

NUCLEAR CONSULTING GROUP – WRITTEN EVIDENCE ESI0033 – UK ENERGY SUPPLY AND INVESTMENT

Introduction

The House of Lords Economic Affairs Committee, chaired by Lord Bridges of Headley, has launched an inquiry on UK energy supply and investment.

Our written evidence response focusses on the issue of whether the Regulated Asset Base (RAB) mechanism is a suitable business model for financing new nuclear power stations and whether it is fair for consumers to shoulder the financial risk the RAB model would inevitably impose on them.

It is clear that new nuclear cannot help in any way with the current energy crisis of cost and security of supply and it is highly unlikely new nuclear plants could be built in time to help achieve the Net Zero by 2050 target. The Government's Impact Assessment published with the RAB legislation states the government does not expect the first station in a new reactor programme would be operational before 2036 at the earliest.

More importantly, given its very slow deployment and the government's target of decarbonising electricity generation by 2035, new nuclear cannot make any significant contribution to UK Net Zero policy. If new nuclear is to be justified, it has to be on grounds that it is cheaper than the alternative methods of generating low-carbon electricity.

We therefore judge that the Government's plan for 24GW (8 new stations) of new nuclear capacity is unjustified given that renewable generation costs have been falling rapidly and are far lower than nuclear, renewable deployment is far quicker, far more effective, and the projects are far less vulnerable to failure before completion.

It should also be noted that new nuclear does not address any issue of relative renewable intermittency, given that, on economic or technical grounds, nuclear technology is not appropriate for 'load-following'. So, in a system where nuclear meets baseload, there will still be a need for flexible capacity to meet demand when, as is always the case, demand is higher than base-load level.

Further, as knowledge of enhanced climate sensitivity and polar ice melt-rate evolves, it has become clear that sea-level rise is significantly faster than previously thought. There will also be more frequent and destructive storms, storm surges, severe precipitation, and flooding. With rare extreme events today becoming the norm in the future, existing risk mitigation measures become increasingly obsolete.

The corollary to this analysis is that the sites planned for new nuclear capacity are coastal locations, at significant risk from climate change. In other words, the claimed advantage that nuclear power is low carbon has to be balanced against the climate threat. UK nuclear will be one of the first, and most significant, casualties to climate impact. Put simply, UK nuclear is on the front-line of climate change – and not in a good way.

Is the Regulated Asset Based (RAB) mechanism a suitable business model and is it fair for consumers to shoulder the risk it will place on them?

How will electricity be bought and sold and at what price? The document is silent about how the electricity will be priced, bought, and sold. Will the power be bought by the Low Carbon Contract Company and then sold on to electricity retailers as will be the case for Hinkley Point C? Will all electricity retailers be required to buy their share of the output, even renewables-only retailers? Will all consumers be required to buy the power, including electric intensive industry?

It appears the kWh price consumers will have to pay will be set at whatever level is necessary, however high, to generate enough income to provide the plant owners with their guaranteed income. It is stated that the guaranteed income including allowed expenditure (such as O&M costs) and return on capital will be reviewed every five years by the Gas and Electricity Markets Authority. How much scope will there be to make these parameters more challenging? If there is significant scope, this risk be a significant deterrent to potential investors.

Will there be a target load factor, which will determine how many kWh of electricity should be produced? How much scope will there be to revise the allowed rate of return on the asset base? If the actual load factor is low requiring a higher than forecast power purchase price to generate the allowed income, will there be any risk sharing? Will there be any 'price-smoothing' in such cases? If there is this will deter potential investors?

Who will pay to bring the project to the point of designation?

It will only be when the project has been designated that a Final Investment Decision (FID) can be taken. The designation criteria are: the Secretary of State is of the opinion that the development of the nuclear project is sufficiently advanced to justify the designation of the nuclear company in relation to the project, and; the Secretary of State is of the opinion that designating the nuclear company in relation to the project is likely to result in value for money.'

This definition will require the design to pass the Generic Design Assessment (GDA) process to ensure the design meets the UK's safety regulatory standards (or an alternative process of comparable rigour); a site to be identified and purchased; the site to undergo the technical assessment to determine its suitability (geology, vulnerability to inundation); the site to get through the Planning Assessment process.

The Sizewell C project had already cost about £500m by end 2021 to get within 2-3 years of an FID. This figure does not include the cost of site purchase and GDA process because the site was already owned by EDF and the technology proposed had already passed the GDA for the Hinkley Point C project. So, the total cost to get to FID is likely to be in excess of £1bn. Institutional investors will not be willing to invest until the project is designated, so who would pay for this stage? If the government's process of assessing whether the project should be designated is rigorous, this expenditure would inevitably prove risky. So, we might be looking at an element of the development process alone costing in excess of £1bn.

