Editorial

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Carbon in its many forms is vital to human life. Life exists in the universe only because the carbon atom possesses certain exceptional properties. Whilst carbon is so essential to life, our relationship with certain types of carbon, how we produce it and what we do with it, has caused problems for mankind for a very long time. As an example, in the UK a number of historical instances exist of legislation being enacted in order to mitigate the effects of burning coal.

Today the production of man-made greenhouse gases and their consequent effects on the climate have become the subject of controversy and intense debate. We have become familiar with terms such as carbon-critical design, low carbon, embodied carbon and carbon footprint. By these, what we really mean is carbon dioxide and equivalent greenhouse gas emissions or carbon dioxide equivalents.

In most cases carbon dioxide equivalent is intended to represent the amount of greenhouse gas added to the atmosphere by burning fossilized carbon compounds (e.g. coal, oil and gas) for electricity, transport and heating. As we know, not all carbon is bad. Graphite, carbon fibre, limestone and timber are all frequently used in construction and are atmospherically benign materials. Our primary concern therefore, should not be with carbon as such, but with those man-made compounds that have the effect of inducing climate change and the potentially serious consequences that accompany it.

The fourth Intergovernmental Panel on Climate Change (IPCC) Assessment Report drew attention to the consequences of climate change (IPCC, 2007). It was intended that the United Nations conference on climate change in Copenhagen in 2009 would reach a global agreement on carbon emissions, which would have had an impact on the design of civil engineering structures. That did not happen, but the UK, through the Climate Change Act 2008 (2008) produced as a result of the Kyoto protocol of 1997, has made a commitment to reduce carbon emissions. As a result, the concept of low or zero carbon design and construction is now being developed, starting with zero carbon homes by 2016 and other zero carbon buildings by 2019 (DCLG, 2008).

In 2010 the UK government began consulting on their commitment to build all new homes and non domestic

buildings to a zero carbon standard. The report on low carbon construction by the BIS Innovation and Growth team set out 65 recommendations to the British government which identified the issues that needed to be addressed in delivering a low carbon construction economy (HMG, 2010).

Clearly much work still needs to be done to reduce the potential impact on the climate which is caused by construction and production processes. The role of *Municipal Engineer* is therefore critical not only in moderating the generation of man-made greenhouse gases but also in dealing with the consequences of climate change. For this reason this themed issue of the journal focuses on climate-critical design.

The first briefing (Coackley, 2011) looks at climate-critical design as it affects the municipal engineer. The author draws attention to the particular concerns of individual countries and identifies a wide range of issues and areas where further work and research are necessary.

The briefing by Goodson (2011) brings us up to date with the development of sustainable drainage systems (Suds). Goodson highlights the increasing importance of Suds and the need for planning and flood management authorities to ensure they are able to deal adequately with Suds in relation to new development and flood risk. The final briefing (Jenkinson, 2011) draws attention to the UK Department for Transport's new local authority carbon tool. This is a method by which the carbon dioxide emissions of different transportation policy options can be assessed.

The first of the papers (Collier, 2011) considers the role of micro-climate in urban regeneration planning. It draws attention to the effect of the industrial revolution on the UK which was accompanied by the rapid development of large urban areas. The paper considers the effects of subsequent regeneration over the past 50 years and explores how these changes may have impacted on local weather and air quality.

The next paper (Chanan *et al.*, 2011) is particularly relevant because some of the worst floods in living memory have recently occurred in Australia. It deals with the challenges of managing coastal areas in Australia which are affected by the

consequences of climate change. The author considers the impact of climate change on an urbanised coastal council where there is a risk of flooding due to more intense rainfall, coupled with rising sea levels.

The third paper (dell'Olio, 2011) gives consideration to the implementation of bike-sharing schemes. Many cities are trying to find ways of reducing car usage and with the acceptance of the bicycle as an alternative to the car, bicycle-sharing schemes are now a reality in many European cities. The paper proposes a complete methodology for the introduction of bike-sharing schemes, considering potential demand and willingness to pay together with location of docking stations.

The next paper details how the Portuguese government conceived a nationwide plan for the co-incineration of hazardous industrial waste in two existing cement plants located near the cities of Coimbra and Setúbal (Almeida and Coutinho-Rodrigues, 2011). The paper goes on to explain that the populations of both cities demonstrated a strong opposition to the incineration of hazardous substances so close to their urban centres.

The paper by Mannall and Chinn (2011), deals with the outcome and implementation of the long-term strategy drawn up by the Greater Manchester Waste Disposal Authority in 2002. The strategy included plans for improving recycling rates, providing waste processing and achieving resource and energy recovery. It recognised the imperative to reduce the disposal of biodegradable waste to landfill and thereby reduce both greenhouse gas emissions and the carbon footprint that would otherwise arise from the conventional disposal of municipal waste. The paper explains the background to the Greater Manchester PFI waste project in which bidders developed technical solutions based on the principles of sustainability and partnership.

In the final paper Omoregie and Ehiorobo (2011) examine the sometimes difficult issues surrounding culture in sustainable infrastructure. The authors argue that there is a high failure rate of infrastructures around the world constraining economic growth and development. They consider the difficulty in maintaining sustainable infrastructures, particularly in sub-Saharan Africa. The paper details a survey covering the six geopolitical zones in Nigeria and identifies major factors responsible for unsustainable infrastructure delivery and failures.

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