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1. Nuclear future hangs by a thread

Negotiations over the guaranteed price which EDF hopes to receive for Hinkley Point C electricity have dragged on for yet another month, continuing past EDF's self-imposed deadline of 31st March. The Government had hoped to announce a deal in the Budget on 20th March, but only managed to confirm that it was granting planning permission the day before.

Why is it proving so difficult to close the deal, asks Nick Butler in the *Financial Times*? The negotiations have focused on the so called "strike price" and on the allocation of risk around the £14bn construction cost of two EPR reactors. Butler says the UK government wants a strike price of around £65 to £70 per MWh, although other commentators have said £80/MWh. The Government will remember that in 2008 EDF talked about a price of £45 per MWh. EDF now wants between £95 and £100. Butler says the allocation of the risks is even more important than the strike price. Unless the Government is careful it could end up paying enormous sums for capacity which is underused because cheaper supplies will be available to consumers. If the company gets it wrong, a bad deal would overhang its finances for decades. (1)

The Telegraph reported that the negotiations are now so 'challenging' that EDF has begun laying off staff from the Hinkley Point project because of the real possibility the talks may fail. Some in the industry suggest the Treasury has become seduced by the possibility of cheap shale gas and is prepared to let EDF's project fail. Others still believe the Government remains committed to nuclear and the Treasury is merely engaging in brinkmanship because it believes it can still extract a better deal from EDF. (2) According to the *Daily Mail*, the Government and EDF were close to striking a deal earlier this year, but then the Treasury demanded a much lower price 'out of the blue' to try and force the discussions in its favour. The unexpected move slammed the brakes on the talks, creating a stalemate that has yet to be broken. (3)

Interestingly, the reason why the Press has been full of a confusing array of stories about how the negotiations are going is blamed, by Butler on "amateurish public relations campaign on behalf of the company". He says one day the message is that the deal is almost done; the next that the company is about to down tools and walk away. This causes a mixture of amusement and irritation in Whitehall. Threats and attempts to bounce through decisions do not go down well.

Perhaps this explains why *The Independent on Sunday* (IoS) reported early in March that a strike price had been provisionally agreed at £96-£97/MWh, and that the Government had committed to this strike price being in place for 35 years. Yet another Sunday newspaper reported that the Government is still holding out for a strike price of £80/MWh. IoS says "Our sources are impeccable and our rival rarely makes mistakes". (4) IoS also thinks that DECC and EDF have broadly agreed the terms of the strike price and length of the contract, but the Treasury has convinced itself that the strike price should be closer to £85. With such an emphasis on the development of shale gas projects in the Budget, it seems that the Treasury believes there are alternatives to nuclear, which weakens EDF's hand.

Ian Marchant, CEO of SSE, writing in *The Times* says onshore wind already costs less than the strike price EDF wants (about £90/MWh) and the wind industry is striving to get costs down even more. Like Butler, Marchant says nuclear can do nothing to ease security of supply



concerns over the next five years - no one expects a new nuclear station to be available before 2020. Ian Marchant struggles to see why we should pay a premium for new nuclear when new gas, renewables and energy efficiency can fill energy gap. (5)

Butler agrees: "*Nuclear has come to look like yesterday's technology*". He says energy technology is moving very quickly. Shale gas will not be the last major breakthrough. So who knows where the sector will be by 2020? Agreeing a strike price for 30 or 40 years locks consumers into a decision which could soon be overtaken by events. Nuclear is beginning to look un-fundable as a private sector investment. Which private investors want to tie up \$14bn of capital for more than 10 years? The only serious prospective investors then are governments. The Chinese are said to want a stake in a strategic sector in Europe and might pay to get it. "Might" is the key word. *The Telegraph* reports that interest from the Chinese seems to have waned. (6)

EDF chief executive Vincent de Rivaz doesn't sound particularly optimistic. He warns that "*to make this opportunity a reality we need to reach agreement swiftly*", and describes the negotiations as "*challenging*". Although he believes that an agreement is still possible. EDF must get other investors on board to replace Centrica and, possibly, cut its own stake to as little as 51%. But as de Rivaz pointed out: "*If we have a deal with Government which is attractive to investors, we will secure the funding.*" (7)

The Guardian called the decision on planning permission for Hinkley "*symbolic*". As well as the strike price, EDF and the Government also have to agree how much the company will pay for long-term storage of nuclear waste. "*Discussions on both those are on-going and intense, but I expect them to be concluded shortly,*" said Secretary of State Ed Davey.

EU State Aid Issues

There are additional concerns that when a deal is agreed with EDF, the European commission could launch an inquiry into the subsidies, which would qualify as state aid. That would delay the project by at least 18 months. EDF would then have to begin finding funding of up to £14bn to pay for construction. (8) Plans to reward nuclear with fixed prices are illegal under EU rules according to Doerte Fouquet, a lawyer specialised in EU law in Brussels. "*Neither under the current (...) nor under possible future frameworks could the CfD scheme for nuclear generators be declared compatible with European state aid rules.*" (9)

This presages a battle over whether the European Commission will give state aid clearance to the British plans to subsidise nuclear power, according to Energy Policy lecturer, Dave Toke. Under existing EU law, while renewable energy has a state aid exemption on the basis that it is an environmental measure, nuclear power does not. We have seen, to use Tom Burke's words a process of 'salami slicing' demands, so that bit by bit EDF moves towards enjoying virtually a blank cheque. Even not counting underwriting, EDF's (desired) subsidies will look gargantuan compared to what premium subsidies will be offered to both onshore and offshore wind under the CfD arrangements. Onshore wind will get no more than around £80 per MWh for a 15 year contract, so EDF's payment of, say, £95 per MWh for 35 years would mean that they would get well in excess of twice the subsidy paid to onshore wind. Offshore wind may get offered around £100 a year according to Government plans, but only for a 15 year contract. (10)



A European Commission investigation into the use of taxpayer subsidies to support a new reactors could delay the programme for years. Sources in Brussels have indicated that, if after a preliminary investigation the EC's competition directorate decides to launch a full-scale investigation that would take at least 18 months and probably two years or more. Such an outcome is made more likely by reports that ministers and EDF are discussing a "strike" price of a little under £100/MWh. (11)

High Bills locked in for 35-40 years?

