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Editorial

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Energy is a vast, diverse and developing discipline, as evidenced by this issue of the *Proceedings*, which covers an eclectic and fascinating range of topics.

Energy comes in many forms, but much of it has historically been derived from fossil fuels, and coal has provided a major source. Over recent centuries humanity has continuously explored and exploited increasingly difficult reserves. Set against the backdrop of increased energy demands, the potential available from exploiting Alberta's deep reserves of coal will, over time, become increasingly significant. Almost 50% of Alberta's land mass is underlain by coal-bearing formations. Richardson and Singh (2012) estimate the coal resource at in excess of 2000 Gt – more than three times the energy content of Alberta's vast oil sands. However, much of the coal is too deep or too expensive to mine by current underground techniques, and their paper suggests that gasification underground would maximise the recoverable energy from these reserves. Combine that with carbon dioxide capture and geological storage (CCS), and Alberta would have a large 'low-carbon' energy resource. However, the current low price of gas will make the economics of gasification combined with CCS unlikely to be competitive in areas where the free market drives energy investment.

While this offers a way to capitalise on Alberta's large coal reserves, development of the nascent technology for CCS is still required to render the coal a low-carbon energy source. Ways of de-risking the new technology are explored in a paper by Lucquiaud and Gibbins (2012), which discusses ways of managing capture technology uncertainty in capture-ready gas plants. Further background on clean coal technology and gasification is contained in a recent briefing by Shelton (2011). A more detailed discussion of integrated gasification combined cycle is offered by Weil (2010).

One of the challenges of offshore energy generation is cable laying. A briefing paper by Readyhough (2012) offers us an insight into the issues raised during installation of the world's longest power link to an offshore floating platform. This provides invaluable practical insights for both platforms and for wind farms. Further background on the wind farm aspects of this is given in a briefing by Jones (2009), which discusses the benefits of using high voltage direct current systems.

Our second briefing paper, by Iqbal *et al*. (2012), argues for provision of a postgraduate degree in nuclear civil engineering, identifying a series of design criteria that are peculiar to the nuclear industry. Interestingly, the paper by Garnsey *et al*. (2011), which discusses lessons to be learned from recent nuclear build projects, mentions the shortage of suitably skilled project management and certain specialist trade skills, but is relatively silent on design skills. Clearly nuclear design is different, and the paper's conclusions are worthy of note.

Moving to another renewable energy source, the ground source heat pump, Hemmingway and Long (2012) present a paper describing a test rig that determines several of the ground thermal parameters that are inputs to designing medium to large-scale ground source energy systems. They constructed a test rig from off-the-shelf components; it cost an order of magnitude less than a commercially available rig, and produced similar results. This therefore offers designers of ground source energy systems an economical approach.

Buildings are key users of energy and building design is a key influencer on the in-service energy cost of any building. Kendrick *et al*. (2012) compare the thermal performance of industrial sheds using conventional in-plane rooflights with those using northlight configurations. The use of northlights in retail sheds has been out of favour for some time, due to design advances in portal frames. Recent improvements in the production of structural steel tubing have reduced the cost of welded steel trusses, which are suitable for large spans with a saw-tooth roof that includes northlights. Northlights offer more even daylighting than in-plane rooflights and avoid direct solar radiation.

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