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Editorial
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Editorial

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Welcome to this general issue of *Energy*, with no predetermined theme, yet the articles all relate to the key issue of providing low-carbon energy for communities and industry throughout the world.

We start with a short briefing on the UK Government's public spending review. In a nation which, like much of the western world, is facing the challenge of balancing government expenditure with the desire to promote growth, Bedford (2011) notes the UK's continued commitment to 'prioritise investment ruthlessly in green energy infrastructure'. And as time has passed since the spending review, the picture has developed. The spending review was followed in March 2011 by the UK's budget, which *inter alia* included the commitment to set a floor price for carbon at a level higher than generally anticipated, making the UK a trailblazer in carbon pricing. It has met with a mixed response – enthusiasm from the producers of low-carbon energy, and concern from some energy users. Furthermore, the UK Treasury's *Plan for Growth* develops thinking on the *National Infrastructure Plan*'s identified £200 billion required investment in UK infrastructure over the next five years. Much is changing in the UK, but all this continues to point towards the importance of low carbon energy.

In another briefing, Napier-Moore (2011) takes the focus to Thailand and an interesting comparison between various solar power technologies emerging there. His company's involvement in several of the largest solar developments in Thailand provides a good position from which to view the emerging technical and commercial challenges. Comparisons are drawn between the traditional flat-plate collector photovoltaic panels and the newer concentrating solar thermo-electric power generating plants. Thailand has only moderate levels of direct irradiation due to significant cloud cover, which impinges on the comparison, and encourages the continued development of the latter technology. This could have wide application in the Desertec concept for exporting low-carbon power from north Africa to Europe.

Moving to the main body of papers, Garnsey *et al.* (2011) present the results of a survey into construction lessons from current and recent nuclear build projects. This work, carried out with the support and guidance of the Royal Academy of Engineering's Engineering the Future (EtF) alliance of professional engineering organisations and the UK government's Office for Nuclear Development, draws on experience at current nuclear power station construction sites in Finland, France (Flamanville), China (Taishan, Sanmen and Haiyang), the UK's most recent nuclear power station (Sizewell B, completed in 1995) and the UK's largest current nuclear construction, an evaporator at Sellafield.

This paper comes at a significant time for the new nuclear industry, following shortly after tragic events at Fukushima in Japan. However, whatever conclusions emerge from the reviews which follow those events, the conclusions from this paper will remain valid, as they relate to construction lessons. Indeed they may have wider application to other major projects in the power and infrastructure sectors.

Five significant lessons are drawn.

- Follow-on replica nuclear power stations are cheaper than first-of-a-kind stations. Stations will thus be cheaper to build if a firm commitment is made to a fleet of identical stations, rather than piecemeal decisions.
- The design must be mature and licensing issues resolved before the start of construction. Regulators may give permission for construction to start despite not being satisfied that the design can be licensed for operation, which can become a problem as construction progresses.
- A well qualified team is essential to develop the design, secure the safety case, plan the procurement and build detailed schedules, in collaboration with main contractors. They regard this as essential for large, capital intensive, complex and technologically sophisticated projects. This resonates well with themes within Infrastructure UK's 2011 *Implementation Plan* (HM Treasury, 2011).
- Ensure that subcontractors are of high quality and are nuclear experienced or are taught the necessary skills. This requires investment from industry and educational institutions and an unequivocal commitment and encouragement from government to the inspiration of students.
- Maintain good communications with the community local to the site; they should be kept informed and involved, so that their concerns are addressed and the station is perceived as bringing benefits.

The authors undertook a literature review and interviewed experts on the projects, giving the paper a solid grounding in

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the practicalities of nuclear construction. It is important to note that while the paper is entitled 'lessons learnt' and the lessons are clearly set out for learning, history will be the judge of the degree to which the lessons were learned, or whether they were merely taught.

In his foreword to the EtF report, ICE Director General Tom Foulkes said that acting on the report findings would 'help prevent delays and inefficiencies being repeated and will make the UK plants exemplars of global best practice'. 'Hot topic' groups have therefore been formed to produce practical guidance to help participants in the UK new build programme to implement the learning captured to date. Each group has included representatives of power station owners, equipment vendors, the construction supply chain, regulators and the Office for Nuclear Development.

Maybank *et al.* (2011) provide a fascinating account of the development of sustainable, low-carbon energy for the complex and conflicting requirements of London's 2012 Olympic Games site at Stratford, the Stratford City development and the legacy use of the Olympics site – achieved with significant private sector investment. Two energy centres convert fuel to electricity and feed an extensive district heating and cooling network. The energy centres employ combined cooling, heat and power (CCHP) plant, initially using natural gas, but with provision for the CCHP engines to use renewable, synthetic gas.

Martin and Spence (2010) commented that district heating is relatively unusual in the UK. Stratford offered an ideal demonstration project. And as new infrastructure was required for the vast 2·5 km^2 site, the project invested in pre-insulated pipes and cables that were future-proofed and would not require significant change over the 30 year design life. This is worth reading alongside the paper by Papafragkou *et al.* (2009), which discussed street-level microgrids, and Martin and Spence's paper which describes the success of a district heating scheme at Lerwick, in Scotland's Shetland Islands, and should encourage others to consider community energy projects.

India's sugar industry produces some 6 million tonnes of press mud, a semisolid fibrous reside, which is currently used as manure. In seeking to assist energy security and produce low-carbon energy, Balin and Raman (2011) have investigated the opportunities for producing bio-hydrogen, by anaerobic co-digestion of press mud mixed with sewage. Noting that hydrogen has a 2·75-fold greater energy yield per unit mass than hydrocarbon fuels, they see this as providing a near zero pollution source of energy, while also beneficially using sewage sludge, which would otherwise be a pollutant. The results of their thorough research, using varying dilutions, are clearly presented as optimum parameters for maximum hydrogen yield. It will be interesting to see this lab work being applied at larger scale.

So we cover topics in China, India, Thailand, France, Finland and UK, and a wide gamut of low-carbon issues from local energy generation to new nuclear build, and from research into anaerobic digestion to large-scale solar power. And all set against the backdrop that many western governments are seeking to reduce their expenditure, while promoting investment in low-carbon energy. Food for thought, indeed.

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