but these may be assessed on a different and not necessarily compatible basis for scoring credits. This might result in perverse outcomes being rewarded by the different credits.

The proposed scope of 'cradle to constructed, sealed and serviced' falls short of BPIC's preferred approach of 'whole-of-building, whole-of-life' by missing out on key impacts in fit-out elements, end of life and assessing operational performance as above.

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?

BPIC believes that if the analysis is done on specific products there may be a proportion of the environmental burden apportioned for transport that is significant. However, if the approach is to use generic products in initial building design selection of 'which material' as opposed to 'which supplier of that material' which may be done later, then the determination of transport contribution is more complex and problematic, and may lead to perverse outcomes.

If transport is included, then the contribution due to this criteria should be auditable. That is a generic or particular material LCA data be used, and then product/supplier substituted by sub-contractors with material with a different LCA.

Is 1m^2 of GFA an appropriate unit?

The per m^2 of GFA is the best unit at present to use for a new commercial/mixed use building and that by analogy, per m^2 of NLA is the best unit at present to use for rating tools that address tenanted space.

However, this assumption should be reviewed in any future iterations of the rating tool

Are there constraints to using this unit?

Yes, if the assessment is constrained to embodied performance only.

However, in a comprehensive 'cradle-to-grave' LCA, the energy arising from the raw materials and manufacture of the elements of the building, the operational energy and the end-of-life use are all considered and should be included.

If there are constraints or reservations about the proposed functional unit, what are the alternatives?

GBCA should consider with stakeholders the merits if assessment were per m^2 GFA (NLA for tenanted space) over a 50 year life 'cradle-to-grave' to avoid perverse outcomes.

Is it appropriate to limit the number of environmental impact categories to six?

BPIC see no particular justification for use of the 6 proposed impact categories and would prefer the full set of 14 as listed in the BPIC publication *A Life Cycle Impact Assessment Method for the BPIC/ICIP Project – Part 1: Classification and Characterisation.*

The BPIC impact assessment research identified these categories which we believe are supported by international consensus, are relevant and appropriate for Australia and for which adequate data are available for normalisation.

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?

See previous response.

If fewer categories are to be included which categories do you recommend be removed?

See previous response.

If six impact categories are appropriate, are the six categories above the most appropriate?

See previous response.

Is it appropriate to refer to the AusLCI impact categories? Is there an alternative which should be used? Why?

The BP LCI categories appear to be attributed to AusLCI in the consultation document, listing all of the categories investigated rather than the ones recommended for use. These draw from and extend the AusLCI Impact Assessment Working Group's work. (Internal Environment is not assessed by LCA currently).

The full list of designations and units are given in the BPIC publication *A Life Cycle Impact Assessment Method for the BPIC/ICIP Project – Part 1: Classification and Characterisation.*

There are many possible permutations and combinations of impact assessment methodology – the corrected set above has the consensus support of BPIC members representing the major material and product suppliers in Australia.

Is it appropriate to reference the BP LCI weightings? If not, what should be used instead?

The methodology used and results obtained have a long pedigree (since 1997 UK) and have proved consistent between countries (UK, US, NZ, AU 11 Cities), between demographic groups and different stakeholders (with similar profiles of stakeholder opinion between countries). Although the methodology has been criticised (as have all alternatives), statistical analysis of the results themselves prove the critique to be unjustified.

BPIC support use of these weightings for the material/product assessments in Green Star.

BPIC also support the reporting of the individual characterised metrics of performance for transparency in compliance with the BP LCI Protocol.

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?

If each of the categories is separately scored then the number of credits given to each category should be proportionate to the corresponding BPIC weighting.

BPIC does not support a single credit score as the sole outcome from any proposed Greenstar rating tool. BPIC believes the individual scores for each category need to be explicit even if a single score is also displayed.

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?

BPIC does not support a standard practice reference project approach for a number of reasons.

The determination of a base case reference building is extremely problematic. Any structure is a complex mix of materials responding to a number of criteria – from foundation conditions to climatic requirements. BPIC considers that a single building responding to a range of criteria would be almost impossible achieve

consensus on in a short-period, and would likely require review/revision every 5 years as design approaches develop.

