



NUCLEAR – THE WAY FORWARD

In the UK, apart from the PWR at Sizewell B, we have a fleet of ageing, gas-cooled nuclear reactors producing 20% of our electricity needs. These reactors will need to be shut down over the next 10 to 20 years. It is difficult to see how this energy gap can be filled, without creating CO₂. If we decide to have no nuclear, we will still need fossil fuel power stations to back up the grid when green energy is not available; and they will emit CO₂.

The decrease in popularity of nuclear power since the early 1980s has led to the UK's nuclear industry shrinking and to a decrease in expertise (in large-scale nuclear builds) within the UK. This, combined with the Treasury model used hereto for the bidding process for new nuclear power stations (which did not give enough weight to risk), and the unwillingness of the UK Government to stand behind the financially risky nuclear build projects, has led to foreign countries, through nationalised companies (France and China) building the first new power station at Hinkley Point in Somerset. To persuade them to do so, the UK Government has negotiated a strike price which is twice the current cost of electricity, for 20 years, despite the fact that electricity prices are falling and green energy is becoming competitive with coal and gas, without subsidy. The current plan is to replace all the current nuclear power stations on a one-for-one basis.

But, the concept of a one-for-one replacement results in massive cost (£15bn+) for each power station and time lags from concept to fruition of up to 20 years, which leaves no flexibility going forward and ultimately probably means very expensive electricity. In addition, third-generation PWRs (such as the EPR at Hinkley Point) have the downsides that they produce additional nuclear waste and that they must be sited by the sea for cooling purposes, which further limits flexibility.

Both China and Russia have programmes to sell their nuclear power stations (on credit) around the world. It is not clear that they achieve the high standards of safety which are insisted on in the West. Hence, China's keenness to be involved in the EDF EPR project at Hinkley Point, and to join EDF on the new build in Suffolk – Sizewell C. They also hope to lead

on the build of a new power station at Bradwell, in Essex. This programme is now at risk because of the deteriorating relationship with China, post-Huawei.

In parallel, the Japanese-Westinghouse bid for UK power stations has been withdrawn and various proposals by Hitachi, including the advanced PRISM reactor, have also been stopped. There are no obvious candidates to pick up the other replacement stations, although a new US offer has recently been put on the table (Westinghouse, Bechtel and Southern) to build an AP1000 reactor. And, in terms of Hinkley Point, it is worth noting that EDF is over-budget and behind schedule. Their other EPRs – in France, Sweden and Finland – are all behind the delivery date and over budget; for instance, Flamenville in France is more than 3 years behind and EUR6.5Bn over budget. So, an inauspicious start to the forward programme.

Clearly, there are significant political issues with any nuclear programme going forward. In particular, there are three concerns: safety, what will be done with the nuclear spent fuel generated and the potential non-nuclear alternatives on offer. The catastrophes at Chernobyl in 1986 and Fukushima in 2011, have led to an unwillingness from electorates and Governments to invest in nuclear. As well as the risk of contamination of vast areas of land, as manifested in these two reactor accidents, there is the difficult problem of the dangerous spent nuclear fuel which must be safely stored, away from the environment, for at least 100,000 years.

There seems to be a general feeling that we should move away from nuclear power, despite the fact that nuclear produces reliable power without polluting the atmosphere and could form a large part of the carbon neutral solution, that we are all aiming to achieve by 2050.

In Germany, for instance, the political reaction to Fukushima is that they have closed down their nuclear power stations but, as a result, they are burning brown coal (lignite), which is heavily polluting; while, ironically, at the same time using French energy, which is 80% nuclear.

There are now various cheaper and more flexible alternative designs on offer from vendors around the world, and the potential availability of private funds. But, most are still in development. Designs such as small modular reactors (SMR) and fourth generation advanced modular reactors (AMR) can potentially be factory-built on a production line and then transported to site by road, which would bring huge economic savings:

- Small Modular Reactors (SMR). Rolls Royce have been building these for our nuclear submarines for generations. In practice, SMRs can be used individually or in series to provide power from anything from a small village to a full replacement power station. Can be manufactured in the UK. Nuscale has had their design authorised by the US Authorities.

- Advanced Modular Reactors such as the Stable Salt Reactor (SSR). Can use existing nuclear waste as fuel, thereby solving the waste disposal problem and the reactor is inherently safe, as it is self-controlling, without any moving parts and does not produce dangerous radioactive gas. The costs of building and running are projected to be less than any alternative forms of continuous power generation (including coal power stations), so it will be attractive to the electricity companies. The first SSR is being built in Canada by New Brunswick Power under Government and private funding.

In the UK, and more widely around the World, we are at a crossroads with nuclear power. We need to take key decisions that will shape our overall energy provision for the next 50 years plus, against a background of achieving carbon neutrality and in an era where private funding of smaller, safer, more cost-efficient nuclear power stations is now possible. If we are all to reach the target of zero CO₂ by 2050, without suffering electricity blackouts, then nuclear must be part of the mix. The right decisions need to be made, alternatives to simply building replacement nuclear on the same sites need to be looked at carefully, and these decisions need to be made in the near future.

In the UK, the Green 10 point Plan for a Green Revolution, announced in mid-November includes: A total of £525 million has been pledged “to help develop large and smaller-scale nuclear plants, and research and develop new advanced modular reactors”. But this is only a first step, and time is pressing.

Join the London Energy Club discussion at 14:00 UTC on 21st January 2021 to discuss the way forward for nuclear
Complimentary registration is at: <https://bit.ly/35ME8Bw>