Britain's disappearing nuclear power programme

At the end of 2010 the Government announced plans for an allegedly revolutionary 'Electricity Market Reform'. This was chiefly concerned with an objective of incentivising a programme of building 'cost-effective' new nuclear power stations that were deemed essential to keeping the lights on. Yet now the plans for new nuclear power plants are falling apart. It seems that they are neither more cost-effective than alternative renewable sources, nor are they essential to keeping the lights on. The reason for this apparent policy failure is because the evidence was never seriously considered. Rather the Government is dominated by embedded pro-nuclear interests which select the evidence to suit their policy preferences for what has been called the 'nuclear renaissance'. Meanwhile the UK is falling behind many other countries in the efforts to expand the provision of clean, sustainable energy.

The UK's much heralded programme of building new nuclear power stations has faltered. This central aspect of the Government's Electricity Market Reform (EMR), billed as essential to decarbonising the economy and 'keeping the lights' on, appears to be on the brink of collapse. How and why has this come about, and what are its implications? This paper analyses how it is that a set of beliefs about nuclear power that appear in conflict with the reality of energy outcomes has been entrenched so firmly in policy.

UK Government policy has, since a White Paper issued in 2006[1], established the building of new nuclear power stations as a central element of UK energy policy. Four themes emerged from then onwards; the need to counter a perceived electricity 'generation gap' as old coal and nuclear power stations were retired, second the need to reduce carbon emissions, third to reduce dependency on imports of natural gas, and fourth, rising energy prices. The impression was given by the Labour Government from 2006 onwards of an imminent nuclear revival. There was much talk about the cheapness of new designs for nuclear reactors. For nuclear supporters the Holy Grail was the French nuclear programme of the 1970s and 1980s, which built up the present system whereby around 75 per cent of French electricity comes from nuclear power. A well organised, centrally co-ordinated, system of building tried-and-tested 'pressurised water reactors' (PWRs) developed in the USA was said to have produced a relatively cheap nuclear programme. Nuclear advocates argue that this could be a model for the UK in the 21st century, with a new French reactor design, the European Pressurised Reactor (EPR) being a leading technological candidate. The UK and French Governments are fond of issuing press releases about this joint venture.

Indeed so forceful and comprehensive was the public relations offensive led by the nuclear industry that surely only the fools and sectarians could deny the inevitable forward march towards nuclear construction. Nevertheless, behind the scenes, academic and industry analysts were acutely aware that little was likely to happen without some system whereby long term financial guarantees were given to nuclear development companies assuring them that they could make money on their investments in the nuclear projects. In practice the Labour Government was simply unwilling to give sufficient financial 'muscle' to enable their words to be shoe-horned into reality. Tony Blair was a

keen nuclear enthusiast, but Gordon Brown and the Treasury were less keen on allowing the necessary incentives to be allocated to nuclear power.

Then, shortly before the 2010 General Election, the Conservatives announced that they would put some muscle into a nuclear new build programme. A strong nuclear commitment was inserted into the coalition agreement, despite the Liberal Democrat policy of opposition to new-build nuclear power. Chris Huhne became the new Secretary of State at the Department of Energy and Climate Change (DECC), and he announced the nuclear march forward. He also said that there would be no subsidies for nuclear power. Given the fact, as discussed later, that nuclear cannot be funded without state subsidies, he was, in effect, (whether he realised it or not) saying that new nuclear build was a non-starter. A radical restructuring of the electricity system was trailed by the Government in the consultative document for 'Electricity Market Reform' (EMR), published in December 2010. This became a White Paper the following summer[2]. A large nuclear construction programme was outlined to be completed by 2025. This would replace, and expand production compared to the current nuclear fleet which, at its peak, supplied around 20 per cent of UK electricity supply. While the Government insisted that there would be no public subsidies for nuclear power, it simultaneously announced that nuclear power would be given the same incentives as renewable energy.

