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REGULATION OF SMALL MODULAR REACTORS

Words:
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Burges Salmon

This autumn will see the publication of the Feasibility Study on Small Modular Reactors (SMRs) commissioned by the UK government (see page 4). Reports on SMRs to date have focused heavily on technical developments, although the IAEA recognises that 'regulatory infrastructure' is one of the main challenges to SMR deployment. There has been less attention paid to the key issue of the regulatory profile of SMRs. SMRs are classified by the IAEA as reactors with an equivalent electric power of less than 300MWe, which itself leaves a wide range between very small reactors and what are effectively small power stations. The regulatory profile of each cannot therefore be the same, and if reactors are genuinely 'modular', there may be significant regulatory differences between a site with one unit and one with more.

Effective regulation of SMRs will be one of the key challenges that each design will have to meet. Developers of SMRs need to be 'designing for regulation' as well as for use, in this sense. At present, there are a range of very different designs and technologies of SMRs under development in different parts of the world, with the IAEA reporting that 131 SMR units are in operation in 26 IAEA member states, 14 under construction in Argentina, China, India, Pakistan, the Russian Federation and Slovakia, and 45 further designs undergoing research.

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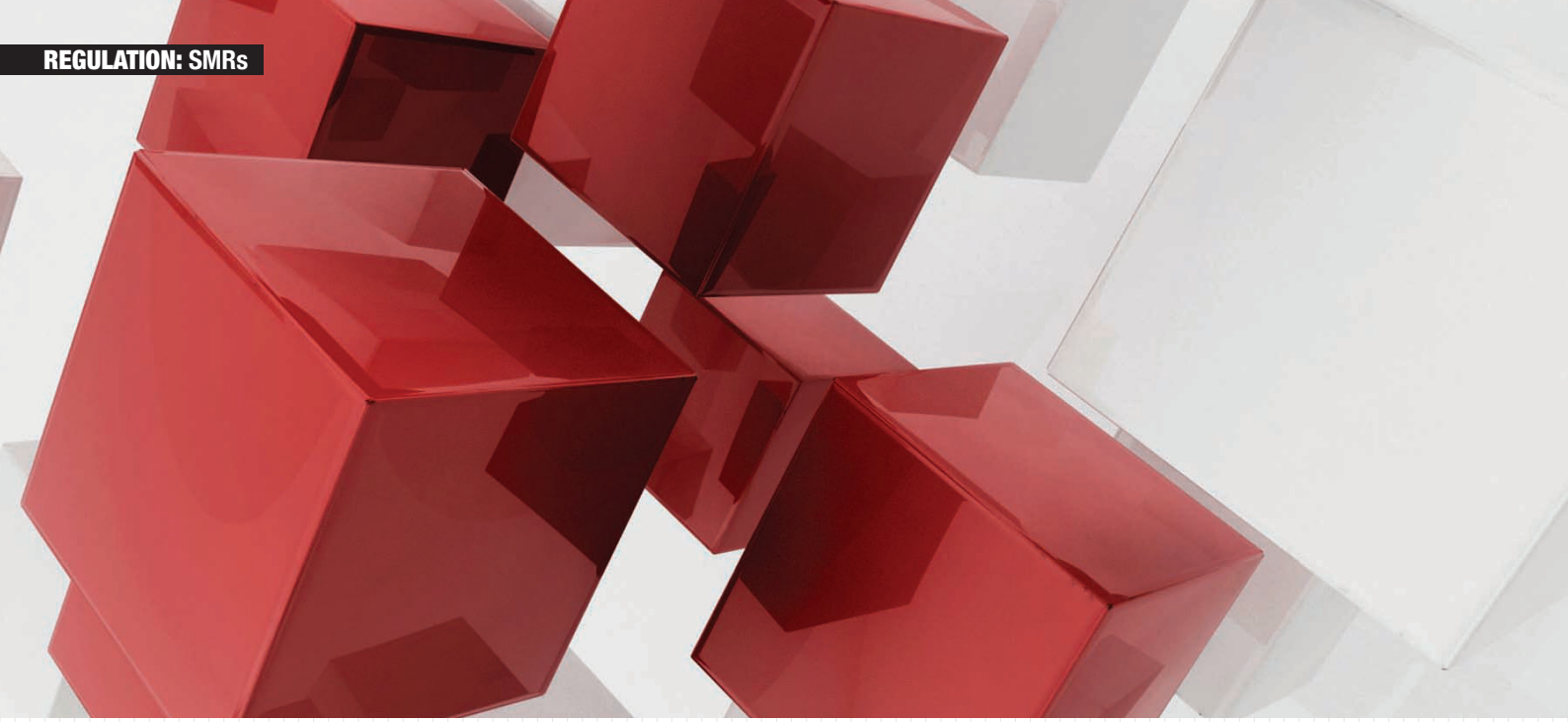
Few regulators have the time or resources to engage staff time on following in detail the development of designs which have not been formally submitted for their approval. Therefore unless developers anticipate regulatory constraints, they may encounter them for the first time when they finally do submit the design for approval, which in the EU at least will include the application of the justification test. This approach risks long delays and higher costs.

