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## Editorial

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## Editorial

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Every so often, editorial panels for the *Proceedings of the Institution of Civil Engineers* seek to publish papers on topical issues in themed editions of the Proceedings. This edition of *Engineering Sustainability* is one such publication, and ‘Smart cities’ is the topic. I was invited as guest editor and am honoured to be able to introduce this issue.

So what is a ‘smart city’? The British Standards Institution defines a ‘smart city’ as involving the ‘effective integration of physical, digital and human systems in the built environment to deliver a sustainable, prosperous and inclusive future for its citizens’ (BSI, 2014: p. 12), and this issue contains five excellent papers touching upon these subjects.

It is heartening to read about how ingenuity is being actively applied to the sustainable development of cities. This is all the more important in a world of change – climate change, rapid population growth and mass migration to cities. For society to prosper in the long term, engineers need to respect the 17 United Nations (UN) Sustainable Development Goals (SDGs) and the Paris 2016 Climate Change Agreement. These point the way to reducing greenhouse gas (GHG) emissions and a (desperately needed) sustainable future, and we as engineers need quickly to adapt our practices to deliver what these goals aspire to – in both the ‘construction’ and ‘operating’ phases of city infrastructure – indeed throughout the whole life cycle.

Thinking about future generations and how various research papers tell us that we are likely heading for the globe’s sixth mass extinction event (e.g. McCallum, 2015), society desperately needs this ingenuity.

The first paper in this issue (Siew, 2018) is about an index, the ‘Green Township Index’ (GTI), as is under development in Malaysia. The GTI aims to measure ‘people, planet and prosperity’ at city scale and proposes awards based upon assessed scores in these three areas. While it initially looks at the sustainability of existing townships, it is hoped that it can guide the planning of new towns. The development of the GTI has included a review of other indices. The initiative has promise for long-term strategists, to benchmark and drive sustainability and can be used to demonstrate commitment towards the UN’s goals.

The next paper, ‘Scenario analysis of embodied greenhouse gas emissions in UK construction’ (Giesekam *et al.*, 2018), is directly relevant to the Paris Agreement, as reductions in GHG emissions are driven by national emissions targets declared as part of the Paris process. The paper examines GHG reductions in embodied emissions in buildings and infrastructure and provides a way to develop reduction targets at project level. Interestingly, its analyses suggest that sector reduction targets are unlikely to be met, lending weight to the notion that engineers need urgently to adapt their practices.

Adapting engineering practices looks like it might be helped by the third paper, which tackles the sustainability of concrete production (Suresh and Karthikeyan, 2018). This advocates, among others, a marked reduction of embedded carbon dioxide in the production of concrete. ‘Performance enhancement of green concrete’ describes research into making sustainable concrete and explores the feasibility of replacing all the traditional materials in concrete production with industrial inorganic polymeric residual waste. The result, geopolymers concrete (GPC), has the potential to reduce substantially the GHG emissions associated with concrete (usually in the manufacture of Portland cement). GPCs could make a significant contribution to smart cities’ sustainability.

Our penultimate paper brings a different angle – and includes studies on the social aspects associated with the use of big data in the development of smart transport in the UK city Milton Keynes (Valdez *et al.*, 2018). The paper describes how citizens are concerned about passive intrusive surveillance (on personal movement, for example) as can be used to help manage traffic flows. Citizens perceive the benefits accruing not to themselves but to industrial and governmental players. The paper describes how this ‘distrust’ can be ameliorated by having citizens play an active part in providing transport data, but this is only likely where the citizen recognises the benefits. This is an important contribution to the discussion on how, and what, data are collected and the rights and needs and willingness of citizens to participate. A truly smart city will rely upon technology, much data and many data sources, but the social aspects are key factors that need recognition.

Finally, ‘To dig or not to dig? Place and perception in subsurface housing’ (Tkachenko *et al.*, 2018) takes a look at assessing public opinions on urban planning using web-based tools and makes use of

underground development in urban locations as a case study. This paper tested web-based tools and suggests these offer a screening approach to target planning issues requiring more in-depth analyses or studies by way of forums or focus groups.

This themed issue of *Engineering Sustainability* gives some excellent insight into the engineering, planning, social and environmental issues regarding smart cities. The papers respond well to the UN SDGs and the 2016 Paris Agreement, and my hope is that they will help to inspire others to develop a better awareness of the challenges of the future and to enact – engineer – a sustainable future for cities and the society that uses them. Smart cities are often thought of as things of the future; I think they should be today's norm.

I would like to finish by thanking those responsible for sharing their experience and knowledge by preparing the papers and those that helped to review them. I hope you found this issue interesting and may I encourage you to consider whether you might wish to share your own experiences in a similar way in this or other ICE journals?

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