The policy had two key measures helping to promote nuclear power. First was the idea of a carbon floor price that would ensure that whatever happened in the EU market for carbon emissions allowances, there would be a known minimum addition to the price of fossil fuel electricity. This would give non-fossil fuels (nuclear and renewables) a price advantage since their costs are unaffected by carbon prices. The idea was attractive to the Treasury since the minimum floor price is guaranteed through the levying of a tax which generates revenue. The carbon floor price is less useful in encouraging investment in low carbon energy plant. This is partly because it is politically very difficult to set a floor price that would encourage investment in low carbon energy sources given that energy prices would have to be pushed up very high indeed in order to achieve significant amounts of low carbon investments. In addition developers cannot borrow the money needed to invest in such plant on the basis of a government statement that a tax will be at a certain level in ten or twenty years time. Legally enforceable contracts offering good prices in return for energy production are necessary to secure bank loans.

The second, crucial, measure promoting nuclear power was that nuclear power developers, as well as renewable energy developers, would be given contracts under which they are paid premium prices for their production set in advance over, say, 20 years. These were called 'feed-in tariffs' (FITs), based on a system that has been used in Germany, Spain, France and many other countries to promote renewable energy such as wind power and solar power. This was a key change since it would offer incentives to new nuclear developers that were broadly comparable to incentives that renewable energy sources had been enjoying for several years in the UK under the 'Renewables Obligation'. The cost of providing such incentives is borne by electricity consumers through their bills.

Yet, complexity was introduced into the proposals by making the feed-in tariffs operate through the existing electricity market arrangements necessitating a poorly understood mechanism called

'contracts for differences'. The arrangements were widely criticised as an attempt to obscure the fact that despite the commitment in the party manifestos and the Coalition Agreement that nuclear would not receive public subsidies, nuclear power was, in effect, going to receive subsidies[3]. Nuclear critics, of course, argue that nuclear power already receives substantial state subsidies in various forms.

Nevertheless, it seemed from official accounts that nuclear power would beat its other (renewable) low carbon competition on commercial terms. The Committee on Climate Change asserted, as part of its review into renewable energy, that nuclear power was the most 'cost effective' low carbon source[4].

However, despite a string of positive sounding press announcements about the progress being made, it proved difficult in practice to persuade major electricity companies to make the investment decisions needed to have the plant built. City analysts doubted whether the nuclear programme could be financed under the Government's proposed policy framework[5]. Southern and Scottish Electricity withdrew their intention to invest in nuclear power in September 2011, followed, in March 2012, by withdrawal of interest by E.ON and RWE. Then the second consortium, led by GDF-Suez announced that the incentives proposed by the Government were insufficient and announced the suspension of their plans until at least 2015. Finally, in May, directly after the French Presidential elections, EDF announced that it was postponing the start of work on its first new nuclear build project at Hinkley C. There are no other proposals to build nuclear power plant.

There is a yawning gap between what Government and its agencies have said about the cost of nuclear power compared to renewables and energy efficiency and reality. Nuclear power is, according to White Papers and reports by the Committee on Climate Change, the most 'cost-effective' low carbon electricity option. So how is it that renewable energy projects can be financed and developed whilst there are so many doubts about whether a similar system of 'feed-in tariffs' for nuclear will deliver nuclear projects? How can this apparent dissonance between the Government narrative and actual events be explained?

Reasons for nuclear decline

The Fukushima nuclear accident, in March 2011, has sapped political support for nuclear power. However even without this event the British nuclear programme would still have considerable problems. Two central pillars of 'nuclear inevitability', that is the 'generation gap' and the alleged low carbon cost-effectiveness of nuclear power, have all along been figments of the nuclear industry's imagination.

The Government's own projections of availability of generation capacity now suggest that in 2025, there would still be just about enough capacity to cover current peak electricity demand even without any contribution from 'variable' renewable energy supplies[6]. This is the position even if no other generating plant were built, and taking into account projected plant closures. Yet there are plenty of plans for more gas fired power stations to be built, so it does seem that there is no danger

of the lights going out. Indeed the Government, in its EMR, is proposing further measures to promote the building of gas fired power stations. Even keen nuclear advocates such as Dieter Helm are prone to talk about the large extent of natural gas resources, although also combined with an effort to criticise extensive plans for windfarms[7].

