

Editorial

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Welcome to the November 2018 issue of *Civil Engineering*. It follows up on last month's Global Engineering Congress – which the Institution of Civil Engineers (ICE) hosted in London as part of its 200th anniversary celebrations – with a suite of papers on globally important issues.

Jensen *et al.* (2018) start by offering a valuable insight into the development of electricity generation from offshore wind in Europe, demonstrating how societal and government issues have provided an environment in which Denmark has created a successful industry over the past 25 years.

The paper describes relevant elements of the political and social environment which fostered an initial interest in wind power – and how the Danish government's relatively small but long-term support encouraged a growing wave of enthusiasm and investment. This approach could be replicated by visionary governments elsewhere in the world and in a variety of sectors. The paper also discusses the evolution of differing offshore foundation techniques, dependent on water depth and seabed conditions.

Back on shore, the world continues to experience extreme natural events – not least tsunamis, which have recently been the cause of enormous loss of life. In 2011 a tsunami affected some 650 km of Japanese coastline, triggering a crisis at the Fukushima nuclear power plant and causing the loss of thousands of lives.

Macabuag *et al.* (2018) review the structural failure mechanisms following such events and contrasts the US and Japanese tsunami design guidance for critical infrastructure and evacuation structures. The 2016 US code includes the world's first tsunami design standard written in mandatory language. Some other countries are developing codes based on this, but Europe – where there is precedent for large tsunamis – is not.

The authors also discuss field observations made following the 2011 tsunami and design conditions not covered by standards. They regard the precedent for large tsunamis as a significant risk to some of Europe's coasts and highlight the need to develop codes of practice for critical infrastructure in places at risk.

Next, we go underground, where great advances have been made in global tunnelling techniques over recent years. Knowledge of ground conditions is also key to design and affordability, but is usually interpolated from vertical borehole data. However, horizontal directional coring can give a continuous sample along the proposed tunnel trajectory.

Boden *et al.* (2018) review the technique's use in Hong Kong over the past decade, where it has been successfully used to identify ground conditions continuously along the alignment in mountainous topography. It has been particularly useful in accurately identifying problem areas, such as faulting, ensuring appropriate design and construction techniques can be adopted from the outset.

As the cost of horizontal directional boreholes is several times more than conventional vertical boreholes, they should ideally be used once the alignment of the tunnel is reasonably defined and areas of concern have been identified. Some 15 km of directional cores have been drilled over the past decade in Hong Kong, confirming the reliability and value of the technique.

Finally, back on the surface, many European cities responded to the housing crisis following World War II by building vast estates of prefabricated medium-rise social housing. Often poorly designed, they were intended to be temporary – but many remain in use and are a source of increasing social problems. Wealthier cities have relocated residents and completely replaced the estates, but for many smaller cities this is not an option.

Linov and Ivanov (2018) report on an affordable solution being adopted on a large estate of five-storey blocks in Russia. A private developer is adding between two and four additional storeys and improving the existing stock at minimal cost to the public purse – and without the need for wholesale disruption of the existing community. Avoiding the social and physical cost of relocating communities is shown to give a positive return to the developer.

I hope you enjoy these excellent papers. I trust too they encourage you and your colleagues to share your own experiences of helping to solve the world's global challenges through civil engineering.

References

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