Carbon emissions and power poles research

- Comparative studies suggest that wood-based products, timber buildings and power poles typically have lower embodied carbon than concrete buildings.[1]
- However, the overall 'environmental friendliness' of each material is difficult to compare, given the impacts of harvesting native forests on biodiversity and ecosystem services e.g., water purification. Additionally, there is scope to consider how harvesting native forests can make bushfires worse.[2]
- Some studies have found that uncertainties in understanding carbon emissions from forest management activities (e.g., soil carbon loss and decomposition of woody waste) and end of life disposal mean that timber may have higher carbon emissions than previously understood.[3]
    - In the case of railway sleepers, some studies have found concrete sleepers may be less emissions intense than timber sleepers, as timber sleepers have shorter lifecycle and require energy intensive treatment.[4]
- Research from the International Institute for Sustainable Development (IISD) found that biogenic carbon emissions and sequestration related to the production and end-of-life stages of wood building products hold the most significant uncertainty in existing life cycle analysis (LCA) of building material greenhouse gas emissions (GHG). Specifically:
    - Accounting for emissions in the biogenic carbon cycle of wood products is complex and requires sophisticated carbon models that can track exchanges between different carbon pools, which LCA studies may not capture.
    - GHG emissions can be generated from soil disturbance, conversion of old-growth primary forest and forest management practices.[5]
    - Sensitivity analyses of assumptions related to biogenic carbon suggest that the life-cycle GHG emissions of wood products can be significantly higher than those presented in LCA literature, and have greater embodied emissions than concrete.
- Service lifetime is an important factor influencing LCA.[6] The longevity of concrete electricity poles may also lessen the carbon emissions relative to timber poles in bushfire prone areas. Timber poles in bushfire prone areas may need to be more frequently replaced and would release carbon emissions when burnt.
- In scenarios where wooden poles are assumed to have a much shorter lifetime than concrete poles, it is not clear with 95% probability which pole type has higher or smaller environmental impacts.[7]
- Extending the lifetime of a product is an effective way to reduce green-house gas emissions.[8]
- The greatest embodied carbon impact of concrete is in the production stage and new technologies are being developed to try to reduce these emissions (e.g., low carbon concrete mixes, incorporating recycled materials, green energy).

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[1] Life cycle assessment of the environmental influence of wooden and concrete utility poles based on service lifetime; Embodied carbon assessment using a dynamic climate model: Case-study comparison of a concrete, steel and timber building structure; The embodied carbon of mass timber and concrete buildings in Australia: An uncertainty analysis

[2] Recent Australian wildfires made worse by logging and associated forest management

[3] The embodied carbon of mass timber and concrete buildings in Australia: An uncertainty analysis; Embodied carbon assessment using a dynamic climate model: Case-study comparison of a concrete, steel and timber building structure; Emissions Omissions

[4] Greenhouse Gas Emissions Embodied in Reinforced Concrete and Timber Railway Sleepers; Life Cycle Cost and Assessment of Alternative of Railway Sleeper Materials (2022)

[5] Emissions Omissions

[6] Life cycle assessment of the environmental influence of wooden and concrete utility poles based on service lifetime; Environmental and economic assessment of utility poles using life cycle approach

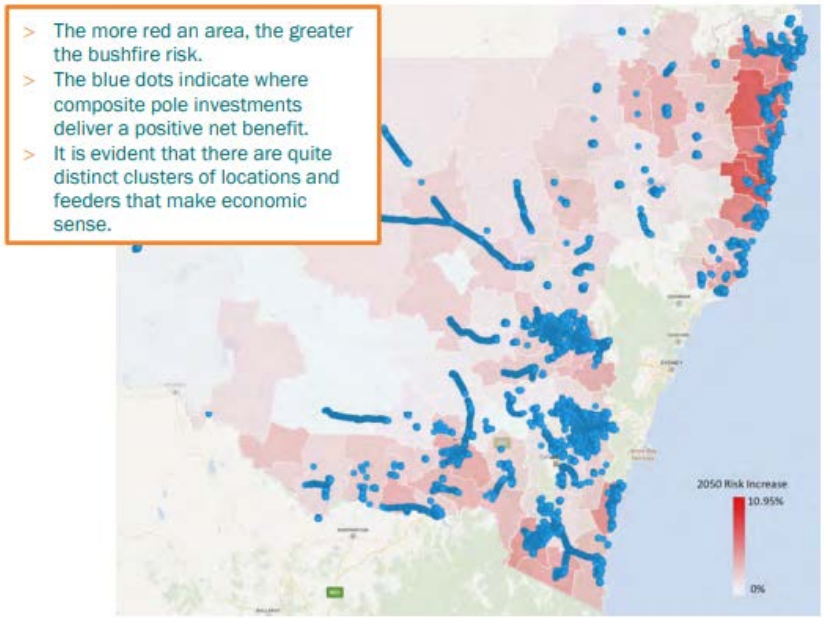
[7] Life cycle assessment of the environmental influence of wooden and concrete utility poles based on service lifetime

[8] Life cycle assessment of the environmental influence of wooden and concrete utility poles based on service lifetime; Emissions Omissions

- Similarly, innovations in low carbon transport may reduce the emissions associated with concrete utility pole transport.

Case study: Essential Energy's proposal to replace timber poles for composite poles

- Essential Energy has set out a proposal to invest $138 million between 2024-29 to replace ~11,000 existing timber poles for composite poles in its 2024-2029 Regulatory Proposal to the Australian Energy Regulator (AER).[9] The composite poles will be constructed from glass fibre, fire-retardant resin with a UV and fire-retardant coating.
- The regulatory proposal outlines that the main reasons for switching to composite poles include:
    - Improving resilience to future risks caused by extreme weather events and climate change. Composite poles will be fireproof and immune to rot, termites and corrosion.
    - Long-term economic benefits, as composite poles having a longer technical life and less expensive maintenance costs. The diagram below, taken from the regulatory proposal, outlines locations where composite pole replacements are economically viable.
    - Improved safety for workers and the community.
- The AER has a role in ensuring that regulated entities like Essential Energy are recovering efficient costs from consumers by reviewing these entities' regulatory proposals and determining their maximum allowable revenue to be recovered.
- The AER made a final determination on 30 April 2024 on Essential Energy's 2024-2029 Regulatory Proposal, in which it acknowledged the high quality of the proposal and found that the expenditure proposed is likely to deliver efficient outcomes in the long-term interests of consumers.[10]
    - Specifically, the AER scrutinised Essential Energy's replacement expenditure model and conducted its own stakeholder consultation on the costs. The final determination raised no concerns about the replacement costs being inefficient or excessive.



[9] https://www.aer.gov.au/system/files/Essential%20Energy%20-%202024-29%20Regulatory%20Proposal%20-%20Jan23%20-%20Public.pdf
[10] https://www.aer.gov.au/system/files/2024-04/AER%20-%20Final%20Decision%20-%20Overview%20-%20Essential%20Energy%20-%202024%E2%80%9329%20Distribution%20revenue%20proposal%20-%20April%202024.pdf