An especially tendentious part of the Government narrative has been the alleged low cost of nuclear power itself. The treatment of nuclear costs by the Government is certainly at variance with the calculations made by investment houses that deal in energy. Moreover the comparisons with renewable energy costs can only be described as 'Orwellian'. According to Government figures nuclear power is the cheapest long-term low carbon option, although in the short term, according to the Government's own EMR proposals, onshore wind power is, on average, probably cheaper [8]. This conclusion is reached by imagining that nuclear power (in the guise of a new reactor design) is some sort of new technology while renewables such as wind power are relatively old technologies. Many would argue that this is as being contrary to commercial reality and that the attempt to sell nuclear power stations as a 'new', 'cheap', technology compared to renewable energy is a piece of doublethink straight out of Orwell's '1984'.

In Britain the pro-nuclear establishment has always maintained the over-enthusiastic myths about the cost-effectiveness of proposed nuclear plant. The AGR reactor programme in the 1960s to 1980s, plant for reprocessing spent nuclear fuel and Sizewell B power station (completed in 1995) were going to be cost effective. The MOx fuel plant, which started operation in 2001 was going to make a profit. None of these things have ever happened. The AGR programme has been widely regarded as a disaster, Sizewell B had to be bailed out with subsidies to cover its construction costs following electricity privatisation and the MOx plant is now being closed down. Over the decades increasing demands for higher environmental and safety standards for nuclear power plant have increased their construction cost – indeed one by product of Fukushima may be to increase nuclear construction costs even more. However, another crucial factor often overlooked is the impact of privatisation and market liberalisation on nuclear costs. In the past nuclear power stations have been funded more or less directly by state owned organisations who have guaranteed that whatever production costs are run up, the building costs will be paid, and the energy then sold onto consumers by monopoly suppliers.

Under liberalised energy markets capital has to be raised privately and energy suppliers have to compete with others to supply the energy to consumers. Nuclear power stations have long construction lead times during which investment is committed long before any financial return from sales of electricity. Uncertainties about construction time are toxic for nuclear power plant since private capital is not cheap and interest charges ramp up very dramatically if there are delays in construction. It is very, very difficult to fund nuclear power by risk averse private investors in liberalised energy markets. To compound this problem, the only two EPR plants being built (one in Finland and also one in France) have fallen terribly behind construction schedule, and the costs have rocketed. Under liberalised market arrangements, nuclear power is effectively un-financeable through conventional private sector money raising operations. The two EPRs in Finland and France were financed only because their costs were underwritten by the French Government, either directly through EDF, or (in Finland) through the French state-owned nuclear constructor AREVA.

The lack of private finance for nuclear power undermines Government policy of offering renewable energy-style 'feed-in tariffs ' to nuclear projects. This factor alone makes nonsense of the claims, from the Government and the (quango) Committee on Climate Change, that nuclear power is cheaper than renewables. A nuclear feed-in tariff would have to be set at a ridiculously high level if nuclear power has to be financed through the same financial mechanisms utilised by renewable energy projects. The nuclear operators would have to be paid a lot more than offshore windfarms. Institutions such as merchant banks and pension funds will lend to windfarms, but not nuclear power stations, at least not without further government guarantees.

Now that EDF has been part privatised and exposed to market liberalisation measures in France itself, EDF is no longer able to borrow money using interest rates similar to that paid on government bonds. It has to raise it on the private markets and it can no longer enjoy a monopoly in supplying electricity. EDF cannot afford to have many unsecured new nuclear investments connected with its balance sheets. It seems unlikely that EDF will be able to build any more nuclear power stations in France. If EDF goes ahead with its British nuclear plans it will face a downgrade by credit rating agencies, which could depress its share prices and escalate its general borrowing costs through higher interest rates[9]. A recent survey by the French state auditors is revealing many of the details of state support for French nuclear power and that the image of 'cheap' French nuclear power was a mirage[10].

The British Treasury is wary of giving EDF a blank cheque that would be paid by electricity consumers. In the days of nationalised energy, and in the transition period to liberalised markets (when Sizewell B was completed with the 'fossil fuel levy' in the early 1990s), it was easier to keep such arrangements confidential. Giving a blank cheque to nuclear would contradict Treasury attempts to set strict funding envelopes for renewable energy funding. The renewables lobby would demand a similar guarantee to that given to nuclear power. In addition such an arrangement would run counter to EU 'state aid' rules and would also count towards the PSBR, thus threatening the Treasury's debt reduction plans. In short, there seems little chance of any nuclear power stations being built.

