Climate Positive Design

Q&A to AILA Victoria Group Presentation 10/09/2020

Australian Institute of Landscape Architects

1. Re: 'Communicating with Government': Suggest engaging with the public sector LAs who are employed by Government prior to engaging with Govt. Could gain some insights and better support Public sector LAs.

Thanks, yes that is a very good idea and we would be happy to follow up on this.

2. Is soil sequestration considered?

In speaking with the developer, we understand that soil sequestration has been considered.

3. The pathfinder tool seems to indicate that in the Small/Medium category deciduous trees sequester more carbon then evergreen trees, any thoughts on why this is?

This recommendation is a result of the USDA forestry research which has informed the tool. One possible reason for this is that many of the northern hemisphere evergreen trees are likely to be softwoods (conifers etc) which will have a lower timber density than a deciduous hardwood tree and therefore less carbon sequestered for the same size tree. It is potentially less relevant here given the small range for deciduous trees in Australia.

4. What is the average timeframe as in hours to integrate pathfinder process into project time frame.

Typically 1 hour is required, provided you have all the data available (such as QS measurements).

5. Does the app allow for climate change? In the sense that plant growth may be impacted by lower rainfall or higher temperatures?

No, the app uses legacy data from the USDA forestry research. As noted in the presentation the tool uses averaged tree data, with three climatic growth zones, rather than absolute data per species closely calibrated to a specific region.

6. What happens to the sequestered carbon when the trees dies?

At the moment, many street trees would simply be chipped for re-use as mulch when they are removed. This would essentially allow the sequestered CO2 to be released back into the atmosphere over a few years as the chipped mulch breaks down. We need to start thinking about our street trees the same way as a sustainable forest. When a tree falls in a high wind, or is felled due to age, then databases, processes and protocols should be in place with the local council to extend the life of that timber, through say a local saw mill, or furniture/art manufacturing. For example with say a wind thrown tree, it should be moved off the road with a crane rather than cut into small pieces with a chain saw. This will retain the trees value for timber. The additional costs associated with this may need funds from a levy or other to ensure it is viable for the small timber mill.

Another option is biochar. It is not common in Australia, but could provide a means of locking carbon from felled trees back into the soil.

7. What about the use of timber - does this count as sequestration of carbon or removal of trees?

The pathfinder app classes timber as a climate negative element. According to the EPiC database, there is high embodied carbon in manufactured timber products - particulalry kiln dried timber. (See web link for EPiC Database in Q8. Further research is required here.

There may be some elements like unprocessed timber log play equipment that might provide short term seqestration say 15-20 years. You need to consider the full life cycle assessment - say 50 years. Its final demolition and end of life strategy would need to be accounted for.

8. Is it legitimate to make custom elements that are standardised combinations of others - e.g. stone paving plus reinforced concrete slab plus compacted base plus reinforcing, or a tree plus tree grate plus irrigation? And can those be kept available for future projects? Building a catalogue of custom element's co2 emissions. Is this something that AILA could support and share?

Yes, custom elements are a good way to build a complex element – say a tree pit with say a strata cell, subsoil drainage, irrigation, a tree grate and tree guards as a single element. You would need to use the custom element tool and select "item" as the unit. This would allow you to then just count all the tree pits and uses that custom element. You could do the same with say a seat wall and work out what 1 linear metre is, make it an item and then multiply by the length of wall. Where the materials are not in the pathfinder, you would need to use a data set (such as EPiC Database), add 15% for construction and any lifecycle replacements to build the embodied carbon.

www.epicdatabase.com.au

It's not something that AILA is likely to be able to do as each of these will be project specific, but we would highly recommend that you build up your own library of common elements you use in your design.

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9. Building a catalogue of custom element's CO_2 emissions. Is this something that AILA could support and share?

Given the number of possible custom elements it is unlikely that we will have the resources to build these. What we may be able to do is a guide on how to calculate a custom element using a data set like epic database mentioned in question 8.

10. As well as carbon sequestration, what about reducing emissions associated with high emission materials?

Refer to the presentation. They key strategies are to remove or reduce high carbon elements, and swap them out with low, or lower carbon elements.

11. Is there a requirement to upload the design / drawings at any stage? If so, what format do the design development drawings need to be in, to be able to do the assessment?

This is on the long-term wish list, but is likely several years away to that level of sophistication if at all, given the software development costs.

12. Understand that the park example being presented is relatively simple but could you run through including a small off the shelf playground and a steel post and frame shelter.

This would have to be built as a custom element as per question 8. This is where it will be important to start to ask manufacturers for EPD's (Environmental Product Disclosure) forms.

13. What are the differences between trees & shrubs re CO2 sequestration?

The amount of CO_2 sequestered is primarily related to the amount of biomass. The greater the woody biomass the greater sequestration. The app book tool allows you to see the amount sequestered for each element. Soil carbon is likely to play a bigger role in shrub planting, given the leaf litter understorey is less likely to be removed and can help build soil carbon.

14. Is there a larger growth map? i.e. where is the line for central and south? i.e. is Brisbane in central or south?

There is no larger map, but Brisbane is likely to be in "south." These are amount of growing days. The North, Central and South climatic zones are extrapolated from the USA zones North, Central and South in the see page 40 of USDA publication. McPherson, E. Gregory; Simpson, James R. 1999. Carbon dioxide reduction through urban forestry: Guidelines for professional and volunteer tree planters. Gen. Tech. Rep. PSW-GTR-171. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture;

15. Is the additional 15% on top to cover things transport/site work etc. (mentioned in the first set of slides) a general rule instead of going in and manually inputting all the details of electric vs. gas construction machines etc.?

