Energy
Volume 166 Issue EN2

Editorial
Earp

ice | proceedings

Proceedings of the Institution of Civil Engineers
Energy 166 May 2013 Issue EN2
Page 47–48 http://dx.doi.org/10.1680/ener.2013.166.2.47

ice
Institution of Civil Engineers
publishing

Editorial

John E. Earp BA, CEng, FIMechE, FNucI
Nuclear Consultant, UK

I have been part of the Editorial Advisory Board for the ICE's *Energy* journal for more than three years, being recruited initially through the Nuclear Institute to bring an industrial nuclear perspective to the group. The experience of being involved with such a prestigious publication has been excellent and I was particularly pleased to be asked to take the lead on this nuclear energy themed issue.

Nuclear energy often appears in printed articles, ranging from daily newspapers through to institution and technical journals and, most recently, this has been related to new nuclear build. Initially, therefore, it might seem surprising that only one of the papers offered for this themed issue specifically relates to this aspect of the nuclear sector. However, on more detailed analysis, this is possibly not surprising as the timing of the issue has proved difficult. Currently, the major companies engaged with potential new nuclear builds in the UK are in protracted negotiation with the government on a number of fronts, but, most importantly, related to the required cost of the power from the stations once completed as, clearly, this has a major impact on the viability of the proposed projects. Hence, any published material could have the potential to influence these negotiations.

As a result this themed issue contains four excellent papers, two of which relate more to nuclear decommissioning/clean-up matters, one relates to a potential new fuel cycle utilising thorium and only one relates to new build, and this in a very generic sense. It also contains two briefings, one linked to decommissioning and clean up, the other aimed at introducing potential new reactor technologies that are liable to gain in importance in the sector over the coming years.

The first briefing (Ambler, 2013) describes an innovative approach employing modular construction techniques used for the building of an active nuclear laboratory on site at Dounreay in Scotland. The Dounreay nuclear facility on the north coast is in the process of being decommissioned. To assist with this process a new active nuclear laboratory was required. Building any facility on a licensed nuclear site always has the potential to be problematic. This briefing describes how utilising off-site modular construction of the building and its facilities saved both time and cost.

The second briefing, by myself (Earp, 2013), introduces the concept of small modular reactors (SMRs). It offers the best available definition for them and provides a brief description of several of the most developed designs currently appearing in the technical press. Also included are the relevant references for those readers who wish to follow up the concepts in more detail.

The first paper is on the use of foamed concrete in the decommissioning of complex nuclear facilities (Ashworth *et al*., 2013). Older nuclear facilities, which are contaminated and due to age have the potential to be structurally unstable, have always presented decommissioning teams with a challenge. This paper describes the development of the use of foamed concrete to stabilise structures within a redundant active cell at Sellafield, enabling the ultimate decommissioning. It is an informed approach that is likely to have application elsewhere.

Another paper relating to construction materials and decommissioning (Joyce *et al*, 2013) addresses the complex problem of identifying the extent to which these materials are contaminated. Construction materials such as concrete (or the ground itself) are by definition porous and, when used in nuclear facilities, have the potential to become contaminated. Measuring the extent of this contamination and the depth to which it has penetrated without the need to excavate or damage the facility can significantly influence the decommissioning and disposal routes and processes selected, and hence the cost. This technical paper describes two techniques that can be utilised to address this problem, both of which could have future practical application.

The paper on thorium–uranium open fuel cycles (Ashley *et al*., 2013) highlights how nuclear energy systems might adopt such fuelling strategies. The nuclear industry historically has been dominated by uranium as its fuel source. The alternative use of thorium, however, has been appreciated over a number of years and has been the subject of limited experimentation. Thorium is fertile rather than directly fissionable, so has to be incorporated appropriately into a fuel cycle in which it can be converted into a fissionable material for it to be utilised as fuel. This paper reviews, both technically and economically, the potential for thorium to be used as part of an open fuel cycle in future reactors.

The new build-related paper (Tan and Gibbels, 2013) addresses an age-old problem arising during the build and subsequent operation of nuclear facilities, offering new proposals for the

management of plant life-cycle information. It describes an integrated platform to be utilised at all levels of the complete supply chain from design, through construction, commissioning and operation over the complete plant life cycle, ensuring data quality, traceability and integrity are maintained, and thereby enabling robust configuration management (i.e. the plant was built and operates exactly as the designer intended and meets all safety case requirements).

I commend all six of these articles to our readers as I feel they add to the understanding of the nuclear sector and, in some cases, have potentially wider applications.

REFERENCES

Ambler S (2013) Off-site construction of a new nuclear laboratory at Dounreay, Scotland. *Proceedings of the Institution of Civil Engineers – Energy* **166(2)**: 49–52, http://dx.doi.org/10.1680/ener.11.00036.

Ashley SF, Fenner RA, Nuttall WJ and Parks GT (2013) Open cycle thorium–uranium-fuelled nuclear energy systems. *Proceedings of the Institution of Civil Engineers – Energy* **166(2)**: 74–81, http://dx.doi.org/10.1680/ener.13.00003.

Ashworth T, Hooper A, O'Connor B, Miller E and Jarrett A (2013) Foamed concrete facilitates the decommissioning of nuclear plant. *Proceedings of the Institution of Civil Engineers – Energy* **166(2)**: 58–66, http://dx.doi.org/10.1680/ener.12.00001.

Earp JE (2013) Small modular reactors. *Proceedings of the Institution of Civil Engineers – Energy* **166(2)**: 53–57, http://dx.doi.org/10.1680/ener.13.00014.

Joyce MJ, Adams JC, Heathcote JA and Mellor M (2013) Finding the depth of radioactivity in construction materials. *Proceedings of the Institution of Civil Engineers – Energy* **166(2)**: 67–73, http://dx.doi.org/10.1680/ener.12.00003.

Tan LK and Gibbels R (2013) Plant life-cycle information management in nuclear new build. *Proceedings of the Institution of Civil Engineers – Energy* **166(2)**: 82–90, http://dx.doi.org/10.1680/ener.12.00014.