Editorial

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When Dr John Holdren, Scientific Advisor to President Barack Obama, gave the Grantham Institute for Climate Change Lecture in 2012, he characterised the three responses available to climate change, as ‘mitigation, adaptation and suffering’. He went on to say ‘What we need is enough mitigation to avoid unmanageable climate change and enough adaptation to manage the climate change that is now unavoidable.’

Nowadays, adaptation projects are in the news; from coastal protection to flood prevention to more effective surface water drainage that reduces landslides (for the latter, see Holcombe *et al.* (2016)).

This issue of *Engineering Sustainability* restores the balance a little with five papers that, from very different perspectives, explore how we can mitigate climate change by reducing emissions. The first two are strategic in nature, the second two consider two very specific practical situations and the final one is a critical appraisal of a low-impact treatment method for soil stabilisation.

In the first paper, Saxe *et al.* (2016) from the University of Cambridge, UK highlight the lack of emissions accounting on rail infrastructure projects to date. At a time when the UK is expanding Crossrail and contemplating High Speed 2 (and High Speed 3), they provide a timely reminder of the importance of putting into place a reporting infrastructure that will allow us to assess the net greenhouse gas (GHG) impacts of these projects. They review the research to date in relation to the emissions impacts of rail projects and make the case for acquiring construction, ridership and land use change data on current projects to inform future work. This paper provides an excellent starting point for anyone contemplating the scope of a lifecycle GHG assessment for a transportation infrastructure project.

Vernay and Mulder (2016), meanwhile, use examples from Stockholm and Culemborg – the latter being a small town in the central part of the Netherlands – to illustrate the importance of technical or social ‘bridges’ in the delivery of sustainable gains requiring changes to more than one urban system. In one, the bridge was a distribution network provided by a commercial third party; in the other, the bridge was a group of committed local residents.

The case studies will resonate with anyone with experience of sustainable urban systems. In most cases, the technology is established and reliable. The skill is in achieving a rapprochement between the many stakeholders, whether through a third-party technology supplier or a purpose-built social entity.

Sakhare and Ralegoankar (2016) from the National Institute of Technology in Maharashtra, India set out to tackle the issue of heat gain on the top storey of buildings in hot climates; air conditioning accounts for some 31% of electricity usage in India. Building on previous research, they measured the impact of locally-sourced reflecting and insulating materials on the thermal performance of a full-scale prototype room in Nagpur. The resultant treated roof assembly is cheap, readily available and effective, reducing the room temperature by an average of 6°C.

As the previous owner of a conservatory, I was interested in the paper by Amaoke-Attah and B-Jahromi (2016) concerning the potential benefits of passive solar gain from such buildings. It’s a worthwhile endeavour, as according to the BRE (2013) in 2011, 18% of UK households had conservatories and of those 77% incorporated heating. The paper addresses some of the questions raised in the BRE report.

The authors found that without ‘comprehensive and effective passive solar design strategies’, conservatories can lead to an *increase* in household energy demand. This turns out to mean an appropriate orientation, aspect ratio, low-emissivity glazing, awnings, ventilation operating regime, provision of thermal mass and, crucially, no heating during the heating season.

With these parameters optimised, reductions of 11% are possible in the annual energy consumption of the house/conservatory combination. However, once we heat the conservatory, the gains are reversed. I gave away my conservatory (as a prelude to a well-insulated house extension) to a neighbour, who has re-erected it in their garden. So, at least it was sustainable in one respect.

Enzyme treatment is prospectively a low-impact method for soil stabilisation, utilising organic materials in lieu of traditional construction materials such as cement and lime. However, Khan *et al.* (2016) from the Universiti Kebangsaan Malaysia, Selangor were sceptical, as the readily available information on enzymes emanated almost exclusively from suppliers. In the best traditions of *Bad Science* (Goldacre, 2008), they set out to conduct an unbiased series of tests on the enzyme products available on the market.

Unfortunately, it transpired that enzyme treatment, at least in the case of the illite/black soil mixture that the team selected, is low impact in more ways than one. Despite there being a credible hypothesis for how enzymes might work, in the event no increase in unconfined compressive strength or in chemical composition

was observed. Papers like this, like their medical equivalents, tend not to be popular with journal editors as negative results are less newsworthy. However, the commercial pressures and the risks of getting it wrong are no different in our industry to those in big pharma. And so this paper deserves our attention.

REFERENCES

- Amaoke-Attah J and B-Jahroumi A (2016) Impact of conservatory as a passive solar design of UK dwellings. *Proceedings of the Institution of Civil Engineers – Engineering Sustainability* **169(5)**: 198–213, <http://dx.doi.org/10.1680/jensu.14.00040>.
- BRE (2013) *Energy Follow Up Survey 2011: Report 6: Conservatories*. BRE report number 287473. Department of Energy & Climate Change, London, UK.
- Holcombe EA, Beesley MEA, Vardanega PJ and Sorbie R (2016) Urbanisation and landslides: hazard drivers and better practices. *Proceedings of the Institution of Civil Engineers – Civil Engineering* **169(3)**: 137–144, <http://dx.doi.org/10.1680/jcien.15.00044>.
- Goldacre B (2008) *Bad Science*. HarperCollins, NY, USA.
- Khan TA, Taha MR, Firoozi AA and Firoozi AA (2016) Strength tests of enzyme-treated illite and black soil mixtures. *Proceedings of the Institution of Civil Engineers – Engineering Sustainability* **169(5)**: 214–222, <http://dx.doi.org/10.1680/jensu.15.00023>.
- Sakhare VV and Ralegaonkar RV (2016) Passive cooling of roof over composite climate in India. *Proceedings of the Institution of Civil Engineers – Engineering Sustainability* **169(5)**: 189–197, <http://dx.doi.org/10.1680/jensu.14.00049>.
- Saxe S, Casey G, Guthrie P, Soga K and Cruickshank H (2016) Greenhouse gas considerations in rail infrastructure in the UK. *Proceedings of the Institution of Civil Engineers – Engineering Sustainability* **169(5)**: 171–180, <http://dx.doi.org/10.1680/jensu.15.00015>.
- Vernay AL and Mulder KF (2016) Organising urban symbiosis projects. *Proceedings of the Institution of Civil Engineers – Engineering Sustainability* **169(5)**: 181–188, <http://dx.doi.org/10.1680/jensu.15.00010>.