BPIC feel that a reference project approach may not reward projects with the best environmental performance. Project teams will have a strong incentive to game the reference case to high impact so that their actual project appears to perform better.

The documentation of both a reference and actual design is likely to be costly to prepare and then costly, somewhat subjective and contentious to appraise for the award of credit.

For consistent assessment, GBCA will need to standardise many design and specifications aspects between the reference and the actual which may be a constraint to design team innovation. The more aspects that are standardised the less gaming and the more consistent the assessment between projects will be, but also the greater the constraint on design innovation.

BPIC do not believe that there needs to be a differentiation between low-rise, mid-rise and high rise buildings – the LCA results per m^2 of GFA should be similar for similar mixes of use (substructure is usually a small proportion of total embodied impacts especially over the full life).

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?

BPIC do not support a reference project approach.

Further, BPIC also supports an approach whereby a rating for fit-out is determined separately to that of the structure.

Where a development reuses parts of an existing structure this deserves the commensurate reward of avoiding the use of materials and products that the Greenfield development must consume.

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?

We would not recommend this approach given its difficulties..

Can LCA methodology in the Green Star Materials category operate without a reference case? If so, how do you see this working?

BPIC consider that one option is that LCA credits in the Green Star Materials category can be based on a system reporting the individual impact category scores as the credit criteria.

This approach would avoid, perverse outcomes, inform the community on the true performance of a building, improve the consistency of assessment and reduce the costs of review and appraisal for credit.

Is it practical to conduct two iterations of the LCA with different inputs for the project?

BPIC would not recommend the reference case approach. Iterations of any system would depend on the tools and process employed in the undertaking of the LCA.

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?

BPIC would not recommend the reference case approach.

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?

BPIC do not consider Table 1 to provide the data necessary for either a reference structure or an actual building design. Comprehensive specification/design details and dimensions would be needed for every component for this to provide a consistent basis. More definition is required.

What would be the best way to determine the rules for the input parameters in Table 1?

BPIC would recommend any rules or conditions be congruent with BPIC methodology and relevant National Standards draft standards.

Is it appropriate to nominate ISO 14025 as the reporting mechanism?

BPIC do not consider ISO14025 an appropriate choice for a reporting mechanism. This standard is primarily for making validated Type III Environmental Product Declarations (EPDs) for proprietary products. The resulting EPDs comprise a list of declared parameters (the criteria) about the product together with a similar list of impact performances. It is analogous to a food nutrition label as opposed to a final performance assessment like an Energy Star label. It is hard to see how GBCA would interpret the list of results into credit outcomes in Green Star.

It should be noted that National Standards is creating Australian extensions to the International Standards for Ecolabels (Type 1 Product Environmental Declarations) and EPDs (Type 3 Product Environmental Declarations) that should be viewed by the GBCA.

Is there an alternative that is preferred or should be considered?

National Standards are developing ISO 14025 compliant Product Criteria Reports (PCR's) consistent with the BP LCI methodologies and protocol for building products and establishing the thresholds of "environmentally preferable performance" that can be used by ISO14024 compliant eco-labelling bodies. BPIC supports this initiative by National Standards and would commend this to GBCA for consideration for any Green Star credits related to product assessment.

Is percentage reduction in impact an appropriate way to award points for improvement?

BPIC would support percentage reduction in against an absolute target for each building end-use as the appropriate way to award points for improvement perhaps with benchmarks also set for individual impact categories so if you do not meet a benchmark in any particular area you may not get the points.

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?

As above, BPIC support the reporting of the individual characterised metrics of performance for transparency in compliance with the BP LCI Protocol

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

The BP LCI methodologies, protocol, impact assessment methods, weighting factors and replacement life data have been agreed by all major industry product sectors. They are publicly available, the data has been compiled to be consistent with the methodology and hence consistent and comparable for the Australian building material industry. BPIC members have committed to keep the data updated. The BPIC LCA Protocol incorporates a hierarchy of data sources to be used as follows:

- From the BPIC/LCI database (this data will comply with the BPIC/LCI Methodology Guidelines).
- From AusLCI (this data will comply with the AusLCI Data Guidelines and be highly compatible with BPIC/ICIP data).
- From other acknowledged Australian data sources (documented for source, age, representativeness and data quality assessment).

