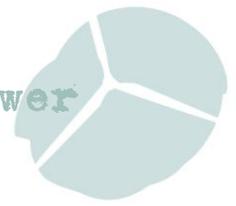


No.94 April 2017

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1. Another month in UK's failing new nuclear programme

The ongoing collapse of the Moorside nuclear project has hit the headlines. But the French nuclear industry continues to be mired in scandal as EDF starts pouring nuclear safety critical concrete at Hinkley. And now we learn that the chief executive of Wylfa Newydd developer Horizon Nuclear Power says he needs to raise cash or the Anglesey project will not go-ahead.

Moorside Collapse

On 29th March 2017, Westinghouse Electric Company, a subsidiary of Japanese company Toshiba and the largest historic builder of nuclear power plants in the world, filed for Chapter 11 bankruptcy protection in the U.S. Bankruptcy Court in New York. (1)

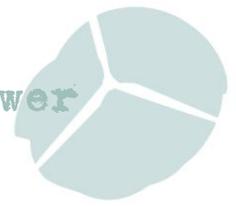
Toshiba owns 60% of the NuGen consortium which is planning to build 3 AP1000 reactors at Moorside next to Sellafield in Cumbria. Senior figures in the UK nuclear industry told the *Financial Times* that Westinghouse's bankruptcy has crystallised doubts about the project. There is now considerable doubt about whether NuGen will be able to find a new source of funding. (2)

As we reported last month the owner of 40% of the NuGen Moorside consortium, French company Engie (33% owned by the French Government) declared last December that it would like to abandon the project. (3) Now the Company has exercised its right under the NuGen consortium agreement to sell all of its shares to Toshiba in the "event of a default". Toshiba's decision to place Westinghouse – into bankruptcy protection qualifies as such an event. Toshiba said it would pay around \$138.7m for Engie's stake. Under its agreement with the French utility, it is required to pay at least the amount that Engie invested to acquire the stake. (4)

(Interestingly Engie has also sold its portfolio of onshore oil and gas exploration and production licences to Ineos. The portfolio includes minority interests in 15 licences across Yorkshire, Cheshire and the East Midlands, seven in which Ineos already owns a stake and others where the partner is Cuadrilla or IGas. Engie's exit reflects scepticism among many large energy companies about the prospects for UK shale and is part of its wider withdrawal from oil and gas in favour of power generation and consumer energy). (5)

Engie is the seventh international energy utility to give up on UK new nuclear build. Over the past decade, on top of Toshiba, E-on (Wylfa), RWE Npower (Wylfa), Iberdrola (Moorside), SSE (Moorside), and Centrica (Hinkley Point) have all pulled out of developing new nuclear reactors in the UK. (6)

This leaves a very limited field of companies for the UK to approach in its hunt for a new partner for the Moorside scheme. South Korea's KEPCO remains the most likely suitor, but *Reuters* reports that the giant utility won't be rushed. It is one of few utilities remaining with global nuclear ambitions, but despite the fact that the AP1000 reactor has now received approval from the Office for Nuclear Regulation and the Environment Agency, may still want to use its own technology – the APR1400. This would delay the development by a further four to five years



whilst the South Korean reactor is put through its Generic Design Assessment by UK Regulators. Greg Clark, the Business Secretary, was in Seoul for talks at the beginning of April, but offered no evidence of concrete progress in the negotiations. (7)

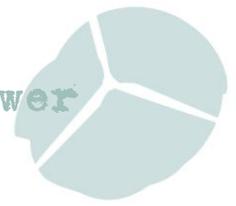
KEPCO would also want to know more about the causes of the problems with two new nuclear projects in the US, involving AP1000 reactor designs which brought Westinghouse to its knees. Were the problems specific to the AP1000 reactor or a classic big project issue of not having done your homework before you start digging? (8)

Westinghouse's insolvency has resulted from a number of factors, most importantly, the massive cost increases and time delays at the two projects in Georgia and South Carolina. Contributing to the bankruptcy are also certain decisions that Westinghouse made, including, for example, its choice to purchase Chicago Bridge and Iron (CBI), which was working on the Vogtle reactors in Georgia. Done as a part of attempts to resolve a complicated legal tangle, that purchase left Westinghouse with "*no way to pass on the cost overruns*" associated with the project.