The chief exec of RWE npower says contracts lasting up to 35 years would be "wrong". Paul Massara said: *"The risks have to be firmly set on the provider, not on the Government. I am worried about consumers' bills and anything that adds to those bills is a problem."* (12)

As well as "locking a generation of consumers into higher energy bills", Greenpeace Executive director John Sauven says: *"It will distort energy policy by displacing newer, cleaner, cheaper technologies. With companies now saying the price of offshore wind will drop so much it will be on par with nuclear by 2020, there is no rationale for allowing Hinkley C to proceed. Giving it the green light when there is no credible plan for dealing with the waste could also be in breach of the law."* (13)

No waste plan makes Hinkley 'unlawful'

Greenpeace believes it was unlawful to give Hinkley planning permission because there is no permanent solution to storing the UK's existing nuclear waste. The Government's plan to find a local community to host an underground repository collapsed last month after Cumbria became the last council to withdraw from the process. Greenpeace's submission to Mr Davey quotes the Government's White Paper on nuclear energy, which requires "effective arrangements" to be in place to deal with new reactors' future waste. (14)

10% return for nuclear; 4.5% for solar

Bridget Woodman, a member of the Energy Policy Group at the University of Exeter, says at £100/MWh the strike price would be approximately double the current market price for electricity. But it is also significantly above the estimated cost of electricity from the same reactor in France, and 25% above DECC's original cost estimate for power. Hardly value for money for consumers. One reason for such a high strike price may be that EDF is reportedly demanding a 10% rate of return on its investment. By way of contrast, it is interesting to compare this with DECC's views of the rate of return guaranteed under the Feed In Tariff (FiT) for small scale solar PV. When DECC was challenged over the reduction in the FiT it stated, *"we continue to consider that a significantly lower tariff is needed to provide generators with a rate of return of 4.5 per cent to five per cent for well located installations. We are not persuaded that a higher rate of return would be reasonable"*.

The longevity of the proposed nuclear CfD is also significant. It will guarantee nuclear power a fixed price for a suggested 40 years, excluding inflationary indexing until 2060! This is double the commitment for renewable energy sources, which are expected to receive guarantees for 20 years. This is important both in relation to the total potential additional cost to energy users but also due to the changing costs of the alternatives over such a long period of time. The cost of



manufacturing and deploying renewable energy sources at scale is falling, in the solar sector panels have fallen by 80% in the last three years and wind power is now around a quarter of what it was two decades ago. These declines are leading to lower and lower FiTs for renewables across the world each year. (15)

The argument that nuclear power can provide a comparatively low cost way of meeting future carbon targets is being eroded by the rapid cost reductions evident in the renewables sector. The scale of decline in solar PV costs, with a resulting reduction in subsidy levels for the technology has been widely documented. The costs of larger scale renewable technologies are also declining rapidly as the technologies become more refined and reliable. Offshore wind farm developer Dong Energy claims it can beat the government cost target of £100/MWh by 2020. Dong says it can reduce the cost to around £87/MWh for projects on which it takes investment decisions in 2020. Average costs for its projects in 2012 were €160/MWh. (16) WWF argued that costs for renewable energy technologies such as onshore wind and solar PV are falling rapidly and major new contenders such as offshore wind are set to deliver substantial cost reductions over by the end of this decade and beyond. (17)

Nuclear Grid Costs to be paid by renewables

Woodman says new reactors will require an 'operating reserve', or back up power in case of an unforeseen failure. The amount of operating reserve required will rise be high at 1320MW, and overall costs of providing reserve and other back up measures could rise from £160m/year to £319m/year. This is clearly the result of specific plans to build large, inflexible nuclear stations. However, instead of charging the nuclear operators for the additional system costs they impose, the National Grid decided to spread the costs of new, larger reactors across all generators connected to the transmission grid, on the grounds that targeting those responsible could delay the construction of new reactors. (18)

Michael Meacher says the Government now finds itself utterly dependent on new nuclear because it has failed to promote renewables on anything like the scale and speed required, but it is now held hostage by two forces it cannot control and which work strongly against each other – the demand by the in effect monopoly provider EDF for vast subsidies and the requirement to get approval from the EU Competition Directorate. The UK will have to pass 2 tests in the investigation into these subsidies: is it in the common interest of member states and will the benefits outweigh the distortion of competition? The answers are anyone's guess, and the EU inquiries will probably take 12-18 months. Either way, government's unforgiveable failure to address long-term energy needs till far too late means the lights will very likely go out in the 'energy gap' around 2017-8, if not before. (19)

Just as we go to press Davey has told the BBC's Newsnight he will make sure any deal struck will be good value for the taxpayer. He played down the strength of EDF's negotiating position, saying there were three consortia. He noted that Hitachi, which bought Horizon last year, has "*an extremely good track record of delivering on time and on budget*". That was in implicit contrast to EDF, which has seen the cost of its Flamanville plant in France double. (20)

Meanwhile, a cross Party group of MPs – Alan Whitehead, Simon Hughes, Caroline Lucas and Zac Goldsmith – has written to the National Audit Office to request a detailed review of the form, function and potential outcomes of the negotiations between Treasury/DECC and EdF.



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2. What's wrong with the Lib Dems?