The failure of the MOx plant in Sellafield, and the bail out of a bankrupt British Energy in 2002 (when electricity prices fell below the operating costs of nuclear plant), gives nuclear a bad financial reputation. The Treasury is dismayed by the substantial taxpayer public subsidies going to manage nuclear decommissioning and waste management. Whilst the Treasury is reluctant to give nuclear power a 'blank cheque' it is under very great pressure to do precisely this from a lobby that has immense strength in Whitehall.

Nuclear conspiracy?

Two factors are important in explaining the influence of nuclear power interests over UK energy policy. One is the relative weakness of anti-nuclear activism in the UK compared to other countries. There has never been a strategic decision not to build more nuclear power in the UK (Scotland under

the SNP aside). Nuclear's failure to make up more of the share of electricity generation than it does is explained by the poor technological choices made by nuclear planners in the past and also the failure of the Thatcher Government to understand the impact of privatisation and liberalisation on the nuclear power programme. The new companies had to source their finance for new plant privately, and were in competition to generate at low prices. Hence the privatised energy companies had to invest in power plant from which they could earn a quick return. The costs of borrowing on private markets are higher than borrowing from the government. This increased still further nuclear construction costs which are in any case inherently uncertain, making the nuclear projects unviable – that is without a subsidy or government cost recovery guarantee.

However, the crucial second factor explaining the extent of nuclear influence is that nuclear interests are entrenched in Whitehall. Jonathan Porritt served nine years as Chair of the Sustainable Development Commission, starting in 2000, and observed what he sees as the unique dominating role of the nuclear power industry. He says:

'I'm amazed nobody's tried to do the book about how the nuclear industry took control of the Civil Service.....how they managed then to retain control of a cabal of senior officials inside the relevant departments to the extent that policy making in the UK on nuclear has never been subject to the same evidence tests, the same financial tests, the same requirements on integrity, governance, performance, any of the same standards that you would expect in any of the other areas. How has that happened? And I have absolutely no hesitation in saying that that relationship between the industry and the senior Civil Service which always survives ministerial changes, just runs and runs.' (interview 14/03/2012)

Despite its influence throughout much of Government, especially in the ministries, such as DECC, that have held the energy brief, nuclear does not have total dominance over the Treasury. Nevertheless the nuclear industry still has firm control over the Government pro-nuclear narrative, and, it seems, the story as told by the Committee on Climate Change (CCC). The CCC was established as a consequence of the 2008 Climate Change Act and has a statutory duty to advise the Government on progress towards the ambitious target of reducing carbon dioxide emissions by 80 per cent of 1990 levels by 2050. Its statutory position makes it difficult to abolish. In contrast to the CCC, the SDC was prone to a heavy degree of nuclear scepticism. Its abolition, soon after the Coalition took office, gave the CCC a clear field to give undisputed quango advice that nuclear power was the most 'cost effective' low carbon source of electricity supply. Porritt is very critical of this judgement by the CCC: '[The] nuclear industry has .....very good relationships with individual members of the Committee on Climate Change and indeed with the Secretariat. Otherwise they could never have made that mistake, in my opinion' (interview 14/03/ 2012).

The nuclear industry has, since its genesis as an offshoot of the nuclear arms programme in the 1950s, been deeply entrenched in government-directed spending programmes supporting all of the major nuclear facilities, reprocessing facilities, MOx fabrication plant as well as the power stations themselves. This has left a path dependent momentum, underpinned by a self-justifying nuclear power ideology. The ideology involves the vision (or nightmare according to anti-nuclear campaigners) of a self-contained nuclear cycle, called the 'plutonium economy' by critics. Initially uranium is mined, made into fuel, used in the power plant and then 'recycled' through 'reprocessing'

spent nuclear fuel. Plutonium and also the fissionable uranium that is generated in the power stations are recovered. The plutonium can be fabricated into what is called 'mixed oxide' (MOx) fuel, which can then be used in nuclear power stations designed to take this fuel. The fissionable uranium can be used in something called 'fast breeder reactors' which actually generate plutonium fuel in the process of operation. The UK has massive stores of plutonium left over from the nuclear arms programme. This has been seized upon by the nuclear industry to justify building MOx fabrication plant to make 'use' of this material.

