Great British Nuclear

Rick Bradford, written 21 December 2022

This was written under the Conservative government. The position of nuclear power under the new Labour government is currently very unclear, though their creation of Great British Energy, dedicated exclusively to renewable generation, is not encouraging.

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On 29 November 2022 then Business and Energy Secretary, Grant Schapps, made a significant announcement advertised as helping to secure the UK's energy independence. A worthy aim, certainly.

This included government backing to the development of Sizewell C to the tune of £679M, the plan to develop the plant being now approved by government. Quote, "Sizewell C is positioned at the heart of the new blueprint to Britain's energy sovereignty". The announcement states,

"Government will become a 50% shareholder in the project's development with EDF and will work together with the project company to raise capital investment for the project. The move is the first direct government investment in a new nuclear power project since Sizewell B, the last nuclear power station to be built in the UK, was approved for construction in 1987."

[Aside: I stand to be corrected but I suspect that while the UK was in the EU the UK government would not have been permitted to be a 50% shareholder. If correct, the prospect of SZC actually happening was dependent on leaving the EU].

I would add that Sizewell B was commissioned in February 1995, easily the fastest construction of a commercial nuclear power station in the UK. Unfortunately the privatisations of the electricity generation industry in the early 1990s under the Major government prevented the building of the other three similar PWR stations that had initially been planned. We could really do with those other three "Sizewell B's" now. It's worth noting that it was political action which stopped them.

Readers will note that the above quote implies, correctly, that the government did not fund Hinkley C. Indeed, at the time (the late 1990s) the sale of British Energy was the only way that any new nuclear build could be accomplished. The government cashed-in from the sale but funding for Hinkley C had to come from EDF (France, two-thirds) and China (one-third). The government's backing for new nuclear build is thus a major *volte-face* from the policy during the Blair/Brown era. So, again because of political obstruction, we have lost a quarter of a century during which we should have been building new nuclear capacity.

The government's determination to continue their Net Zero strategy only makes the requirement for new nuclear build even more staringly obvious. And, as I noted in Nuclear Power v Covid-19, they cannot claim they do not have the cash after blowing £376B on eminently avoidable lockdowns. However, let me not carp over much as it appears that the government has now accepted the inevitable. Quote,

“Today the government is driving forward plans to build a secure energy future, creating cheaper, cleaner energy from British sources, for Britain. This includes continuing the revitalisation of the UK nuclear industry by confirming the first state backing of a nuclear project in over 30 years.”

“To support this, the UK is working at pace to set up Great British Nuclear, the vehicle tasked with developing a resilient pipeline of new nuclear builds, with an announcement expected early in the new year.”

This is all good, but not before time.

And one of the best bits is this, “The investment (in Sizewell C) also allows for China General Nuclear’s (CGN) exit from the project, including buy-out costs, any tax due and commercial arrangements”. Finally, some sense on China, whose expansionist policies must be resisted. (One wonders how this rejection of China might affect the Chancellor, Jeremy Hunt, who was a co-author of the announcement).

At this point the announcement makes reference to the Energy Bill (now the Energy Act 2023) part of whose purpose is “to put in place powers to shield Britain from global forces and secure energy for future generations”. I shall have to get to grips with the Act at some point, but for now I merely note that it is very long and addresses a wide range of issues.

Unfortunately Grant Shapps did not resist blaming record high gas prices on Putin. Certainly Putin has made things much worse, but he is also a convenient scapegoat for government and opposition alike (and the destruction of Nordstream was the USA, not Russia). As I pointed out in Subsidies to Renewables: Who Pays and How Much? the huge wholesale gas price hike started several months before Putin’s invasion of Ukraine (see Figure 1 of that post).

Net Zero is an economically suicidal strategy which remains government policy because it has attained the force of moral obligation – powered by a climate change narrative which articles on this site show to be wildly exaggerated. This does not mean we should be complacent about CO2 releases or climate change, only that the current absolutist political position is more detrimental than helpful. Breaking the economy and becoming a third world country will not help the environment – quite the opposite.

The announcement also “sets a new ambition to reduce energy demand by 15% by 2030. This is backed by a new £1 billion ECO+ insulation scheme, and a major expansion to the government’s public awareness campaign”. Hmm, motherhood and apple pie. One cannot speak against improving efficiency but they ignore the linkage between energy consumption and economic prosperity. Forcing energy usage reductions is likely to result in economic decline as well, as if things were not bad enough. Part of the Energy Bill will strengthen arrangements for “smart” devices, I presume including smart meters. These smart devices could be used to micro-manage demand. This could be done by variable pricing (e.g., at every 30 minute bidding period) or, more draconianly, by remotely authorised disconnections or by automatically switching off smart devices when supply decreases (i.e., when the wind drops).

The government's policy remains to massively expand offshore wind to a total of 50 GW. That also creates an economic challenge because, as shown in Could Wind Power Alone Be Enough?, however large the installed capacity of wind, there will need to be close to 100% backup for it from sources which can be on the grid very quickly indeed. Obliging plant of huge capital cost to stand idle for much of the time can only mean they must be paid well over the odds when they are required to run, as well as being paid to be available when off-load. This is almost as economically bleedin' obvious as the fact that the wind does not always blow. It is remarkable how stupid policy decisions can be when political *force majeure*, or ideological blindness, is in control. The emperor's nakedness must never be mentioned.

If the government truly wants to phase out generation by gas, then what will replace it as the required near-100% backup for peak demand when wind fails? Nuclear generation is not the ideal vehicle for peak-lopping, though the ability of PWRs to load-follow is greater than their usual role as base load suggests. A range between 30% and 100% is feasible, and could be accomplished in around 15 minutes. This is potentially useful. But the run-up of a PWR from zero will always be a longer process, so the 30% to 100% range would only be available if the PWR were running at 30% whilst the wind blew. Is this a feasible scenario – if it were supposed to apply, not just occasionally, but to a lot of nukes almost all the time? I stand to be corrected, but it seems an unlikely operating approach. And, in any case, I'd have concerns over reactor poison management if the load were up and down like a yoyo.

The killer solution would be the development of high temperature reactors coupled to industrial scale hydrogen production. This presupposes that a (partly) hydrogen economy took off in parallel, mainly to supply hydrogen for domestic heating and industrial uses, but possibly also for gas powered vehicles. The nukes would then run at full power all the time they were available, pumping energy into hydrogen production whilst the wind blew and being switched to generating for the grid when the wind dropped. Turbines would need to be kept spinning in readiness, perhaps by always generating at least a small amount. The idea is good, but both the high temperature reactor design and the process for hydrogen production on an industrial scale need a great deal of development. What a pity we didn't start 25 years ago.

Stop Press: As of September 2024, Great British Nuclear continues to run its small modular reactor (SMR) competition, the purpose of which is to choose designs to be awarded co-funding contracts in late 2024, supporting the development and regulatory approval process, to prepare bids for an SMR final investment decision in 2029.