

Review

This collection of 20 academic papers covering a wide range of case studies and countries will be of use to researchers delving into embodied carbon in the built environment, writes **Will Arnold**.

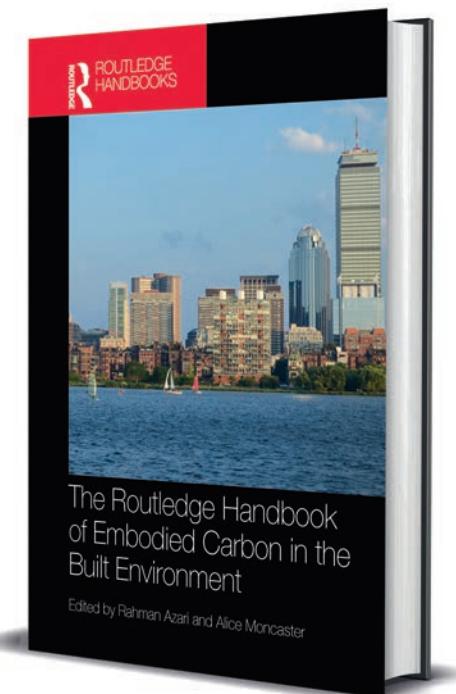
The Routledge handbook of embodied carbon in the built environment

Editors: Rahman Azari and Alice Moncaster

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THIS BOOK IS AIMED PRIMARILY

at academics in engineering, architecture and planning, seeking to deepen their understanding of embodied carbon issues. Although potentially also useful for some engineers and designers, its academic depth and overall length may be offputting. At 450 pages, I'm not sure 'handbook' is the right word.

The publication compiles 20 academic papers by leading researchers, covering a range of interrelated topics, including political aspects of embodied carbon, global regulations and strategies for carbon reduction in design. Divided into five sections, it addresses key issues of debate (e.g. thermal mass), global policies, and considerations at planning, building and material scales. The papers are standalone, and so can be read in any order. I read the whole tome cover to cover, but I would expect that most readers would select papers most relevant to their work.

Certain papers stood out to me more than others. I was particularly drawn in by the paper, *Minimising embodied carbon: A question of politics, not percentages*, which shed light on the failure to incorporate embodied carbon in UK legislation despite two decades of recommendations. The author quotes a 2007 report, written for the relevant government department, as stating quite clearly, 'the embodied energy of materials should be made part of building regulations', a sentence that is sadly still being echoed today.

Papers such as *Embodied decarbonization in North America: a paradigm shift* and *Embodied carbon in building regulation – development and implementation in Finland, Sweden and Denmark* discuss exactly what you would expect, providing an overview of the differences in approaches being taken by the named countries. One paper investigates the embodied carbon emissions for the whole of Switzerland – spoiler: the authors conclude that the country is 'spending

around four times the remaining 1.5°C budget'. Sobering stuff.

Quality varies between papers, as you might expect across 20 groups of authors. For instance, one paper delved into low-carbon design interventions, but gave equal weight to trivial matters like the inclusion of wood shavings in concrete mixes, as it did to the reuse of entire building structures. Another, *Quantifying the sunk carbon costs of cities* made a slightly confusing argument around using an understanding of historical emissions that may have occurred in order to argue against demolition, while overlooking the importance of the whole-life carbon emissions of whatever would replace them.

Sunk-cost fallacies and upside-down hierarchies aside, most papers offer compelling arguments and insights. There are a couple of real gems inside, including a paper arguing for a more systemic approach to tackling the world's housing crises, a quaint case study around the creation of three windows through time, and a fascinating exploration of the metric 'emergy' (with an 'm') as a proxy for broader environmental impact.

This book will surely be of use to researchers investigating the knotty details of embodied carbon, as a library of useful references if nothing else. However, for newcomers to the subject, or designers who are short on time, more accessible starting points are available.

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Will is a Fellow and staff member of the Institution of Structural Engineers, and is both a chartered structural engineer and chartered environmentalist. In his role at IStructE, Will is responsible for embedding climate action into all aspects of the Institution's work. He is well-known for his work on embodied carbon policy in the UK, including on Part Z and the UK Net Zero Carbon Buildings Standard.