



Discussion: A framework for decarbonisation for bridge owners, engineers and designers

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This is a discussion piece on Duguid B, Archer-Jones C, Hendy C *et al.* (2024) A framework for decarbonisation for bridge owners, engineers and designers. *Proceedings of the Institution of Civil Engineers – Bridge Engineering*, <https://doi.org/10.1680/jbren.23.00031>.

The authors of the paper under discussion (Duguid *et al.*, 2024), on behalf of the Net Zero Bridges Group (NZBG), make some excellent points with regard to bridge specialists concerned with lowering the carbon dioxide footprint of their work as well as developing best practice for future use in the specific domain of bridges.

The abstract alludes to this, without developing the theme of reusing, repurposing and strengthening existing bridge structures in lieu of demolition and replacement. The paper does progress this, although not as extensively as expected.

The context developed in the paper applies across the built environment and states that, while buildings are to an extent leading the way, this suggests that bridges are to catch up with other elements of civil and structural engineering also required to do so.

In the section on Avoid overlapping with Switch and indeed Improve, I would suggest that a piece in the appropriate client standards on the following is added.

- Undertaking archive searches for existing drawings, photos and other records such as ground data is a precursor to the concept design/Approval in Principle stage of bridge design and assessment, with sufficient time included for this at this stage.
- The inclusion of instrumentation and monitoring during the construction phase, with some retained or indeed supplementary instruments retained for structural health monitoring for those bridges over water, over rail and in areas ringfenced for future underground/tunnelling is adopted within the Approval in Principle writing phase.
- Adopting the results of structural investigation with regard confirmation of built foundations, especially where abutments are piled and such records have been lost, adding cost and complexity in the reuse and/or strengthening of the abutment

and preventing development of such schemes as redecking on retaining existing abutments as opposed to wholesale replacement.

- Making available for review, not just the extended supply chain information on construction-phase embodied carbon data that is to be adopted by the NZBG initiative, but also contractor design elements such as pile design, temporary works left in the ground and other subcontractor design bridge elements associated with launching provision across water/rail routes.

This would assist in changing carbon dioxide outcomes and change the current limited progress in decarbonisation suggested in the paper.

Clearly, this could apply to other structures and this contributor is part of a similar initiative launched by The British Tunnelling Society on 19 September 2024, with regard to tunnel structures, known as the Net Zero Tunnelling Group. This has been inspired by the NZBG and a recent publication from the International Tunnelling Association with regard to tunnel linings (ITA, 2024).

*A response to this discussion can be found at Duguid B, Archer-Jones C, Hendy C et al. (2025) Response to discussion: A framework for decarbonisation for bridge owners, engineers and designers. *Proceedings of the Institution of Civil Engineers – Bridge Engineering*, <https://doi.org/10.1680/jbren.24.00998>.*

REFERENCES

- Duguid B, Archer-Jones C, Hendy C *et al.* (2024) A framework for decarbonisation for bridge owners, engineers and designers. *Proceedings of the Institution of Civil Engineers – Bridge Engineering*, <https://doi.org/10.1680/jbren.23.00031>.
- Duguid B, Archer-Jones C, Hendy C *et al.* (2025) Response to discussion: A framework for decarbonisation for bridge owners, engineers and designers. *Proceedings of the Institution of Civil Engineers – Bridge Engineering*, <https://doi.org/10.1680/jbren.24.00998>.
- ITA (ITAtch AG Excavation) (2024) *Low Carbon Concrete Tunnel Linings*. ITA Report No 35.
- The British Tunnelling Society (2024) *Net Zero Tunnelling Group*. See <https://britishtunnelling.com/nztg/net-zero-tunnelling-group> (accessed 20/02/2025).