The additional 15% as noted in the presentation is already embedded in the materials emissions, as well as lawns. Other maintenance such as leaf blowing etc would need to be estimated and included. Ideally a landscape maintenance contractor could provide guidance here.

16. How to calculate 'site elements' type of inclusions (such as furniture, play equipment etc.) as opposed to materials - is this something suppliers can often provide? or is there a database somewhere?

Unfortunately, in Australia we do not yet have many products with Environmental product disclosures at this stage. See answers to question 8.

17. Comment: Would be great to share info on low-carbon furniture options.

This is something we can look into and consider.

18. Does the calculator assume energy generated by coal fired power plants and if so - can this be adjusted with a shift to renewable energy sources for production and transport?

The calculator adds an additional 15% on construction for manufacturing, delivery and installation based on current emissions in the USA which would be largely comparable to Australia. We have probably a 10 year transition period to a lower carbon economy and electric vehicles, so long as the Federal Government sets firmer directions for this.

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19. Can you add maintenance costs in the 'total material impact' section? Recognising the varied maintenance regimes required for different materials, up front.

We can request this as an option for future upgrades.

20. Are our assessments in the public arena online, or is they secured via password / similar?

Your assessments are not accessible to the public or other users of the application and is secured by your log in and password. All the data is stored in the cloud.

21. What about tradeable credits between projects? e.g. a low footprint project "trading" credits to a high footprint project?

The application calculates your profile / practices total years to positive as an overall score when you log in. There are no tradable credits. The objective is to get to the lowest embodied carbon as possible.

22. In the calculations of CO_2 sequestered was the large amounts of CO_2 discharged back into the atmosphere through respiration accounted for? Also higher levels of CO_2 shortens the trees life span massively, was this acknowledged in the study?

Yes, the respiration of $C0_2$ is accounted for, as what is calculated is the final mass of the timber in the tree, which is the retained carbon and excludes respired CO_2.

Elevated CO_2 levels are not accounted for as it uses legacy data. See answer to question 5. There was a recent study by the University of Leeds, published on the 8th/09/2020 in nature communications that suggested elevated CO_2 levels resulted in accelerated growth and shorter tree lifespans. It suggested that increased CO_2 uptake due to growth stimulation is neutralised by earlier tree death.

https://www.nature.com/articles/s41467-020-17966-z

There is still ongoing research about heightened CO_2 levels on tree growth. The UWS EucFACE site in Western Sydney is currently studying this. Refer below:

https://www.westernsydney.edu.au/hie/EucFACE

23. Haven't played with tool yet but e.g. stone would be great to be able to have options for imported vs local materials (often Chinese and cheap) stone vs. local sourced stone (more$$) to try and convince clients of diff in outcomes for using more 'sustainably' sourced materials.

This is not accounted for, but you could make a custom element that provides a loading factor for imported materials, or distance traveled for particular material or the entire project if it is in a regional location etc.

24. As students, where can we find those data and calculations of concrete, soils, trees, etc?

All the data used for the app is noted in the book icon and there are references to all the data sources on the website.

25. A common fear is the cost and usability of less carbon intensive concretes (fear of new technologies etc.), can you speak to overcoming this fear in projects, including budget and specifications? we need to be using these products to make them more mainstream.

Specifying low carbon products is an important step in reducing our overall carbon footprint.

There are 5 key things to cover.

1 Talk to manufacturers early – ideally during the design and documentation stage so you know what products are out there. Consider early pre-qualified tenderers or a two stage tender process. Offer to partner with manufacturers on trials and tests. Look into early contractor involvement on projects during design and documentation stage.

2. Set realistic targets for what you need to achieve. For example with concrete, changing the strength compressive strength date from 28 days to 90 days can make quite a difference with the ability to use low carbon alternatives. Meeting a 28 day compressive strength requirement is not really necessary in most landscape applications.

3. Make sure you have a means of verifying what you have asked for – test result, Mandate provision of Environmental product disclosures on all high carbon intensity building products and materials.

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4. Timing. Make sure you allow sufficient time and flexibility in the tenderer and their respective supply chain for the low carbon products to be sourced.

5. Selection criteria. Make sure that you specify selection criteria that will prioritise by a weighting system or other means, the selection of low carbon alternative over cheaper standard products. Preference low carbon product / suppliers and provide transparent tender selection process e.g. CO_2 Ladder or similar.

For more information See this recent discussion paper by Lend Lease

https://www.lendlease.com/au/better-places/low-embodied-carbon-in-construction-materials/-/media/b4990c03a40e488fa460e9ed3aa15032.ashx

26. What about recycled materials?

There are a range of product options. If a specific recycled material is not there you could make it a custom element.

27. Does this product have options like you find on Buy Recycled as alternatives you can select?

The app makes suggestions on design material substitutions. Once you have input your materials in the app, refer to the 'Design Suggestions' tab at the bottom of the page.

28. Have you got priorities for products or product classes that require EPD's?

Not yet, but we would want to start with high embodied carbon products, and complicated products like street furniture.