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Editorial

Engineering Sustainability

Editorial

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This issue of *Engineering Sustainability* brings together three articles that explore environmental sustainability and carbon reduction from complementary perspectives: organisation, built environment and public policy.

In their systemic review of ISO 14001, Horry *et al*. (2024) identify the benefits and barriers to engineering and construction organisations adopting the global standard for environmental management systems – ISO 14001 – which support organisations in improving their sustainability. Reading through the lists of benefits and barriers reminds me of the future scenarios created by the Global Scenarios Group and adapted by Rogers *et al*. (2012). Four possible future worlds are envisioned, one of which is 'Market Forces', where the economic market dominates. In such a world I see some of the identified benefits of ISO 14001 living comfortably: 'Enrichment of corporate and public image' (the no. 1 identified benefit by far), 'cost savings' and 'long-term competitive advantage'. In the world of 'Policy Reform' another benefit sits, 'compliance with regulations', because in this world policy and regulation push society to be more sustainable. However, the world many of us aspire to bring into reality is 'new sustainability paradigm', where populations voluntarily act for the benefit of the planet. It is here that the benefit of 'improved environmental performance' aligns. I might have lost hope at the paucity of altruistic benefits identified in the literature had the authors not noted that papers published from 2011 onwards showed increasing mentions of 'sustainability' as a benefit to adoption of ISO 14001. This is, perhaps, no coincidence as it is at about this time that the impacts of climate change became increasingly visible to the general population.

Today climate change is inspiring sustainability initiatives across the globe. In the UK this is embodied in our Net Zero legislation (for the country to be net zero carbon emissions by 2050). Low-carbon energy is a crucial part of achieving carbon reduction targets at every geographical scale. Kon *et al*. (2024) worked at the building scale using the Taguchi method to test the energy demand impact of three building design characteristics on power plant carbon emissions. The three characteristics are (1) insulation; (2) whether the building stood alone, was surrounded by trees or adjoined another building; and (3) window glazing type. This paper demonstrates the potential of context-specific design and underlines the geographical mismatch between energy demand and the pollutant emissions at the serving power plants, which may be located many miles away. The authors provide specific combinations for the highest reduction in carbon, achieving an impressive 50% reduction of which any ISO 14001 compliant organisations would be proud. The authors also quantify the impact based upon the type of powerplant generating the energy. Spoiler alert, coal is the worst offender. There may, of course, be a break point below which there are no carbon savings – a minimum pollutant emission for any given power plant. Certainly there will be trade-offs to be made, such as where the carbon return on investment of the insulation, surrounds and windows cannot be outweighed by the power plant's carbon savings. This paper adds to an increasing library of studies that take a systems approach and provide the evidence needed to give decision-makers the confidence to make the changes that will reduce carbon emissions.

Change of this sort can take a long time. Building stock is slow to be renewed and replaced, posing a constant challenge in the world's fight to reduce the impacts of climate change. Shocks such as natural disasters can accelerate the rate of change, but not always for the better. Often devastated places are rebuilt with speed and safety, not sustainability and carbon, as priorities. In late 2019 Covid-19 began its devastating sweep across the globe. Covid-19 (coronavirus disease) was (and still is) an infectious disease caused by the SARS-CoV-2 virus. Its toll on human life is equivalent to that of many multiples of natural disasters, but, unlike natural disasters, its core disruptive impact (characterised by lockdowns and distancing restrictions) extended over months, not days, minutes or seconds. This crucial difference has illuminated the power of coordinated public policy, has fundamentally changed our everyday lives, and has quickly brought about a 'new normal'. Nadimi *et al*. (2024) have looked at the impacts of the pandemic on public transportation system costs and revenues, air quality and traffic accidents in Tehran, Iran. In Tehran, as elsewhere across the world, there was a shift away from public transportation as people avoided personal contact to reduce their chance of infection. Lockdowns enforced periods of highly restricted movement of people. In this context, many governments used the pandemic as an opportunity to promote reduced, sustainable and low-carbon travel to their populations – not only to reduce transmission, but to reduce carbon emissions. However, this was not the case in Iran. This study shows that, as a result, Covid-19 actually reduced Tehran's transport sustainability. For me the question is, how did it fare elsewhere? The authors point out that income level is a contributing factor, with affluence associated with being able to choose to travel in less sustainable ways (such as by private vehicle). Globally, decisions to combat the pandemic were sometimes contrary to sustainability goals and carbon targets. In these cases, the duration of the pandemic may actually make this a harder shock from which to sustainably recover in the long run.

I hope you enjoy reading the articles in this issue. Don't forget that you can find current and past issues of Engineering Sustainability in the ICE Virtual Library. We also publish recent articles on our homepage as Ahead of Print.

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