Energy Secretary, Liberal Democrat Ed Davey MP - the man who in June 2006 declared nuclear power to be unaffordable and unnecessary, gave planning permission for Hinkley Point C on 19th March. He now says we can't afford to repeat the mistakes of the past, but:

"I believe safe nuclear power, with manageable waste, can play an important role in reducing greenhouse gas emissions, as long as it is cost competitive with other low carbon generation." (1)

Meanwhile, Business Secretary Vince Cable teamed up with Ed Davey to launch a Nuclear Industrial Strategy. The Liberal Democrat Ministers announced another £31 million in subsidies for nuclear technology and a long-term nuclear energy strategy, which would move us into a plutonium society. The strategy, published by the Department of Business, Innovation and Skills (BIS), reaffirmed the Government's position that nuclear power will make "*a major contribution to the longer term energy mix*". As part of that strategy, there will be funding for 35 projects to develop new technologies for construction, operation and decommissioning of nuclear power plants.

Vince Cable joined the great Lib Dem nuclear sell-out saying: "*There are huge global opportunities that the UK is well placed to take advantage of in the nuclear industry. Our strong research base will help develop exciting new technologies that can be commercialised here and then exported across the globe.*" (2)

The Independent reminds us that the 2010 Liberal Democrat manifesto promised to "*reject a new generation of nuclear power stations.*" Maybe it's time for another 'sorry' video? (3)

Just in case we might start thinking they are all as bad as each other (and don't forget to add Chris Huhne into the mix), it's worth having a look at a chapter by Fiona Hall MEP in the new "Green Book" (subtitled "New Directions for Liberals In Government").

Hall complains that the coalition government has continued with the twin assumptions taken by its predecessor that a 110GW of installed capacity will be needed by 2025, compared with 85GW now and that 60GW will need to be new build. She points to a 2012 report by McKinsey, commissioned by DECC which shows that electricity use could be reduced by 40% by 2030 or 155TWh. There was no cost-benefit analysis carried out to see whether demand management would be cheaper than increasing capacity. She says if the UK continues to disregard demand-side management it will be forced to invest, not only in new generating capacity, but also new grid connections. Onshore wind is the cheapest and quickest way to decarbonise the power sector, and the North Sea has sufficient capacity to power the European Union four times over with offshore wind. There are a growing number of ways to provide the security of supply and flexibility required whilst relying more and more on variable renewables. One is to provide interconnections to the rest of Europe. The cost of a 1.4GW interconnector between the UK and Norway is £660m - £880m. By comparison a 1.4GW nuclear station will cost £7bn.



Trouble is – Hall’s last sentence has been completely undermined by her three Westminster colleagues. She says “*it is the Liberal Democrats who can be relied upon to deliver this open, outward-looking and green approach to UK security of supply*”.

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3. Nuclear stealth tax will kill

Why should a stealth tax which is supposed to encourage new low carbon electricity generation provide a huge windfall to old nuclear reactors? Adding around £34 per year to the average electricity bill is going to worsen the UK's fuel poverty crisis – in other words this tax to help old reactors is going to kill people by increasing cold related illnesses.

On 10th January 2008, when the Blair Government confirmed it wanted new reactors to go-ahead, one of the 'facilitative actions' proposed to speed up construction was simply to work to strengthen the EU Emissions Trading Scheme (ETS) and give investors confidence there would be a meaningful long-term carbon price. But by October 2009 it was becoming increasingly clear that the nuclear industry wouldn't be able to afford to build new reactors without some form of subsidy, so secret plans to tax electricity consumers were drawn up. (1) According to *The Guardian*:

"The government believes that only by artificially increasing the cost of electricity generated by coal and gas stations through an additional carbon levy on household bills can nuclear become more competitive and encourage new reactors to be built". (2)

The coalition Government agreement, drawn up after the May 2010 General Election, included a commitment to introduce a 'floor price' for carbon within the European ETS. (3) Despite this by August 2010 it was clear that a carbon floor price (CFP) wasn't going to be enough to get new reactors built (4) so plans for Capacity Payments and a Feed-in Tariff were drawn up, but that's another story. (5)

These new elements – Capacity Payments and Feed-in tariffs needed to be included in the Energy Bill, which was only introduced on 29th November 2012 and is still going through Parliament. But the CFP was included in the 2011 Finance Bill which was discussed in Parliament June and July of that year. Labour MP Nic Dakin pointed out that the Carbon Floor Price means a windfall of almost £1 billion being given to the nuclear industry for doing absolutely nothing new. The tax will add nothing to energy output or Britain's energy security, and there will be no requirement for the companies to invest the windfall in national priorities such as energy efficiency programmes or meeting our renewable energy targets. It will hurt the consumer and fail to deliver our green ambitions. He urged the Government to think again, but to no avail. (6)

Responding to a question from Liberal Democrat MP Martin Horwood, the Treasury's Justine Greening admitted that existing nuclear will benefit from the higher wholesale electricity prices resulting from the CFP to the tune of £50 million a year to 2030. Labour's Shadow Economic Secretary at the time Kerry McCarthy MP said the Carbon Floor Price would "**...provide an effective subsidy to the nuclear industry ... In fact, it will benefit nuclear power twice as much as the renewables sector ... the Government explicitly promised voters that they would not grant nuclear power stations a public subsidy. ... The Government [is] using money taken from people ... to subsidise nuclear power stations, which they explicitly promised voters they would not do. They are also using that money to subsidise existing power stations, which makes no sense. ...**" [Emphasis added]