Fundamentally, though, what led to this bankruptcy were two bets that Westinghouse and Toshiba made. The first bet was that there will be a growing and large market for nuclear power plants. When Toshiba acquired Westinghouse from British Nuclear Fuels Ltd. (BNFL) in February 2006, the press release confidently predicted a 50% growth in the global market for nuclear power generation by 2020. The second bet that Westinghouse and Toshiba made was that the well-known problems of cost increases and lengthy construction periods could be solved using its AP1000 design. These problems have afflicted nuclear power plants around the world. Westinghouse promised to beat this trend by simplifying the design and the adoption of "*modular construction techniques*". All of these projections have gone spectacularly wrong in both China, with the Sanmen and Haiyang projects, and especially in the United States. The modular construction methods only had the effect of shifting some of the problems from the building site to the factory. (9)

KEPCO is unlikely to be tempted into taking over the troubled Moorside nuclear project without some sort of public financing, says former energy minister and chairman of New Nuclear Watch Europe, Tim Yeo. He says they will also be hesitant to step in and save the development unless it can use its own reactor technology. "*I've been arguing for some time that we should look at providing during the construction phase some government finance.*" Yeo said this would have to be on the basis of repayments beginning as soon as the plant is generating. (10)

The Trump administration is working to find a new owner for Westinghouse, but doesn't want the Company to fall under Chinese control. The administration is "*keenly aware*" of the national security implications attached to the sale of the company, and is trying to pre-empt any possible blocking of a deal by making clear at an early stage that the US government would take a tough stance on any significant Chinese role. A US-led deal for even the profitable operations of Westinghouse could be tricky to arrange though. The only US company with substantial nuclear engineering operations is General Electric, through its joint venture with Hitachi, but its technology is different from Westinghouse's. Westinghouse has close links to China, where it has four of its AP1000 reactors under construction. As part of the deal for those projects, Westinghouse agreed to transfer intellectual property relating to the plants. More than 75,000



documents were handed over to its Chinese customers in 2010 in the first stage of implementing that agreement. (11)

French nuclear scandal

EDF, Areva and the French nuclear regulator ASN have known since at least 2005 that Areva's Creusot Forge factory was not capable of producing nuclear safety compliant components. Yet the factory has been allowed to continue manufacturing components which have now been found to contain anomalies, including the bottom and lid for the reactor pressure vessel (RPV) for the EPR at Flamanville. (12)

The French Radio Station which broke the news commented that:

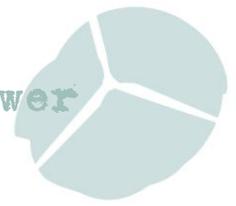
"Never before has the French nuclear industry suffered such a scandal. And this case challenges the entire chain of control of a sector already shaken by the Fukushima disaster." (13)

The Creusot Forge is under investigation by ASN after it was discovered to have produced potentially defective parts and substandard safety reports for reactors around the world. But the letters from 2005 and 2006 - obtained by France Inter - show that EDF and Areva were told by the ASN about "numerous incidents" at the facility, including "discrepancies during inspections". This will raise serious concerns about EDF and Areva's new nuclear project at Hinkley Point. (14)

In December 2005 ASN sent a letter to EDF alerting it to the deplorable condition of the Le Creusot plant, which was experiencing major malfunctions. Yet the lid and bottom for the RPV for the Flamanville EPR were manufactured by the Creusot Forge, in Burgundy, between September 2006 and December 2007. In August 2006 ASN asked Areva to demonstrate that the steel for these two parts was homogeneous. For seven years letters were exchanged between ASN and Areva, but no analysis was carried out. On 24th January 2014 the RPV arrived at Flamanville, and was placed in the reactor building. Nine months later Areva finally did some tests and discovered that the bottom and the lid had abnormalities. "*The steel should normally contain 0.2% carbon,*" explains Yves Maignac, of WISE Paris, but the concentration was 0.3%, enough to modify the mechanical properties of the steel and, in particular, to influence the temperature at which it becomes less supple and more brittle. (15)

