



Supporters of Nuclear Energy

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SMRs GET A BOOST AS HINKLEY FACES A CHALLENGE

This month has been notable for the considerable boost given to the development of the small modular reactor (SMR). Much of this has come from positive announcements in the United States and the United Kingdom but the SMR “small is beautiful” cause has also been helped by further questioning of the financial aspects of the large-scale Hinkley Point C project and question marks over the Moorside scheme.

January has been something of a “curate’s egg” of a month for nuclear energy. The term derives from a Punch cartoon published in 1895 which shows a timid looking curate eating breakfast in his Bishop’s house. The Bishop says: “I’m afraid you’ve got a bad egg Mr. Jones.” The curate, desperate not to offend, replies: “Oh no, my Lord, I assure you that parts of it are excellent.” That’s how I felt as the mixed nuclear messages appeared.

SONE supports nuclear energy not a particular reactor type or size and, uniquely, it is truly independent. Like the curate, I do not want to offend anyone (but probably will). I want Hinkley C to be built and operate successfully and I want the first SMRs proving themselves in the UK as soon as possible. I will start this piece by examining the more palatable part of the egg - the SMR news.

First, a piece of history in the making, a request by NuScale Power for the US Nuclear Regulatory Commission(NRC) to approve the company’s SMR commercial power plant design. This was the first-ever SMR design certification application to be submitted to the NRC.

It has taken a lot of time and effort to get this far. NuScale has had more than 800 people working on its SMR project over the past eight years. The company has documented, in extensive detail, the design conceived by its chief technology officer, Dr. Jose Reyes, more than a decade ago.

The application consisted of nearly 12,000 pages of technical information and the NRC is expected to take the next two months deciding if any additional information is needed before it even starts its review.

SMRs are not expected to come into operation in the US before the mid-2020s but there are estimates, said to be conservative, that between 55 GWe and 75 GWe of global electricity will come from SMRs by 2035. By then the global SMR market could be worth £400 billion.

THE SOLE WINNER

As the sole winner of the second round of the US Department of Energy's cost sharing programme for SMR technology development, NuScale is the only developer receiving DOE financial support. The first commercial 12-module NuScale power plant is planned to be built on the site of the Idaho National Laboratory (INL) It will be owned by Utah Associated Municipal Power Systems (UAMPS) and operated by Energy Northwest.

In 2015 the DOE awarded NuScale and UAMPS a \$16.7 million grant as part of a three-year cooperative agreement to conduct site characterisation activities at the INL site and prepare documentation leading to a combined licence application (COLA) for a first plant at INL. NuScale has also launched the so-called Western Initiative for Nuclear, a broad collaboration of six States to study the demonstration and deployment of a series of NuScale SMR plants in the Western United States.

The NuScale SMR consists of integrated pressurised water reactor modules, designed on the light water reactor technology that has operated world-wide for the past 70 years, with an excellent safety record. When coupled to its factory fabricated power generation equipment, a NuScale power module can produce 50 MW of electricity and a power plant can house up to 12 of these modules, providing a total facility output of 600 MW.

A power plant's capacity can be increased in stages, depending on electricity demand. Construction time-frames - about three years for each module - can make it easier for a smaller electricity utility to raise capital and allow quicker returns on an investment while the rest of the plant is under construction.

In addition, each module can be built at an off-site factory and shipped to the plant site by truck, train or barge.

NuScale says that its SMR design has unique safety features. Under abnormal conditions the reactor can shut itself down and cool itself for indefinite periods without the need for human intervention, water addition or external electricity supplies, the company says.

ANOTHER SIGNIFICANT MOVE

In another significant development in the United States the Tennessee Valley Authority (TV) has welcomed the acceptance of regulatory review of its early

site permit application for its Clinch River site in Tennessee as a milestone towards the potential use of SMRs in its operating fleet.

The US Nuclear Regulatory Commission (NRC) may now begin its technical review of the application, during which the NRC staff will address site safety and environmental protection issues, as well as plans for coping with emergencies, independent of the review of a specific nuclear plant design. It will also prepare an environmental impact statement and hold a public hearing. An early site permit, or ESP, certifies that a site is suitable for the construction of a nuclear power plant from the point of view of site safety, environmental impact and emergency planning but does not specify the choice of technology. The permit is valid for up to 20 years, renewable for an additional ten to 20 years.

Any decision to build SMRs at Clinch River is “several years” away, with several evaluations and business decisions to be resolved before it would commit to such a scheme, TVA said. “Nevertheless, the NRC’s docketing of TVA’s early site permit application moves the nuclear industry closer to potential commercialisation of the technology.”

TVA submitted an application for two or more SMR modules of up to 800 MWe at a site near Oak Ridge in May 2016. It was the first SMR-related application of any type to be received by the NRC.