In the March 2011 Budget the Chancellor announced that a carbon price floor of £16 per ton of carbon dioxide would be introduced in April 2013, stepping up to £30/tCO₂ by 2020. In the 2013 budget it emerged that the tax would increase almost fourfold by 2015, adding about 6.5 per cent, or £34, to the average annual household electricity bill of £530. Since the tax was first announced, carbon prices under the European ETS have collapsed to almost zero. As a result, the level of the top-up tax levied by the Government is far higher than anticipated to make up the difference, resulting in an even bigger windfall for the Treasury. Two years ago, the Government expected the tax to raise £740 million in its first year and £1.4 billion in two years' time. The tax is now forecast to raise £975 million in 2013-14 and £2 billion in two years' time. (7)

The CFP represents a completely unnecessary windfall to EDF for existing reactors - rather than just a subsidy for new reactors. Following the announcement that EDF will extend the operating life of two of its nuclear power stations - Hinkley Point B and Hunterston B - by seven years until 2023 (8) Alan Whitehead MP calculated how much free subsidy from consumers EDF will receive. He reckons EDF will get £13 billion of free money per station over the period covered by these life extensions. That's in addition to the £9 billion per plant that will come EDF's way from the life extensions already announced for Hartlepool and Heysham A - making a total of £44 billion in addition to the money actually earned from producing electricity. And there will be more life extensions to come as they review the rest of the present operating fleet - Torness and Heysham B are likely to get life extensions to at least 2030 - if not 2040, so probably another £26bn at least, making a grand total of £70bn - enough to pay for Hinkley Point C five times over. (9)

A note of a meeting held in March 2011 between Justine Greening MP, who was Economic Secretary to the Treasury at the time and Vincent de Rivaz, Chief Executive of EDF Energy, just obtained by Nuclear Spin after a Freedom of Information request, is interesting more because of what it doesn't say than what it does. EDF expressed a preference for the CFP to be introduced in 2013 rather than 2014, which is no big surprise given the windfall it represents. De Rivaz says the CFP is important because it will "send the right signals" and be a "crucial step to help the Board make the financing decisions for their new nuclear plants". But there is no discussion at all about alternative ways of sending the same signal which don't result in a windfall for existing reactors. No discussion, for example, about a target for decarbonising electricity by 2030, and there was no discussion about how this windfall to existing reactors might be recouped.

According to the Energy Bill Revolution campaign the Government will raise an average of £4bn every year from the EU ETS and the Carbon Floor Price. The money the Government receives isn't used to help people use less energy to heat their homes - which would cut carbon emissions even further AND cut people's energy bills. If the Government recycled this carbon revenue back to households, it could provide billions of pounds to help insulate homes. The benefits would be immense. This could bring 9 out of 10 homes out of fuel poverty, lower people's bills, cut carbon emissions AND create jobs. (10)

With at least eight old people dying every hour during the winter months from cold related illnesses we can be sure that nuclear power will kill people, not from radiation but from driving



more people into fuel poverty as their bills are hiked to pay subsidies to EDF Energy. Time for an Energy Revolution?

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4. Energy costs analysed

A new analysis published by DECC shows the Government's energy and climate change policies are tempering the impact on household energy bills of global gas prices and network costs. Although global gas prices and network costs have driven household energy bills up in recent years, and are predicted to continue to do so, the Government is pursuing policies aimed at putting a cushion between the price of energy and the bills paid by householders. While some policies are adding to household bills, others lead to reductions, and the net result, based on the most thorough evidence base to date, is that households are on average better off than they would have been in the absence of policies.

Today's householders are paying on average £64 or 5% less for their gas and electricity bills as a result of energy and climate change policies compared to if no policies had existed, and in 2020 the net saving against the do-nothing scenario will reach £166 or 11%. (1)

The trouble is, says *The Telegraph*, households will have to spend thousands of pounds buying new green appliances to benefit. Millions of households, especially older people, will not necessarily be replacing their appliances within the next seven years. Many people choose to repair their old white goods when they go wrong or buy second hand ones that do not comply with the latest green standards. (2)

DECC's report showed that 85% of the present average £1,250 bill cannot be controlled by the government because it is determined by international gas and electricity prices, transmission and metering costs. After energy companies have taken their profits, and VAT has been paid, government policies can only influence around 11% of the bill. In a riposte to some Conservative politicians and media which have claimed that wind power will cost more than £120bn in the next eight years and send household bills soaring, he claimed that energy-saving policies, better gas boilers, tighter building regulations, the coalition's green deal loan scheme and smart meters could save householders around £166 a year by 2020. According to DECC, that is an 11% cut compared to the government doing nothing. Onshore and offshore wind power is needed for the UK's energy mix to insulate it from global gas prices and together cost householders only £18 a year in total. (3)

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5. Sellafield: “an intolerable risk”

Sellafield was originally a military site set up immediately post-war to provide plutonium for nuclear bombs. Today it is the site of two reprocessing plants. The first, B205, opened in 1964 to reprocess waste fuel from Britain’s oldest reactors, known as Magnox reactors. The last of these reactors will close on 30th September 2014, but B205 isn’t expected to complete the reprocessing of waste spent fuel until sometime between 2017 and 2028 depending on how well it operates.

The second reprocessing plant - THORP (the Thermal Oxide Reprocessing Plant) opened in 1994 to reprocess waste fuel from the UK’s newer Advanced Gas-cooled Reactors (AGRs) and overseas Light Water Reactors.

These projects have been overseen by the Nuclear Decommissioning Authority (NDA) since 2005 – a public body set up to replace the widely discredited British Nuclear Fuels (BNFL). The NDA also replaced Nirex – (originally the Nuclear Industry Radioactive Waste Executive) – which was responsible for developing “*safe and environmentally sound options for dealing with radioactive waste in the long term*”.

