

July 26, 2016 5:00 am

# Small modular reactors are nuclear energy's future

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*This wheel's on fire: a nuclear reactor design by General Atomics of the US*

As delays mount at large new nuclear power projects around the world, more attention is turning to smaller alternatives, which industry experts hope may help provide the next generation of electricity.

So-called “small modular reactors” — miniature nuclear power plants with a capacity of less than 300 megawatts — could provide an alternative to mega-plants like the two 1.6 gigawatt reactors planned at Hinkley Point in Somerset.

The UK project is one of a number of delayed or abandoned nuclear power schemes, which have left policymakers around the world looking for cheaper, less risky options to meet electricity demand.

SMRs are designed as shrunken versions of larger plants; they can be made in factories and moved by train, truck or barge to the site. Developers say that if enough are built in the same factory, costs per unit of energy output can be driven down well below those of larger plants.

Small reactors are already used on nuclear submarines and in some developing countries such as India and Pakistan. But only recently have the industry and politicians begun to take seriously the idea that they could be made economically on a large scale.

Anurag Gupta, nuclear director at KPMG UK, says: “SMRs promise all the benefits of nuclear — low cost and green power — but without the significant cost and schedule overrun issues that have beset conventional large nuclear projects.”

Since the invention of nuclear power, bigger has generally been seen to be better. Once a company had gone through the time and expense of securing a site along with planning approval and grid connections, most wanted to build as much capacity on that site as possible.

But many of those stations have been plagued with problems, which some blame on their size. Plans by EDF, the French energy company, to build new reactors in France and Finland, for example, have gone billions of euros over budget — something many experts blame on the difficulty of making such large structures safe.

Tapani Virolainen, a Finnish nuclear regulator, recently told the Financial Times: “It took more time to build [these plants] because there are more huge structures [to protect] against aircraft crash and so many safety systems.”

Large projects such as these have also had trouble getting financed — one of the principal causes of delay at Hinkley Point has been the difficulty EDF is having raising the money needed for the £18bn project.

For now, small-scale nuclear industry proponents are focused on proving the technology can work at costs low enough to make it competitive. The countries that are furthest along are, unsurprisingly, those with the most developed nuclear energy industries.

Russia is in the process of converting two small reactors which used to power icebreakers. They will eventually be placed on barges which can then be moved to where they are needed.

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The US and the UK are both trying to catch up. The UK recently took a leaf out of the US book when it announced it would run a competition to find the best SMR design, with £250m on offer to help with research and development.

“The US and the UK are in a race at the moment, and that is driving both forward,” says Jared DeMeritt, programme director of MPower, an SMR developer. “We think 2025 is a realistic start date for the first small modular reactor in the west, which will be in one of these two countries.”

MPower’s design shows some of the ways that smaller plants can avoid the pitfalls of larger ones. In its case, MPower plans to bury all safety-critical equipment — including the reactor and the fuel vessels — underground, thereby minimising the need for expensive physical defences.

Despite the optimism among some in the industry, there remain significant hurdles to widespread use of SMRs. Firstly, even those building them privately admit the first ones will cost roughly the same per unit of electricity produced by a large reactor until costs can be driven down. One executive says: “Over time, we think we can get the costs down — as long as enough of them are commissioned.”

But advocates of SMRs say that even if they prove more expensive for the electricity produced, costs are less likely to escalate and more likely to be fully funded.

David Hess of the World Nuclear Association says: “Financing is a huge policy risk, and SMRs reduce that. And if the project goes wrong, at least less money has been wasted.”