The regulator - ASN - has been seriously at fault, according to the *Observatoire du Nucleaire*, since it has said nothing for many years about the criminal practices at Le Creusot. It says ASN is no less guilty than Areva and EDF because, although it was fully aware of the serious problems, it authorized EDF to install the pressure vessel in the EPR at Flamanville in December 2013. It is clear, says the website, that ASN is not able to withstand pressure from EDF and politicians who accuse them of seriously harming the industry if they enforce safety regulations. (16)

Following the discovery of manufacturing irregularities and the falsification of documents at Areva's Creusot Forge foundry last year, French nuclear regulator ASN and several other international regulators inspected the site in early December. ASN said Le Creusot is not up to the job and did not have the right equipment to produce the parts for the nuclear reactors. "*Creusot Forge is at the limit of its technical capacity. The tools at its disposal are not adequate to manufacture such huge components. In such a situation, errors are made.*" (17)



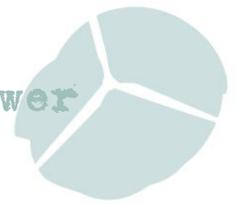
EDF's oversight of AREVA, which will supply the Hinkley Point C reactors was questioned in an internal document by the UK Office for Nuclear Regulation (ONR). In an ONR report about the visit dated 16th December disclosed under a Freedom of Information request ONR said the nuclear safety culture at Creusot fell short of expectations and warned about the implications for Hinkley Point C. ONR said it has since decided to implement a series of additional inspections of EDF and its supply chain to ensure all components are manufactured to the required standard. The ONR report said after an inspection in late 2016, that an international team from France, Canada, the United States, China, Finland and Britain had concluded that the nuclear safety culture at Le Creusot Forge foundry fell short of what regulators expect from a major supplier of nuclear equipment. It added that improvement measures ordered by ASN were not yet effective and said despite the prohibition of the use of correction fluid on documents at the foundry, the inspectors found evidence of its continued use. (18)

EDF Energy Chief Executive Vincent de Rivaz says there will be “no impact” on Hinkley Point C from issues at Le Creusot. He said the RPV would be made “*at the right place and right time*”, declining to give further details. (19) A spokesman for EDF said: “*Steel forgings for Hinkley Point C will be manufactured to the most stringent nuclear standards which are reviewed and assessed by ONR. EDF Energy also has its own inspection and quality assurance programme to provide the required confidence that the components manufactured by Areva for Hinkley Point C meet those exacting standards.*” (20)

EDF Finances

A French Parliamentary report from the National Assembly's Commission for Sustainable Development and Regional Development says the clean-up of French reactors will take longer, be more challenging and cost much more than French nuclear operator EDF anticipates. Whereas Germany has set aside €38 billion to decommission 17 nuclear reactors, and the UK Nuclear Decommissioning Authority estimates that clean-up of UK's 17 nuclear sites will cost between €109–250 billion over the next 120 years, France has set aside only €23 billion to decommissioning its 58 reactors. In other words France estimates it will cost €300 million per gigawatt (GW) of generating capacity to decommission a nuclear reactor, Germany estimates €1.4 billion per GW and the UK estimates €2.7 billion per GW.

EDF says it wants to set aside a €23 billion fund to cover decommissioning and waste storage for an estimated €54 billion final bill – and the difference between these two figures will be closed through the appreciating value of its equities, bonds and investments – in other words, ‘discounting’. Unfortunately, recent experience has taught us that markets can go up and down over time – especially the very long-time periods involved in radioactive waste management. But for a company that has huge borrowings and an enormous debt of €37 billion, €23 billion is a large sum of money to find. Any significant change in the cost of decommissioning would have an immediate and disastrous impact on EDFs credit rating – something that the debt-ridden corporation can simply not afford. EDF is already in financial trouble. Along with bailing out collapsing AREVA, EDF also has to bear the huge financial burden of the failing reactor new-build at Flamanville. It will also have to pay for extending the life of France's existing nuclear power stations (to 2025), at a cost of €55 billion.