AND IN THE UK

Rolls-Royce is supporting NuScale power’s design certification application in the US and it is also pressing ahead with plans of its own for the UK. This month it named the companies it is working with to bring a small modular reactor to market in the UK. The partner companies were named as Amec Foster Wheeler, Nuvia and Arup, together with the Nuclear Advanced Manufacturing Research Centre (Nuclear AMRC). Other names will emerge “in due course.”

The Nuclear AMRC is a collaboration of academic and industrial partners from across the nuclear manufacturing supply chain, with the mission of helping UK manufacturers win work at home and overseas. It brings together the experience and resources of industry leaders with the expertise and innovation of leading universities.

In October last year Rolls-Royce said that a UK SMR could provide a £100 billion boost to the UK economy between 2030 and 2050 because the companies involved are either UK-owned or have a strong UK presence. It said that it was teaming up with “a raft of British engineering giants” to make

SMRs a reality in the UK, creating up to 40,000 high value British jobs and intellectual property and opening up a £400 billion export market.

PLENTY OF INTEREST

The latest announcement came shortly after it was revealed that UK Government officials met no fewer than 32 eligible participants for Phase One of its SMR competition, which aims to gauge market interest in developing, marketing and financing SMRs in the UK. The eligible participants include technology vendors, service providers and potential investors.

The Government competition was announced last November when it announced plans to invest at least £250 million over the next five years in a nuclear research and development programme, including the competition to identify the best value SMR design for the UK. Rolls-Royce submitted a paper to the Department of Business, Energy and Industrial Strategy outlining its plan to develop a fleet of seven GWe of SMRs with its partners. Others known to be taking part in the competition are the French-owned EDF Energy and its Chinese partner China National Nuclear Corporation (CNNC), Westinghouse and, of course, NuScale Power.

While the flurry of interest in SMRs dominated the news this month there were some important developments in relation to conventional new build reactor power stations in the UK.

The Government asked nuclear regulators to begin a Generic Design Assessment (GDA) of the UK HPR1000 reactor. This is the Hualong One design that General Nuclear Services (GNS) - a subsidiary of EDF and China General Nuclear (CGN) - proposes to use as a prospective new nuclear power plant at Bradwell. This is a voluntary process for reactor vendors, a policy rather than law, but it is a Government expectation for all new build projects in the UK.

BIG REACTORS STILL OF INTEREST

As with previous assessments, the full cost of the GDA will be charged to the requesting party - in this case GNS - which submits the design for assessment. The process is independent of any final agreement to commission a reactor of the relevant type.

The GDA process will take some years to complete. There are a number of different consents and permissions to be achieved before a nuclear power plant can be constructed. As well as successful completion of the GDA process, other requirements include development consent, site licensing and environmental permits.

If the GDA process is successful it will lead to the regulator, the Office for Nuclear Regulation, issuing a Design Acceptance Confirmation (DAC) document and the Environment Agency issuing a Statement of Design Acceptability (SoDA) note. Before this an interim DAC and interim SoDA will have had to have been issued.

EDF Energy's UK European Pressurised Reactor design, of the type to be employed at Hinkley if all goes well, received a DA and SoDA in December 2012 but the project still seems to be mired in controversy. The latest barrage of criticism, overt or implied, came from members of the House of Lords Economic Affairs Committee, including a suggestion by one of its members that the UK could be "left with a half built power station." This was refuted by Greg Clark, the Secretary of State for Business, Energy and Industrial Strategy (BEIS), when he gave evidence.

I have a great deal of sympathy with their Lordships, who have asked Mr. Clark to clarify several of the financial aspects of the Government's agreement with EDF and its partner China General Nuclear (CGN) to build Hinkley Point C. Specifically, they want to know whether the Government guarantee supporting the project still stands. It was originally provided through a unit within the Treasury, Infrastructure UK, which is now part of the Infrastructure and Projects Authority.

Asked about this guarantee Mr. Clark said: "The original case involved a Treasury guarantee of £2 billion, which was part of the State aid approval of this . (By the European Commission). "In the final terms that we agreed with the contractor, with EDF in particular, we agreed that they would not avail themselves of that guarantee." EDF wrote to the then responsible Minister giving that assurance, he added.

Pressed by the Committee to explain what would happen to that assurance if EDF "goes bust" Mr. Clark said: "The agreement requires volition of both sides to come into effect. We had approval for the guarantee but agreed with EDF not to make it live. That could only change by agreement."

The use of the word "volition" is interesting. As I understand it the sense of the expression is that it is a matter of free will, that either side could walk away from the deal. That was certainly implied by Jeremy Pocklington, the BEI director general of energy and security, who accompanied Mr. Clark at the hearing.

"The formal language is that they (EDF) have no present intention," he said, which I assume to be no intention at the moment of changing anything. But that surely leaves scope for either side to make unilateral changes in the future.

No wonder the Committee members were confused, but they pressed on with their questioning anyway..

They asked why the Government's estimate of future top-up payments through the contract for difference (CfD) varies so widely compared with that of the National Audit Office and whether the index to which the strike price is linked could be changed in the future. It seemed a simple enough question.