Great Britain Nuclear, the new government-owned entity announced in the British Energy Security Strategy, is strangely not mentioned in this document even though it has the updated details of the new nuclear development plan. Will this body, i.e., taxpayers, have to pay for projects to get to try to get to FID?

What risks will be shared, with whom and in what proportion?

While there are repeated mentions of risk-sharing, there is no detail on what risks would be shared, how and in what proportion. All recent experience with nuclear projects worldwide shows construction cost and time overrun is clearly a huge risk. There is no detail on why any expenditure incurred would be disallowed from inclusion in the asset value on which the allowed return would be paid. Would load factor and O&M costs be subject to risk sharing and, if so, how?

Has this been tried before?

In the US, as in UK, the high cost of building nuclear plants and the poor record of completing plants to cost and time brought nuclear ordering to an end. In the US, no reactor order not subsequently cancelled was placed after 1974. By 1980 more than 100 orders had been cancelled. Bad experience of cost overruns meant regulators were unwilling to allow electric utilities carte blanche to recover whatever costs they incurred building nuclear plants no matter how high. This meant utilities risked not being able to recover their costs putting them at risk of bankruptcy and this, in turn meant financial institutions were unwilling to lend money to nuclear projects because of the risk their loans would not be repaid.

From 2000 onwards, to get round this problem, in a few states, state electricity regulators gave strong assurances that all costs incurred could be passed on to consumers and allowed utilities to charge consumers for finance costs during the construction phase, known as Early Cost Recovery (ECR). This was counter to all previous US regulatory practice that consumers would not pay for facilities until they were complete, and regulators had satisfied themselves that the facilities would be 'used and useful' and the costs incurred 'prudent'

In short, electricity consumers were forced to pay all the interest charges associated with construction during the construction period. Two projects were launched using this method with construction on them starting in 2013. As in Britain, ECR (i.e., the U.S. version of RAB) was sold to U.S. policymakers by utilities as a way to reduce the finance costs by forcing consumers to pay some of these costs and to reduce the interest rate by transferring the project risk from the companies financing the plant to consumers. To back this, the Federal Government also offered loan guarantees for nuclear projects, shifting some of the project risk from financiers to taxpayers. This would create the illusion of making nuclear power more competitive with other generating sources.

But as U.S. experience was soon to prove, the lower finance cost was not a true saving. At its peak, the "Nuclear Renaissance" promoted by the Federal Government consisted of applications to build 31 units pending at the Nuclear Regulatory Commission. Twenty seven of the thirty-one have been cancelled

with two more abandoned after 4 years of construction. Despite expenditures exceeding \$20 billion, no new U.S. nuclear plants have gone into service. The units in states without ECR were cancelled before large sums were spent on them. In states with ECR, the owners were more willing to incur exposure to large sums. In South Carolina the would-be builders of the two VC Summer units spent \$9 billion before the bankruptcy of the lead contractor Westinghouse caused them to cancel the project. By this time, the project was running several years late and was expected to cost about 5 times the forecast cost.

More than a billion dollars were spent on the Levy County units in Florida and several hundred million apiece on additional units in Florida, North and South Carolina. Only the Vogtle project (two reactors) of the original 31 "renaissance" reactors remains. The project is not complete but is already 5 years late and far over budget and will generate extremely expensive electricity when it is completed. While the U.S. electric customers are exposed to paying more than \$10 billion for cancelled nuclear plants and another \$13.5 billion in cost-overruns, no reactors have come online as a result of the U.S. shift to the U.S version of RAB. Florida and South Carolina have repealed the laws allowing ECR. No U.S. States have enacted such laws in the last decade there is no prospect of orders for new large reactors in the foreseeable future.

Recursive questions and responses to and from HMG on this issue have failed to provide any meaningful insight or clarification as to why the US experience has not informed HMG thinking on RAB. HMG suggest that there is a 'difference' between the two - but have not specified how or why in any substantive sense.

Concluding Comments

The unfortunate reality is that new nuclear construction is significantly more expensive than renewable energy in terms of electricity production and CO2 mitigation, even taking into account the cost of grid management tools such as energy storage - and therefore new nuclear is dependent on very large public subsidy.

The Regulated Asset Base (RAB) mechanism that essentially comprises this public subsidy is subject to considerable uncertainty. Further, there is no question but that if RAB were to be enacted, the hard-pressed UK taxpayer and electricity consumer would carry a very great fiscal burden, especially if (as with all EPR new-builds) construction costs and time-lines over-run.

29 April 2022

Prof Steve Thomas

Coordinating Editor, Energy Policy

**Emeritus Professor of Energy Policy, Public Services International
Research Unit Business School, University of Greenwich**

Dr Paul Dorfman Associate Fellow, Science Policy Research Unit, Sussex Energy Group, University of Sussex

Member, Irish Govt Environment Protection Agency, Radiological Protection Advisory Committee

Chair, Nuclear Consulting Group