Editorial

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My last editorial was written during a pandemic lockdown, but now, with vaccines getting pumped into arms around the world, things are returning to normal. And I'm not at all convinced that's a good thing. Governments are trying to get economies moving again and, on the surface, that's great: shops can reopen, people can work. But our economies are based on consumption and are measured by throughput rather than impact. As a result, a lot of investment will go into projects with high carbon dioxide and environmental impacts. How much of America's US\$1 trillion infrastructure package, for example, will result in additional emissions rather than the reverse?

It's not all about emissions though, it's also about materials. To build things, we first extract raw materials from the natural world, damaging ecosystems. Processing and manufacture create carbon dioxide emissions and pollution. Disposal at end-of-life creates yet more problems. Entropy is added all along the value chain. Reducing this entropy, by using materials more efficiently and reducing waste, is the focus of this issue.

We start with improving materials, in this case using biocementation to improve the strength and durability of concrete. Bhutange *et al.* (2021) discuss the use of mixed cultures of bacteria and other low-cost components to improve the economics of the process.

Our second paper, by Ding *et al.* (2021), looks at the end-of-life of materials, assuming a traditional, linear approach whereby we buy materials, we use them, then we dispose of them. In construction, of course, we like to think we build to last, but there's still an awful lot of waste generated during the build, from packaging to offcuts. In this paper, a new hybrid simulation model for analysing construction waste management is used and overall cost savings are identified where lean construction and other policy instruments are applied.

A circular economy model is, of course, preferable to a linear one. The first step is to reuse materials or products and then to refurbish them. Shi *et al.* (2021) have studied maintenance of bridges in China, particularly the life-cycle impacts of carbon-fibre reinforcing plates versus those of reinforcing fabrics. The study finds plates have lower life-cycle costs, especially as load factors and environmental conditions deteriorate.

This study also highlights, albeit unintentionally, the problem of discount rates when talking about environmental issues. By valuing environmental damage in monetary terms and then assessing the costs to treat that damage over time, higher discount

rates show a decrease in future cost. The impact on nature, of course, does not decrease. If anything, it increases as we make natural systems less and less resilient. It's high time our financial analyses reflected this simple reality.

The circular economy, specifically in construction, is covered in some depth in our final paper, by Medina and Fu (2021). They study the feasibility of implementing circular economy practices in construction and present a new framework for improving circularity. A move towards circularity is desperately needed, especially in the construction sector, given the scale of material used. Ultimately, though, circularity can only take us so far. We need to decouple our economies from resource consumption but, as long as economic growth is seen as desirable, that fundamentally can't happen. We can move towards a knowledge economy but, as Herman Daly says, you can't eat a recipe (Daly, 1996: p. 28).

Nonetheless, as professionals we have a responsibility to do whatever we can to improve the situation. It may not be perfect, but it's better than the status quo. We need to question why we do things the way we do and ask if there is a better way. Often, the answer comes down to money: doing something differently, if not thought through, can be more expensive. But such conclusions overlook the costs not included in the calculus that, if they were, would flip the equation around. So challenge! Find better ways. The papers presented this month are a great start, but there is more we can all do.

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