A new study commissioned by West Cumbria & North Lakes Friends of the Earth has investigated how hazardous nuclear waste at Sellafield has been stored and handled over the past 13 years. The study took place within the context of a decision at the end of January by local municipality, Cumbria County Council not to go forward with a search for a Geological Disposal Facility (GDF), and in November 2012 a National Audit Office (NAO) report on managing risk reduction at Sellafield clearly demonstrated the need for immediate improvements in the management of major projects at the site. The NAO said the site posed a “*significant risk to people and the environment*” because of the deteriorating conditions of radioactive waste storage facilities. In February 2013 a report from the House of Commons Public Accounts Committee (PAC) described Sellafield as “*...an extraordinary accumulation of hazardous waste, much of it stored in outdated nuclear facilities*”, and chair of the committee Margaret Hodge MP, said Sellafield posed an “*intolerable risk*”.

Deadlines for cleaning up Sellafield have been missed, while total lifetime costs for dealing with the waste and decommissioning the site continue to rise each year and now stand at £67.5 billion. An enormous amount of public money—some £1.6 billion—is spent at Sellafield each year.

The NAO report didn’t look at Sellafield’s commercial operations. Cumbrians Opposed to a Radioactive Environment (CORE) discovered that in the 13-year period between financial years 2000/01 and 2012/13 the site missed 83% of commercial targets and that, since the NDA took ownership of Sellafield in 2005, the failure rate has risen to 94%.

The NDA claims it now has a credible plan for decommissioning Sellafield, but given its track record - with only 2 of the 14 major projects being delivered on or ahead of schedule in 2011-12 – it is small wonder many remain to be convinced that sufficient progress is actually being made.



THORP

THORP was expected to reprocess 7,000 tonnes of waste fuel in its first decade of operation – two thirds from overseas customers - but it only managed 5000 tonnes due to a range of equipment failures and accidents. In April 2005 an internal leak of 22 tonnes of dissolved fuel shut the plant for almost 2 years. This was followed by another mechanical failure which delayed the slow return to operation until March 2008. Even then a delay in returning to full operation was caused by a lack of high-level waste evaporative capacity.

In 2005 when the NDA took over, THORP was expected to complete its reprocessing contracts by 2010, but this date has now been pushed back to 2018. In June 2012 the NDA announced that it would only reprocess the waste spent fuel it was contracted to reprocess – in other words it would not attempt to reprocess AGR waste spent fuel for which the contracts allowed for storage or reprocessing. This means the plant will be limping along with a low throughput of around 350 tonnes per year for another five years – less than half the throughput rate it was originally expected to achieve.

High Level Liquid Waste Treatment Facilities

HLW liquids are so incredibly radioactive that they generate their own heat, and are stored at Sellafield in special cooling tanks which prevent the liquid from boiling. The consequences of a prolonged cooling failure could be ‘very severe’ leading to boiling after 12 hours, and to the tanks drying out after three days. Consequently the HLW facility at Sellafield is probably one of the most dangerous nuclear facilities in the world. Following the 9/11 terrorist attacks in 2001 a review found that a terrorist attack on the tanks could require the evacuation of an area between Glasgow and Liverpool, and cause around 2 million fatalities.

Thirteen years ago the Nuclear Installations Inspectorate (NII) warned that the HLW Liquid storage tanks needed to be emptied and the waste solidified “*as soon as reasonably practicable*”, and levels reduced from approximately 1600m³ to a buffer level of 200m³ by 2015. Any shortfall would be “*publicly unacceptable*”. By 2011, even though stocks had only been reduced to 900m³, the Office for Nuclear Regulation (ONR) (which now incorporates the NII) decided to increase the permitted level of highly active liquid stocks to almost three times the limits defined under the earlier legal requirement. The ONR appears to have sanctioned something which twelve years ago it deemed “*publicly unacceptable*”, because it is not prepared to use its regulatory powers to end reprocessing early.

In 1998 the extremely dangerous Liquid HLW was stored in 21 stainless steel tanks, the 8 oldest of which were built between 1955 and 1968. Even the 13 newest tanks were causing concern because of leaks in the cooling system. In 2008 the NII declared that Sellafield needed new Liquid HLW storage tanks “*with utmost urgency*”. The NDA estimated the cost of six new replacement tanks to be £83m with delivery expected in March 2013. But by 2011 the cost had shot up to £474m and delivery was not expected until March 2018. Then on 7th June 2012 the NDA abandoned the project. The ONR simply said the information it had been given suggests that replacement tanks “*may no longer represent the ‘as low as reasonably practicable’ position with regard to hazard reduction activities on the site*”.



So failure by the NDA has been responded to by the ONR changing its recommendations, rather than using its regulatory powers to ensure action. ONR appears to be sanctioning a cost cutting exercise rather than insisting on maximum safety.

The highly active liquid wastes that come out of the two plutonium separation plants operating at Sellafield are evaporated to reduce their bulk. A range of problems with the Evaporation facility at Sellafield over the years has meant that plans to reduce Liquid HLW stocks, whilst continuing with reprocessing and plutonium separation operations which produce the waste have not gone according to plan. There are three evaporators at Sellafield, and the NDA gave approval for the construction of a fourth to start in 2009. The construction project is the biggest single nuclear project in the UK. It was originally estimated to cost £90m and was due to be completed as early as 2010. But the cost has now jumped up to £673m, and it won't be ready until at least 2016.

The Treatment of Solid Wastes

In 2002 *The Observer* newspaper, reporting on a document from Nirex, declared that “almost 90 per cent of Britain's hazardous nuclear waste stockpile is so badly stored it could explode or leak with devastating results at any time”.

A decade later, the description by the NAO makes the situation sound very similar: “Some of the older facilities at Sellafield containing highly hazardous radioactive waste have deteriorated so much that their contents pose significant risks to people and the environment.”

The recent NAO report says a quarter of Sellafield Limited's annual spending - £381m in 2011-12 - is on waste retrieval and clean-up of high hazard legacy ponds and silos containing waste spent fuel and ILW sludges and spent waste fuel cladding etc. But limited progress has been made on starting some key waste retrieval projects, and completing waste retrieval from legacy ponds and silos has been postponed by seven years until 2036.

