Editorial

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I am writing this as the coronavirus pandemic ramps up alarmingly, pondering the similarities and differences with climate change. They are both global emergencies but, whilst climate change had much increased exposure during 2019, real and effective action is eclipsed by that being taken in response to the coronavirus outbreak. How can we achieve coordinated action at every level of society, from governments to individuals, to address climate change with the same vigour?

This journal encourages contributions that address energy production, storage and use in the context of a pathway towards net-zero greenhouse gas emissions in line with the 2015 Paris Agreement (Hammond, 2020). The papers in this issue do that well, relating to some of the biggest challenges that we must get to grips with urgently if we are to limit global temperature rise to well below 2°C. If we do not, the consequences may ultimately be far greater than from the present virus. Perhaps a lesson from the response to coronavirus is that drastic response is possible but damaging to economies. Considered and progressive action to address climate change can benefit economies because reducing carbon dioxide reduces cost, and through the growth of new technologies and industries.

Buildings present one of the biggest challenges for ‘decarbonisation’, accounting for up to 40% of carbon dioxide emissions, depending on region or data source. Progress is poor because of the genuine difficulty in dealing with a massive stock of buildings whose inadequate thermal performance is hard and expensive to fix; but fix them we must because many such buildings will be with us for a long time. The papers by O’Callaghan *et al.* (2020) and Rehman *et al.* (2020) address very different aspects. The first addresses the fundamental problem, how to improve energy efficiency, and the second suggests economic long-term heat storage. Both are important constituents of the broad mix of policy and action needed to overcome the challenges of this sector.

Irish homes use 7% more energy than the EU average, and emissions rose from 2014 to 2016. O’Callaghan *et al.* (2020) consider two groups of contributing factors: behavioural anomalies and overestimation of benefits in energy modelling. Behavioural anomalies include a lack of understanding of the complexities of energy efficiency leading to poor investment decisions. Modelling fails because of over-optimism, change in

human behaviour following improvements, inaccurate assumptions or poor installation. Additional policy measures might include carbon taxes, more stringent building regulations, or even the imposition of restrictions on use of energy – a drastic measure akin to banning public gatherings or closing bars and restaurants?

Thermochemical materials store heat by the chemical reactions of dehydrating and hydrating salt hydrates, with high storage density and negligible heat loss. Rehman *et al.* (2020) studied three salts: magnesium, zinc and iron sulfates. The first has been investigated previously for heat storage but has disadvantages. The authors undertook detailed analyses, concluding that zinc sulfate has the best properties – notably, low dehydration temperature and high hydration energy. Could it provide economic long-term, even seasonal, heat storage?

Umar *et al.* (2020) address a quite different though possibly more intractable issue, that of how to wean the Gulf region off the oil and gas that has provided cheap and abundant energy, and wealth, for decades. They give a good account of the importance of energy for social and economic development, referring to the UN Sustainable Development Goals and the Intended Nationally Determined Contributions (INDCs) that are part of the Paris Agreement. That the Gulf Cooperation Council (GCC) countries were amongst those not to have submitted INDCs illustrates the magnitude of the challenge.

Use of renewable energy in GCC countries is almost negligible, though they do of course have an abundance of sunshine which offers a huge opportunity to develop renewable resources. Incentives found to be effective in promoting renewables in other countries are discussed, followed by listing six key areas that need to be addressed by decision makers.

The paper on tidal power (Firdaus *et al.*, 2020) gives us a tantalising glimpse of a vast resource of renewable energy. Tidal energy has a capacity factor similar to wind but, unlike wind, its intermittency is entirely predictable. However, it carries higher risk and is more expensive so has proved less attractive to investors. The paper is an independent assessment of a project in one of the narrow straights in the Indonesian archipelago. The concept, of a floating bridge below which tidal

turbines will be suspended, is appealing in that the infrastructure cost is shared between the two purposes. But, so far, the project disappoints: the authors find that outputs will be less than the relatively small quoted values. Looking online it seems that a funding plan is still being developed, perhaps reflecting the difficulty of justifying investment (even allowing for the shared infrastructure). How could tidal power turbines be commoditised in the way that wind turbines have?

Lastly, very sadly, Richard Snell, a long-standing member of the editorial panel of *Energy*, passed away on 14 March 2020. His contributions to the work of the panel were always perceptive and valued. He will be much missed, and the thoughts of all panel members are with his family.

The journal publishes its most recent articles ahead of print on its Virtual Library homepage.

REFERENCES

- Firdaus AM, Houlby GT and Adcock TAA (2020) Tidal energy resource in Larantuka Strait, Indonesia. *Proceedings of the Institution of Civil Engineers – Energy* **173**(2): 81–92, <https://doi.org/10.1680/jener.19.00042>.
- Hammond G (2020) Editorial. *Proceedings of the Institution of Civil Engineers – Energy* **173**(1): 1–2, <https://doi.org/10.1680/jener.2020.173.1.1>.
- O’Callaghan A, Purcell K and Hemmingway P (2020) Tackling the energy efficiency gap in the Irish residential sector. *Proceedings of the Institution of Civil Engineers – Energy* **173**(2): 49–59, <https://doi.org/10.1680/jener.19.00043>.
- Rehman AU, Hayat A, Munis A *et al.* (2020) Characterisation of magnesium, zinc and iron sulfates for thermochemical storage. *Proceedings of the Institution of Civil Engineers – Energy* **173**(2): 60–67, <https://doi.org/10.1680/jener.19.00018>.
- Umar T, Egbu C, Ofori G *et al.* (2020) Challenges towards renewable energy: an exploratory study from the Arabian Gulf region. *Proceedings of the Institution of Civil Engineers – Energy* **173**(2): 68–80, <https://doi.org/10.1680/jener.19.00034>.