Critics have pointed to many problems with these processes. Reprocessing generates increased levels of nuclear waste (hence the controversies about reprocessing plant at Sellafield), it is linked to production or use of nuclear weapons grade material. Most chillingly of all, to some Treasury officials, it has a terrible financial record. MOx production factories and fast breeder reactors have a strikingly poor technical and financial record, despite over 50 years of research, demonstration and attempted commercial application both in the UK and around the world.

Yet the ideological commitment among many in the British energy establishment to the nuclear vision remains high, including supporters such as Sir David King and the much lauded David McKay. The mixture of a deeply embedded industrial-Whitehall nuclear complex and a self-justifying 'plutonium economy' worldview is powerful.

Part of the nuclear power industry is still run, under the authority of DECC, as a 'non-departmental public body' by the Nuclear Decommissioning Agency (NDA). The NDA is a symbol of key failures of nuclear power –its nuclear waste, decommissioning and plutonium legacy. These failed remnants of 1950s nuclear ideology are much bigger in the UK compared to most other countries because of the nuclear fuel reprocessing plants and MOx fuel fabrication facilities at Sellafield. The UK clings to the plutonium economy vision long after most of the rest of the world has long abandoned it.

The continued state ownership of this toxic trade is required because dealing with nuclear waste, decommissioning and its various other reprocessing and fuel fabrication activities are all implicit loss-makers with little in the way of income streams. They require considerable direct funding by the taxpayer of approaching £7 billion a year, according to green critics[11]. Yet, the fact that the NDA is part of Government itself, and also manages facilities such as the MOx plant means that the nuclear industry has a direct channel into Whitehall circles to press the interests of the whole nuclear industry. This is the political irony behind much of nuclear power's policy sway in Government. This influence continues despite the history of technical and financial failure, and the more it fails, it seems, the more its influence persists. There is no meaningful exercise in 'evidence based policy' because the evidence is tailored to suit the needs of a pre-determined pro-nuclear policy narrative.

The Nuclear industry is thus able to use DECC as a vehicle to try to keep up the flow of taxpayer's money into new projects that are immune from the commercial criteria applied to other parts of the energy sector. The nuclear lobby is able to write the Government narrative because, essentially, it is the Government. It should be no surprise that the French designed EPR is the favoured power

station since the EPR is designed to use MOx fuel. The alleged need to build EPRs can be used as a justification to use taxpayer money once more to build another MOx plant to supply their fuel. The narrative and the interests they serve are neatly reinforcing and self-justifying without any need for satisfying commercial criteria or alternative rational arguments. This is all despite that fact that a lot of the influence of the nuclear industry within government rests on the need to deal with its industrial and environmental shortcomings.

Part of what has been (in UK energy policy terms) the all-pervasive pro-nuclear narrative has been the (relatively recent) governmental assertion that nuclear is a 'green' choice. Leading individuals associated with environmental concerns such as James Lovelock, George Monbiot and even an ex-Director of Greenpeace (Stephen Tindale) have attested to nuclear's green credentials on account of its alleged irreplaceability in countering the threat of climate change. However, what it clear is that the organisations that traditionally represent green ideological campaigners, the most important of which are Friends of the Earth, Greenpeace, and the Green Party, have always been, are now, and no doubt will remain, solidly opposed to building any more nuclear power stations. They argue that there are better ways of dealing with climate change. Four past directors of Friends of the Earth, led by Tom Burke (and including Jonathan Porritt) have issued a series of detailed briefings against plans for new nuclear build. What they say complements the tone of this paper which attacks the pro-nuclear stance of the Government. This paper, however, gives more or the political background and also puts Government policy in the context of policies of other countries.

A non-nuclear alternative?