Conclusions

Despite a focus which should have been “squarely on the nuclear legacy” the NDA, since taking over Sellafield in 2005, has continued with operations which produce yet more waste because of short-term income generation. We are now told it is too late to come up with an alternative used waste fuel management process so the two reprocessing plants must limp on another five years or so before decommissioning can begin.

Between 2000 and 2008 the nuclear regulator said that the Liquid HLW needed to be solidified “as soon as reasonably practicable”, and that new storage tanks “should be progressed with the utmost urgency” and further evaporator capacity was “essential for the longer term safe management of highly active liquor”. But despite the NDA's failure to urgently replace old tanks containing highly radioactive liquid waste and build new evaporator capacity to reduce the bulk of dangerous liquid waste as quickly as possible, the regulator has allowed reprocessing to continue – not just of overseas spent fuel, which the NDA has claimed it is legally bound to reprocess, but mainly of AGR waste spent fuel – perhaps to free up space so that EdF Energy can extend the life of its ageing AGR reactors, and avoid the cost of new spent fuel storage facilities.



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6. Plan B

The government needs a “plan B” on nuclear power, because of the danger that new reactors will not be built in time to avoid energy shortages and possible blackouts, according to the House of Commons Energy and Climate Change Committee. (1)

If there is little or no new nuclear, then much tougher action to reduce electricity demand will be needed, says the report, along with greater use of other low-carbon technologies. The scale of the challenge can be seen by comparing the difference between DECC’s “low cost” scenario as part of its 2050 pathway analysis, with the alternative scenario provided by Friends of the Earth. Under the “low cost” scenario, there is more than 40GW of nuclear power in 2050, along with 1,400 offshore and 4,400 onshore wind turbines in 2025, which fall to zero in the longer term as decommissioned sites are not replanted. Friends of the Earth’s scenario has no new nuclear but requires more than 10,000 offshore and 8,000 onshore wind turbines in 2050 (as well as greater effort on insulating homes).

If new nuclear capacity is not delivered as expected, some other measures will be needed to make up the resulting gap between demand and supply. Professor Steve Thomas (University of Greenwich) noted that gas, renewables and energy efficiency were all potential candidates for this task. Since any of these options could be delivered more quickly than a new nuclear power station, failure of the nuclear programme should not pose an immediate threat to energy security. However, greater use of gas could introduce new challenges for energy policy. Most obviously, increased use of unabated gas would make it much more difficult to meet carbon targets. There may also be energy security implications if the UK was to become more dependent on imported gas (but this risk could potentially be mitigated by increased use of domestically produced shale gas).

The Committee concludes that failing to deliver the 16GW new build that is currently under development could undermine any hopes of developing new funding models for subsequent nuclear new build. This would make it likely that future projects would not be able to raise the necessary capital, raising the prospect that it would not be possible to build any further nuclear plant without state funding

Tim Yeo, chairman of the energy and climate change select committee, said: “*The government seems to be crossing its fingers that private companies will deliver a fleet of new nuclear power stations on time and on budget. Ministers need to urgently come up with a contingency plan in case the nuclear industry does not deliver the new power stations we need.*” (2)

RWE npower’s outgoing Chief Executive, Volker Beckers, told the Committee that “*it is very clear that without the financial sector, the energy sector alone is not able to stem all these required investments*”. In other words, if there is to be a large amount of new nuclear in the UK (more than the 16GW that is currently on the table) then we cannot rely on large utilities to deliver this investment through balance sheet funding. It is worth noting that under DECC’s “low cost” 2050 Pathways scenario, there is more than 40GW of nuclear power in 2050.

The Committee concludes that:



“While we share the Government’s hope that the new build programme will be a success, the barriers described above may yet prevent some or all of the new projects from going ahead. Given this possibility, it is vital that Government starts thinking about alternative options for meeting our long-term climate change and energy security objectives so that these contingencies can be enacted quickly in the event that new nuclear is not forthcoming.”

Dr David Toke is Reader in Energy Politics in the Department of Politics and International Relations in the University of Aberdeen describes the report as an especially brazen piece of pro-nuclear pleading which effectively says that nuclear power should be given cost priority over all green energy options. They say that EDF and other nuclear companies should have their demands for construction cost ‘guarantees’ met. The report disingenuously suggests that this would have no consequences for consumers. (3)

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7. 100% renewables

A nuclear energy-free future for the UK is not something the Coalition Government "*is thinking seriously about*", according to the government's chief science adviser Prof Sir John Beddington. He says "*we really can't see a future for the UK energy sector, if we are to meet our climate change obligations and have resilience in the power sector, without a significant component of nuclear. A non-nuclear scenario is not one the government is thinking seriously about.*" (1)

Yet in much of Europe, and increasingly in the U.S. and the developing world, 100% renewable energy goals are becoming the new normal. A decade ago, cities, regions, and businesses aiming for 20% renewable energy were on the cutting edge, and anyone even suggesting a target of 100% was probably written off as barmy. But today, entire countries like Denmark have passed laws requiring that the whole energy supply — electricity, heating/cooling, and transportation — is met by renewable resources.

Iceland is almost there, with 100% renewable electricity and 81% renewable energy overall. Scotland has a mandate to produce the equivalent of 100% of its electricity requirements with renewable energy by 2020. Upper Austria, inspired by the town of Guessing, which is already there, has a target to achieve 100% renewable heat and power by 2030. Whole regions in Germany are already meeting, if not surpassing, their power demand with renewables. Several have done the same for their heating requirements, and are busy working toward targets for integrating the transportation sector. In the U.S, cities like San Francisco, Lancaster, and San José have set official goals to reach 100% renewable power within the next decade, and the state of Vermont has an energy plan in place to reach 90% renewable energy in all sectors by mid century. The heartland town of Greensburg, KS has already reached a 100% renewable power goal set after being destroyed by a tornado in 2007, and aims to achieve renewable energy for all sectors.