On top of all this the French authority tasked with disposal of all the countries vast and increasing waste burden (Andra) has recently ramped up the estimated cost for the planned national nuclear waste repository at Cigéo, to €25 billion – and EDF must pay for most of Cigéo’s construction. Although €5 billion more than EDF anticipated, it still seems a gross underestimation, and the costs are likely to rise considerably. (21)

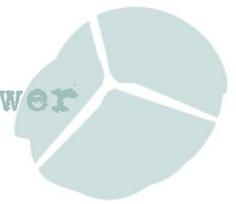
Who will put up the cash for Wylfa?

Hitachi Ltd, the owner of Horizon nuclear, which is proposing to build two Advanced Boiling Water Reactors (ABWRs) with a total capacity of 2.7MW at Wylfa on Anglesey, is set to lose tens of billions of yen this financial year after withdrawing from a uranium enrichment joint venture in the US. Hitachi is expected to report a 70 billion yen (\$620 million) non-operating loss by the time books were closed at the end of March. The deficit is largely attributed to the joint venture GE Hitachi Nuclear Energy Inc. withdrawing from the uranium enrichment project. Hitachi no longer expects any profits from the North Carolina-based company, of which it owns 40% and the rest by General Electric. Hitachi and GE were expecting more nuclear power plants to be built when they launched the joint fuel enrichment business, but orders have been sluggish across the globe, forcing the project to be shelved. Nevertheless, Hitachi says it will be sticking with its nuclear power business and plans to proceed with its project to build Wylfa by ensuring costs are thoroughly managed. (22)

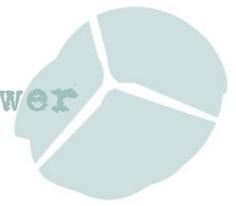
The chief executive of Horizon Nuclear, Duncan Hawthorne, says funding is the key issue to ensure the nuclear plant gets built. Wylfa Newydd would be the “showcase plant” for Horizon and Hitachi and important for the UK and Japanese Governments, which means there is huge resolve to get the project done successfully. But without the private investment and Government support the £14bn project would not happen. He said the deal that was struck for Hinkley Point would not work for Wylfa Newydd due to the fact they are private investors. Hinkley is supported by state backed Chinese and French enterprises. Hitachi are funding the project to the ‘Final Investment Decision’, with around £2.5bn of cash. He said he was very aware of the need to keep the Anglesey community behind the project, showing them what benefits the scheme could bring: “*Without community support we can’t do anything.*” (23)

Meanwhile Horizon has taken another major step towards delivering The Wylfa Newydd power station with the submission of its application for a nuclear site licence. A site licence is one of the main permissions Horizon will need as it looks to build and operate two ABWRs on Anglesey. Receipt of the application by the Office for Nuclear Regulation (ONR) now triggers a rigorous 19-month programme of assessment and intervention to establish whether Horizon can demonstrate it will be in control of all safety related activities on its site. (24)

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2. Decommissioning makes every other disaster in the post-war period pale into insignificance

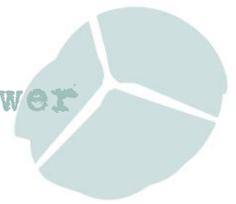
The UK Government has been forced to pay nearly £100m in a settlement with two US companies – Energy Solutions and Bechtel - for mishandling the way it awarded a £6.1bn nuclear decommissioning contract. Ministers have ordered an inquiry headed by the former boss of National Grid to find out why the procurement process was so flawed. Labour said the payout showed “*dramatic levels of incompetence*”. The Nuclear Decommissioning Authority (NDA) will also terminate the contract it awarded for cleaning up the UK’s old Magnox reactor sites nine years early. The sites include Bradwell, Chapelcross, Hinkley A and Hunterston A. (1)