Almost by definition (given the strict 'budget' guidelines issued by the Treasury), if the Government sets aside a major proportion of incentives for nuclear power, then there is less available for renewable energy. It might be thought that, as seems almost certain, the UK new build nuclear programme fails to materialise, then renewable energy will benefit. However, as things stand this seems unlikely to happen. The Government will, in order to deflect criticism of a failing policy, continue to insist that the nuclear build programme will yet happen. Subsidies otherwise earmarked for nuclear will thus not be diverted to spend on renewables.

The UK's policy focus on nuclear power appears to be dragging the renewables programme down compared to other EU states. The EMR package means that the UK is almost certain to miss its target under the 2009 EU Renewable Energy Directive by a wide margin. On top of this the UK starts from a very low base, generating a lower proportion of its energy from renewables than any other EU state apart from Luxembourg and Malta[12].

One way of increasing the proportion of renewable energy is simply by reducing demand for energy in general. Yet commitments to 'zero' carbon building have been rendered almost meaningless. The Government's proposed 'Electricity Market Reform' contains no measures to boost energy efficiency.

The renewable energy lobby itself has grown in industrial and political strength in recent years as major energy companies have used the incentives available under the 'Renewables Obligation' (established in 2003) to invest in large onshore and offshore windfarms. Yet the renewables lobby, unlike the nuclear industry, is based in the private sector, and it is not embedded in government.

The Government has already decided to cut incentives available under the Renewables Obligation and existing feed-in tariffs for wind power and solar power. Then, after 2017, according to the EMR, Renewables Obligation incentives for new wind power projects will be replaced by 'auctioning' of contracts. Although billed as a device to improve cost-effectiveness, such tactics are likely to cutback drastically on windfarm deployment. 'Auctioning' of contracts has always been followed, in the past, by the non-delivery of the majority of projects, as companies put in speculative low bids for projects that later prove to be uneconomic. The Treasury is proposing 'caps' on renewables spending, allegedly to protect consumer electricity bills. Yet this leaves consumers open to volatile price fluctuations caused by the additional gas consumption that follows as a result of having less renewables.

In addition, under the proposals, it will be very difficult for independent companies, including community renewables projects and even quite large projects, to have access to the same sort of contracts giving premium prices that will be available to the main electricity companies. Indeed, early signs are that opportunities for development for independent renewable companies will disappear by the end of 2014 as the 'transitional' phase of EMR begins. It is ironic that at a time when the 'Big Six' energy companies are under increased criticism the Government is installing a system that will give them even greater control over the renewables market that exists already. This will reduce competition in the electricity system. The most decentralised form of renewable energy, solar power, is also under attack. Incentives for solar photovoltaics have been cut back to a level virtually designed to ensure that the fledging industry is choked off. Meanwhile gas fired power stations will receive subsidies under the 'capacity mechanism' proposed by EMR and it is likely that investments in gas fired power stations will be given state backed guarantees under the Government's infrastructure investment programme.

Conclusion

The prime policy focus on nuclear power means that the UK is falling more and more behind countries such as China and Germany in the emphasis that they are putting on renewable energy. The Government continues to issue statements justifying the unlikely possibility that nuclear power stations are going to be built, and this in itself distracts policy attention from the need to develop renewables and energy efficiency. Rather than focusing on how to increase increasingly large quantities of variable renewable energy sources such as wind power and solar power into the grid the UK policy is hamstrung by the continued belief in a non-existent nuclear power programme. The Germans are developing renewables much more quickly than the UK and they are actively phasing out existing nuclear power plant, something that the British establishment finds incomprehensible. Many appreciate the advantages of renewable energy and energy conservation in providing clean low carbon supplies and in minimising volatile energy price movements associated with reliance on imported fossil fuels or uranium supplies.

Nuclear power dominates British policymaking partly because its failed loss-making relics are being run as part of the Government, thus giving nuclear power disproportionate influence within government over British energy policy. What really needs to happen is for the British Government to recognise that nuclear power is not a viable option. Then we will be free of the distraction of nuclear power as a policy option. Regrettably, there seems to be little possibility that this

institutional baggage that gives the nuclear dinosaur such a privileged place in Government policymaking machinery will be seriously challenged any time soon.

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