Additionally, businesses including IKEA, Whole Foods, and Google are aiming to power, or already are powering, their companies with 100% renewable energy technologies. These are just a handful of examples in what amounts to the beginnings of a global movement. Go100Percent.org, a project launched to track 100% renewable energy projects around the world, has mapped more than 8 Countries, 41 Cities, 48 Regions, 8 Utilities, and 21 Non-Profit/Educational/Public Institutions that have shifted or are committed to shifting within the next few decades to 100% renewable energy in at least one sector. (2)

In the middle of 2011, Germany announced its new energy policy: the *energiewende* or energy transformation. This is a 40 year programme with aspirational targets along the way including for renewable energy to provide 35% of electricity and 18% of energy by 2020 rising to greater than 80% of electricity and 60% of energy by 2050; with total energy demand to be cut by 50% by 2050; total carbon emissions to be cut by 80-90% by 2050 with the targets for renewables seen as co-dependent on energy demand reduction. Britain has a similar target to Germany for cutting carbon emissions, but beyond that there is little similarity between the two countries energy policies. Professor of Energy Policy at Exeter University, Catherine Mitchell says Germany "*is unlocking the next stage of the sustainable energy transition. We cannot know what that 'new' system will be but all the evidence points to smaller, nimbler, more integrated approach*



to energy provision. It may take a decade. It may take 40 years but without doubt the future is some system more related to the German energiewende than it is to that of Britain's electricity market reform." (3)

Mainstream media around the world is finally beginning to accept that renewable energy is viable. The *New York Times*, for example, recently featured Mark Z. Jacobson, a professor of civil and environmental engineering and the main author of a study, published in the journal *Energy Policy*. He says: "you could power America with renewables from a technical and economic standpoint. The biggest obstacles are social and political — what you need is the will to do it." (4) After the ground-breaking NYT story, the Grist website wrote "*The most potent weapon in the hands of status-quo defenders is an aura of inevitability: We're stuck with fossil fuels for the rest of the century whether we like it or not; it's impossible to change any faster. That aura is an enormous advantage, but it's fairly brittle. Once rapid, positive change becomes (or becomes seen as) a live possibility, the question shifts from "can we do it?" to "should we do it?" "We can't do it" — always delivered in a tone of world-weary realism — becomes "we shouldn't do it," which is much more difficult to defend. When people get the sense that a better future for their children is possible, is real, is there for the taking, they are willing to fight and sacrifice for it, in a way that few will for a lost cause.*" (5)

In the UK, out of sight of the mass of people living in towns and cities, a quiet revolution is underway in the British countryside as more and more farmers are investing in renewable energy. According to the National Farmers Union, one in five of its members had produced clean electricity from solar or wind by the end of 2012. Between 2011 and 2012 there was a 28% increase in the number of biogas plants, capable of providing both renewable electricity and heat from farm waste. This is from a very low base. As yet, the scale of on-farm renewables in Britain is tiny compared with Europe's leader, Germany. By the end of 2010, German farmers owned over 10% of the country's renewable energy capacity, equivalent to over 5,700 MW. Compared with the UK's 78 biogas anaerobic digesters, there were 6,000 digesters in Germany by 2010, with plans to double capacity by 2020. But the German example just shows the potential that could be realised here. (6)

Community and independent renewable energy generators should be given equivalent income streams for renewable energy projects as will be available to the major electricity companies, according to a letter, signed by over 30 academics and NGO leaders. (7) Proposals that could do this in a competitive manner have been put forward by Alan Whitehead MP, but have so far been ignored by the government. It is remarkable that the media is full of special pleading from EDF for outrageously bloated subsidies, but meanwhile there is silence about the plight of independent renewable generators. Community renewable companies will have access to far lower incentive levels than the Big Six energy companies will get for their renewable schemes. (8)

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8. Moorside update

Toshiba is expected to buy the Moorside reactor site next to Sellafield. Toshiba, the owner of Westinghouse, has approached Iberdrola, co-owner of the Nugen project, to build a reactor on the Cumbria site. The Japanese group recently appointed PwC to advise on investing in nuclear projects in Britain. Iberdrola, which has always denied that it wants to leave the Nugen project, is close to appointing an investment bank to advise on its exit. The debt-laden Spanish group is keen to secure a quick sale of its 50% stake, which could be worth £100 million. The lease on the Sellafield land will expire next April unless its present — or new — owners rapidly accelerate work to prepare the site for construction. If progress is not made, the site could be auctioned off again next year.

Toshiba is expected to seek additional funding from cash-rich Chinese state-owned nuclear groups that want to gain expertise in building new reactors in countries such as Britain. Ministers hope that a change in ownership will revive the flagging project, which has made little progress since the Nugen consortium paid £70 million to lease the 190-hectare plot in 2009. SSE, a partner in the consortium, left in 2011, and the two remaining partners, Iberdrola and GDF Suez, have little appetite or ability to make the multibillion-pound investment required.

CGNPG, of China, has held discussions with EDF Energy about becoming a partner in Hinkley Point but there are doubts if that would be politically acceptable Britain. A Japanese rival, Hitachi, unexpectedly outbid Toshiba last October to buy Horizon from the German groups E.ON and RWE for £700 million. (1) (2)

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9. Nuclear nightmare set to continue

Professor Sir John Beddington, the Government's chief scientific adviser, says new nuclear power is essential. "*We really can't see a future for the UK energy sector, if we are to meet our climate change obligations and have resilience in the power sector, without a significant component of nuclear*" he said at the launch of the country's long-term nuclear strategy. The government says its strategy will help seize the economic opportunities of a £1 trillion global market and provide 40,000 UK jobs.