- 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).
- From other sources with sensitivity analysis reported to show the significance of this data for the results and conclusions drawn.

In using data from other sources, the practitioner should make every practical effort to adapt and model the data to be compatible with the BPIC/LCI Methodology Guidelines and this Protocol. Any deviation from the BPIC rules must be documented with reasons for deviation and attempts made.

We believe that this is a world leading achievement by BPIC and we would recommend GBCA to adopt both the underpinning methodology and the data hierarchy from the Protocol.

Should a European LCI be used?

We would recommend the BPIC LCA Protocol hierarchy for selection of data sources as above.

The use of data for materials manufactured in Australia is inappropriate given the diversity of power supply, the need to consider transport and other elements. Hence a GreenStar assessment with 'overseas' inputs will be misleading in its assessment and its outcomes.

Are penalties needed?

If parties do not document data sourcing and have not shown attempts to follow the above hierarchy, then they should not receive Green Star award of credit points. The reasoning is that we need to seek high quality, Australian data where available in preference over for example just using European generic data that may lead to a skewed assessment.

What data sources would be acceptable for a credible LCA to be conducted.

Those described by the BPIC LCA Protocol hierarchy of data sources above.

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

It is essential to include fit-out – in particular floor finishes, ceiling finishes and partitioning should be included. This may be incorporated into a single tool or more appropriately two separate tools. The functional unit is no more contentious for fit-out than for whole building and can be the same – m^2 GFA. For specific versions of Green Star targeted at tenancy then the analogous unit would be m^2 NLA.

Will the proposed LCA methodology accommodate existing LCA systems and tools?

BPIC would only support the use of tools that are compliant with the BP LCI methodology and protocol.

What constitutes an LCA practitioner, what qualifications should be required, and should the system ALCAS are developing be referenced?

BPIC support the need for an evidence based assessment of LCA practitioners' expertise and ability to conduct LCA's compliant to the BP LCI methodologies and protocols. BPIC are aware that ALCAS is developing an accreditation programme but until details of this program are available could not endorse its acceptance at this stage.

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?

BPIC are not equipped to answer this question

Is the requirement to adhere to international standards necessary?

BPIC consider the ISO14040/4 standard for LCA to be a bare minimum requirement for consistent LCA and hence the need to reinforce this with the BP LCI Guidelines for building products and buildings. Only adherence to the BP LCI Guidelines can provide a credible basis for consistent LCA applied to buildings in Australia (and this guarantees compliance with ISO14040/4).

Which are the relevant standards that Green Star related LCAs should adhere to?

We believe that the underlying LCA and specific product assessments (especially where the supplier exports) need to comply with BP LCI (and hence also comply with ISO14040/4).

BPIC believes the GBCA process must adhere to ISO 14040, 14044, and 14045 as a minimum standard.

We are aware of the emerging development of National Standards and would urge GBCA to consider adherence the methods which are described within them. The National Standards three draft standards re Design Tools (NS11030), ISO Type I Eco labels (NS11010) and ISO Type III EPDs (NS11020).

Is the requirement to use recognised software necessary?

LCA is aided by purpose built software, but this is not essential and does not need to be a requirement.

BPIC recommends support of new and emerging tools, but no specific endorsement.

The National Standards a draft standards regarding Design Tools (NS11030) that should be reviewed by the GBCA in the areas of setting minimum tool requirements.

Should the GBCA recognise particular softwares?

BPIC believe that GBCA should not recognise any particular LCA software.

Which software should be recognised, and why?

Recommend instead the GBCA set the guidelines for tools to be used and how they assess an LCA.

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 comment apart from BPIC recommends GBCA view several current and emerging tools in the market in its considerations.

Is the requirement for peer review necessary?

In LCA, it is the underlying methodology and data that needs to be verified rather than the software. The key issues are scope, boundaries, product and functional unit definition, co-product and recycled material impact allocation, upstream and downstream data modelling.

Expert or panel peer review conventionally provides the mechanism for this data quality assurance and details of the peer review are provided with the data. BPIC supports the establishment of a system assuring third party accreditation of practitioners.

What other requirements are necessary to ensure best practice LCA modelling?

None