

Putting the net-zero hierarchy into practice

Specify low-impact

Conor Hayes expands this series of guidance summaries to move beyond the levels of 'Use less stuff' to the next step in the hierarchy: specifying low-impact materials.

Once a structural engineer has worked through the strategic 'Use less stuff' levels of the net-zero hierarchy, the next rung comes into view: specifying low-impact. Engineers specify enormous amounts of material and carbon every day and there are huge opportunities available to make an immediate difference.

Key to this are measurement and setting targets. *How to calculate embodied carbon*¹ is at the centre of a plethora of IStructE-produced guidance. Laidler² describes how a small practice has integrated embodied carbon into routine design. Embodied carbon targets for your structure should be set with the client and project team, considering local and global whole-life carbon frameworks and tracked through construction. Arnold *et al.*³ propose the use of a Structural Carbon Rating Scheme (SCORS), while Moynihan⁴ suggests actions which engineers can take now to achieve a SCORS A rating.

SEE ALSO

- | Halliwell E. (2024) 'Putting the net-zero hierarchy into practice: Build nothing', *The Structural Engineer*, 102 (1), pp. 10–11; <https://doi.org/10.56330/WSKW8501>
- | Hayes C. (2024) 'Putting the net-zero hierarchy into practice: Build less', *The Structural Engineer*, 102 (2), pp. 18–19; <https://doi.org/10.56330/MGEK3688>
- | Halliwell E. (2024) 'Putting the net-zero hierarchy into practice: Build clever', *The Structural Engineer*, 102 (3), pp. 10–11; <https://doi.org/10.56330/WZIY7163>
- | Moynihan M. (2024) 'Putting the net-zero hierarchy into practice: Build efficiently', *The Structural Engineer*, 102 (11), pp. 10–11; <https://doi.org/10.56330/GSRU2454>
- | Halliwell E. (2025) 'Putting the net-zero hierarchy into practice: Minimise waste', *The Structural Engineer*, 103 (5), pp. 12–13; <https://doi.org/10.56330/ESMS7117>

When it comes to the world's most used construction material, concrete, Astle⁵ notes that 'most of the embodied carbon is associated with the cement, followed by the steel reinforcement' so this is where we 'should focus our attention'. Burrige⁶ offers practical guidance on specifying lower-carbon concrete by specifying performance and allowing lower-carbon options rather than prescribing mix constituents. This includes: i) reducing the use of CEM1 by allowing additions, ii) avoiding small aggregate maximum values (<20mm), iii) careful specification of concrete strength (and exposure class!), iv) considering specifying 56- or 90-day strengths and v) allowing the use of admixtures. The Concrete Centre⁷ explores this approach in further depth.

Hayes, Munro and Banfi⁸ set out practical tips for specifying steel. These include immediate measures

KEY REFERENCES

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- 2) Laidler P. (2021) 'Measuring carbon – a small practice perspective', *The Structural Engineer*, 99 (9), pp. 14–18; <https://doi.org/10.56330/IRFX7299>
- 3) Arnold W., Cook M., Cox D., Gibbons O. and Orr J. (2020) 'Setting carbon targets: an introduction to the proposed SCORS rating scheme', *The Structural Engineer*, 98 (10), pp. 8–12; <https://doi.org/10.56330/SQDI8782>
- 4) Moynihan M. (2022) 'How to achieve a SCORS A rating using current materials and technology', *The Structural Engineer*, 100 (5), pp. 14–15; <https://doi.org/10.56330/FOKT1997>
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- 7) MPA The Concrete Centre (2020) *Specifying sustainable concrete* [Online] Available at: www.concretecentre.com/Publications-Software/Publications/Specifying-Sustainable-Concrete.aspx (Accessed: November 2025)
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- 13) Emanuel O. (2022) 'Making the most of timber – specialist skills for a complex material', *The Structural Engineer*, 100 (1), pp. 38–39; <https://doi.org/10.56330/AFJF1805>
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around design, carbon reporting and specification approaches, but also facilitating future deconstruction. Simple considerations include minimising the use of paint and coatings, avoiding making temporary works permanent and not over-rationalising element sizes and connection forces. The fabricator can rationalise at a later stage, with the engineer's agreement, if necessary. Useful guidance and resources are provided by the Steel Construction Institute⁹. Delivering on 'steel's circular economy potential' via steel element reuse may offer significant carbon savings. Leversha *et al.*¹⁰ offer the perspectives of a contractor, steel producer, fabricator, engineer and client to a structural engineer embarking down this path.

Hawkins¹¹ discusses uncertainties around carbon sequestration within timber. He notes that for potential embodied carbon benefits to be realised, timber must be sustainably sourced and verified with sustainability

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certification schemes. Timber Development UK¹² provides guidance on this and other sustainability topics. The detailed design for timber is often carried out by the manufacturer and Emanuel¹³ highlights the importance of 'a collaborative early workflow' to benefit from the expertise of the timber contractor's in-house engineering teams before tender designs are produced.

We can expect a greater use of newer materials and systems. By definition, the construction industry has had less experience in these and

there exists less specific guidance on how to best specify them for tender and construction. The IStructE webinar series 'Novel materials and methods to achieve net zero'¹⁴ is a good place to begin. Among other topics, it addresses rammed earth, straw bale, fibre-reinforced polymers, timber-concrete composites and the process of bringing novel materials from research into construction.

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