Beddington led a review of the nuclear research and development programme needed if the government's high-nuclear scenario for future energy is to be feasible. Prof David Mackay, chief scientific adviser DECC, said this scenario – one of four set out in the 2011 carbon plan – envisaged 75GW of nuclear capacity in 2050 providing 86% of the UK's electricity. The industrial strategy covers every part of the nuclear chain from new build, operations and maintenance and waste management. (1)

In fact the Government abandoned its longstanding ambition to have 16GW of new reactors running by 2025, saying it now hoped the new reactors would be developed "by 2030".

Launching the strategy document, Vince Cable, the Business Secretary, said the nuclear industry provided "*significant opportunities for economic growth*" for the UK. He said the industry had indicated "*that the UK new build programme (around 16GW) equates to investment of circa £60bn, which could support an estimated 30,000 jobs*". Separate analysis yesterday showed it could be as many as 40,000 jobs. (2)

The strategy is being overseen by a Nuclear Industry Council, co-chaired by ministers and industry. It includes a wide range of commitments, including:

- £15 million for a new National Nuclear Users Facility for universities and companies carrying out research into nuclear technology. The facility will have centres at the National Nuclear Laboratory at Sellafield, the Culham Centre for Fusion Energy in Oxfordshire and the University of Manchester's Dalton Cumbrian Facility.
- 36 nuclear research and development projects have won £18 million worth of support from a Technology Strategy Board competition, which will leverage in a further £13 million of private sector investment. This includes consortium lead by OC Robotics in Bristol who have received almost £6 million to develop their Laser Snake technology – a robot controlled laser cutting tool that can be used as part of nuclear decommissioning projects.
- £12.5 million to join the Jules Horowitz Test Reactor programme which is being constructed in France. The reactor will provide the UK with a valuable radiation testing facility to develop future advance nuclear fuels.
- The government spent £66 million in 2011 on nuclear research and development and will keep under review its level of future expenditure. It is keen to explore opportunities to back future reactor designs, including the feasibility of launching a Small Modular



Reactor (SMR) R&D programme to ensure that the UK is a key partner of any new reactor design for the global market.

- Government is making some changes to the role and organisation of the National Nuclear Laboratory (NNL) so that it plays a more central role in advising government on nuclear matters and in strategic research projects.
- Nuclear new build in the UK is forecast to generate up to 40,000 jobs in the sector at its peak, but employers are currently reporting skills shortages – particularly in engineering. Tackling the skills gaps will be one of the actions to be taken forward through a focussed Skills Delivery Plan led by the Nuclear Energy Skills Alliance.
- UK Trade & Investment (UKTI) will develop a strategy aimed at attracting inward investment as well as promoting export opportunities. (3)

In order to achieve 75GW of nuclear capacity by 2050, (which incidentally would require an eye watering 30GW of new capacity to be built between 2030 and 2040 and another 30GW between 2040 and 2050) the Government expects to need newer fission technologies such as evolutionary LWR's, small modular reactors (SMRs) or Generation IV (mainly fast reactors); options for closing the uranium fuel cycle and reprocessing spent fuel; progressing the development of fusion; and consideration of alternative fuel cycles (Thorium?). (4) The Government says the significant stockpile of plutonium, produced is a key priority in terms of both security risks and proliferation sensitivities for future generations to manage. This stockpile also presents potential opportunities in terms of use in fuel production. It re-iterates that its preferred method of management is to reuse the plutonium as mixed oxide fuel (MOX) for use in civil nuclear reactors – but this is a long term policy and remains subject to further work to confirm that it can be implemented safely and securely, that it is affordable, deliverable, and offers value for money. Other options have not been ruled out, and the NDA continues to assess, on behalf of Government, whether there may be credible alternatives which better meet these objectives.

On nuclear waste the Government says demonstrating that the UK has a credible programme to deliver a disposal route for higher activity wastes and have it in operation as soon as safely practical is a foundation stone for the UK's short, medium and long term nuclear strategies. The key needs in the disposal programme are a willing host community with suitable geology.

Dave Toke 'translates' some key passages to connect it up with reality and to emphasise how, reading between the lines, the Government more or less says that nuclear power is a dead loss: *Nuclear might just about be cost-competitive at the moment with wave power, but very little else, and it is quite possible that even wave power will be more cost-effective than nuclear power in a few years time. But compared to sources like onshore and also offshore wind, and increasingly solar photovoltaics, nuclear is a dead loss. Lots of us at the Department of Energy and Climate Change have been saying that nuclear is the cheapest low-carbon source of energy in the past, but all of these statements are now 'inoperative'. However, we still want to be a bunch of wishful thinkers who firmly believe in the future of nuclear power because we learned this at school and clever people like David Mackay and David King keep telling us that this fairy story will one day come true.* (4)



Responding to the strategy Friends of the Earth's Head of Campaigns Andrew Pendleton said: "The UK needs a coherent industrial strategy - but this isn't it ... The global eco-tech revolution will happen with or without Britain. So that we are not left behind, the Government should be positioning us at its forefront by harnessing our bounty of clean British energy from the wind, sun and sea - this will create thousands of jobs and build a prosperous, secure economy." (6)

- Most of those at an event at Chatham House organised by Princeton University's International Panel on Fissile Materials thought the Government's MoX plans were madness. They were also sceptical of the other plutonium-burning ideas being reviewed by the NDA, like GE Hitachi's Prism reactor, or the Canadian Candu reactor. They preferred to talk about keeping the plutonium in storage, or immobilising it and putting down deep boreholes. That way, maybe, the British government can avoid repeating exactly the same mistakes as before. (7)

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