A design is not going to be approved as safe simply because part of it will be sited underground, or because it has a name implying its inherent safety. There may be real safety advantages, for example, the type of fuel used or the fact that manufacturing can be undertaken in factories instead of on-site. If so, these will need documenting and explaining from a regulator's point of view. Developers need to consider the regulation of the transport of fully fuelled units, their specific decommissioning challenges and how waste and spent fuel from such units will be handled.

The security profiles of SMR designs do not explain themselves; they need to be considered well in advance of formal submission, ideally with regulators' engagement, if that can be secured. ↘



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Safeguards and non-proliferation arguments in favour of SMR designs do not make themselves. Some designs are described as suitable for siting in remote locations or sparsely populated areas, and only needing servicing every five or six years; others could be sited closer to population centres. In both cases emergency preparedness will be a factor. Regulators with responsibilities for non-proliferation will also need to understand how those risks are contained and addressed. What levels of liability for nuclear damage should attach to particular SMR designs, who will be the operator, how will the nuclear liability regime in place in each jurisdiction, whether under the Paris or Vienna Convention regimes or national liability legislation, apply or be adapted to the size and scale of nuclear reactor represented, and will there be nuclear insurance available?

Regulators' approaches to key issues vary widely, from the US prescriptive approach to the goal-based approach of the UK's Office for Nuclear Regulation (ONR). However, the basic issues on which regulators will need to be satisfied around the world are similar, and key issues will include the IAEA's '3SL' priorities of Safety, Security, Safeguards and Liability. One response to this has been to advocate closer collaboration between key regulators, particularly in the USA and UK. The DECC Horizon Scanning document of October 2013 recognised the potential importance of this kind of combined approach, and the House of Commons Environment and Climate Change (ECC) Committee also promises to report on regulations and licensing as part of its report on SMRs.

Giving evidence to the ECC Committee this summer, Dame Sue Ion, Chair of the UK's Nuclear Innovation and Research Advisory Board, saw the stage reached in the US licensing process as "an incredible opportunity for the two regulators to work together with respect to global regulation of this particular type of technology", and that a first deployment in the UK would confer an "enormous competitive advantage as a nation on the global stage". Senior executives of Generation mPower LLC, NuScale Power LLC and GE-Hitachi Nuclear Energy made similar points at an evidence session of the Committee in July 2014.

Developers need to consider the regulation of the transport of fully fuelled units, their specific decommissioning challenges and how waste and spent fuel from such units will be handled.

If the nuclear regulators in the USA and UK can find common ground in their approach to the key issues, so much the better, it will represent a powerful advantage to the deployment of that particular design elsewhere in the world. But it may be more productive to aim to adapt the regulatory framework in each jurisdiction to the size and scale of SMR under consideration, and to encourage practical information sharing, rather than spending large amounts of time and resources in trying to negotiate formal mutual recognition of regulatory findings.

The challenge for regulators will be to hold on to the essential elements of the tests they are charged with applying, but to do that in a way which is proportionate to the real risks. The challenge for technology developers is to anticipate the questions to which regulators will need answers, and taking as much care to plan to address these regulatory issues as is being taken in addressing the technical challenges.

If this article raises any issues you would like to discuss, please do not hesitate to contact William on william.wilson@burges-salmon.com.

If you would like to suggest subjects for future articles, register to receive Burges Salmon's free nuclear e-bulletin, or receive an e-copy of the latest 'Burges Salmon Glossary of Nuclear Terms 2014' please contact Gareth Davies on gareth.davies@burges-salmon.com.

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