The Government's CfD fixes the cost to consumers of the power from new generating sources, regardless of the market price. The Hinkley price, set at £92.50 per MWh or £89.50 per MWh if the planned new nuclear plant at Sizewell goes ahead, is fully indexed to inflation through the Consumer Price Index (CPI). Or is it?

Asked about the link between the CfD for Hinkley and the CPI, rather than the Retail Price Index (RPI) and specifically whether the index could move down in the event of negative inflation as well as up at a time of rising inflation, Mr. Pocklington said he would need "to double check." He said he would also check whether the index used could be change from the CPI to another index.

Mr. Pocklington was also asked why the National Audit Office (NAO), which scrutinises public spending for Parliament and the Department of Energy and Climate Change, the forerunner of the BEIS, used different discount rates.

"Our estimate, which has a low and high range of £11 billion and £21 billion for the top-up payments uses the social discount rate as required in the Green Book, which is the standard Government methodology for assessing the costs and benefits of projects," Mr. Pocklington said. (The comparable NAO figures are £6.1 billion and £29.7 billion).

"As I understand it, it is the better way to evaluate the economic case for the project. The National Audit Office were using a different discount rate based on the cost of borrowing, which is an accounting tool. The NAO's number, which is not a Government number, was £30 billion. (Give or take the odd million, of course) They are different numbers for different purposes."

Call me old fashioned but I am more comfortable comparing like with like.

Hinkley isn't the only nuclear new build project in the UK which is having problems. The future of the planned Moorside nuclear power plant in West Cumbria, close to Sellafield, might well be in jeopardy. Toshiba which has a 60% stake in the project, has announced that it is re-examining all of its nuclear schemes outside Japan, without exception.

The Toshiba overseas business review has been forced on the company by serious problems within Westinghouse, which it bought from British Nuclear Fuels 12 years ago at what many (including me) saw as a knock down price. It

is thought that Westinghouse may have spent several billion dollars too much for its CB and J Stone Webster subsidiary, which it bought in 2015. To make matters worse it is also embroiled in an accountancy scandal.

The sad thing is that the £12 billion Moorside project, involving three of Westinghouse's AP1000 reactors, has been seen as a real winner for the UK. It is too soon to be sure whether this is another of the curate's smelly eggs but it is certainly worrying, for the Government and, particularly, West Cumbria.

CHICKENS COME HOME TO ROOST

One of the driving forces which led to the formation of SONE was the conviction by those behind the organisation that the UK was making a big mistake by halting the nuclear energy programme with such indecent haste - closing stations and halting planned expansion. One day you will need nuclear power, the politicians were told, and we will not be in a position to provide it, not least because the expertise will have been dissipated. How right we were.

Now the chickens have come home to roost and today's politicians, those who form the UK Government, have produced a Green Paper admitting that their predecessors made a huge mistake. The Green Paper accepts that there are acute and urgent skill shortages in key industrial sectors in the UK, not least in the nuclear power industry.

A better system needs to be identified they say and the emerging skills gaps in manufacturing industry, more apparent than ever as the requirements of Brexit take hold, must be fixed. The Green Paper on post-Brexit industrial strategy says that even if shortfalls in science, technology, engineering and mathematics (the so-called STEM subjects) as well as technical education are addressed, shortages in the nuclear industry might well remain.

The Government admits that part of the problem has been the lack of a single authoritative source to forecast skills shortages. The UK Commission for Employment and Skills, the Low Pay Commission, the Migration Advisory Committee and individual sectors have produced assessments focused on their specific remits.

“But no organisation has been tasked with identifying persistent or emerging sector specific gaps and proposing action,” the Green Paper states. “We will now work towards a single, authoritative view of the gaps faced by the UK now and in the future.” The Government is working on a new approach to nuclear skills, it said, “with a view to taking a holistic approach to the needs of the Government and industry.”

In concrete, practical terms an early plan is for the Government to provide £179 million in new funding for what it describes as new and “prestigious “

Institutes of Technology. The aim is for them to provide higher level technical education in the STEM subjects across all regions than are currently available. This is part of a new system of technical education which will replace thousands of qualifications, many of which are of low quality, with just 15 core technical “routes.” The routes will be designed specifically to respond to the needs of industry and to help equip learners with the skills in demand from local employers.

There are also plans to use the free school model to expand the provision of specialist maths education across the country. It is planned to improve the spread of new specialist “mathematics schools, “ working with local partners, including top university maths departments.

The Government also plans to set an “open door” challenge to industry to come to the Government with proposals to transform and upgrade their sector through “sector deals.” These deals would be an open call to organise behind strong leadership to address shared challenges and opportunities.

The Green Paper says that Lord Hutton, who is Co-Chair of the Nuclear Industry Council and Chairman of the Nuclear Industry Association, will oversee work to improve UK competitiveness and skills in the nuclear sector. For my part, I welcome the appointment and wish Lord Hutton every success in this important endeavour.

HAROLD BOLTER
SONE SECRETARY