The High Court ruled last summer that the NDA had “manipulated” and “fudged” the tender process. It meant that the wrong company won the work to decommission 12 UK nuclear sites (10 Magnox sites plus Harwell and Winfrith). The move opens the door for other bidders to attempt to reclaim their bid costs, which could run to an additional £50m. The contract was awarded in 2014 to Cavendish Fluor Partnership, a joint venture between the UK’s Babcock International and Texas-based Fluor. However, the consortium cannot be asked to take on the extra work because that could increase potential compensation claims by companies that wrongly lost out in the tender. Some industry sources have complained that the government plumped for an unrealistically low bid for the work at the outset. Another losing bidder, UK Nuclear Restoration Ltd, which is a consortium of Amec Foster Wheeler, Atkins and Rolls-Royce, said that the settlement “raises serious concerns” about the procurement process and that it has raised the implications of the judgment with the government and the NDA. (2)

Former National Grid chief executive Steve Holliday has been appointed to lead an independent inquiry into what went wrong. The inquiry will look at how the mistakes were made and by who, how the litigation was handled, and the relationship between the NDA and the government departments. Holliday will publish an interim report in October. The government now has the daunting task of starting a new tendering process for the 12 sites, as the deal with Cavendish Fluor Partnership (CFP) will end early, in September 2019 instead of 2028. (3)

Babcock said in a statement the CFP, in which it has a 65% stake, has come to a mutual agreement with the NDA to bring to an end the contract at the end of August 2019, having operated the contract for a full five years. Babcock said it had become apparent that the work that needs to be done is now materially different in volume from that specified in the NDA’s tender, and this puts the contract at risk of a legal challenge. What those material differences are remains a mystery.

The Business Secretary, Greg Clark, said: “*It has become clear to the NDA through this consolidation process that there is a significant mismatch between the work that was specified in the contract as tendered in 2012 and awarded in 2014, and the work that actually needs to be done. The scale of the additional work is such that the NDA board considers that it would amount to a material change to the specification on which bidders were invited in 2012 to tender.*” (4)



The failure of the contract award process was “inevitable” according to nuclear power expert Dr Paul Dorfman, from University College London’s Energy Institute. *“They were set up to fail and have failed because the understanding of costs and complexity to nuclear decommissioning is changing all the time,”* he said. *“Magnox reactors were thrown up in a rush to give electricity too cheap to meter and create plutonium and there was no thought of how they would be decommissioned. Each Magnox reactor is bespoke so decommissioning each one is different with its own complexities and challenges. The more we learn about dealing with the ‘back end’ of nuclear power, the more we see how complex and costly it is.”* (5)

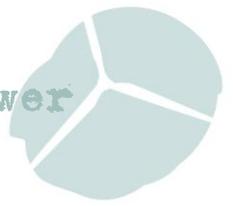
Stop Hinkley Spokesperson Roy Pumfrey said: *“Why should anyone believe that this astonishing level of incompetence will suddenly end when we start to build new reactors? Just because Hinkley Point C is not a Magnox reactor doesn't just suddenly make the industry competent.”* (6)

The *Daily Telegraph* declared today *“if we could, we would stop this madness ... In committing to new nuclear, we seem to have joined a runaway train, with no hope of getting off. Has not the time finally arrived for a fully fledged rethink of the merits of Britain's nuclear energy strategy?”* (7)

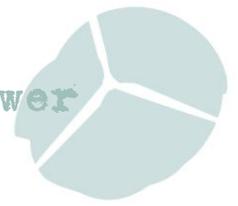
Roy Pumfrey continued: *“We agree – it is time to stop this madness. The UK's nuclear decommissioning costs have increased from £55.8 billion in 2008 to £117.4 billion at the last count. Although EDF is required to set aside funds for decommissioning Hinkley Point C, this is only up to an agreed limit. The taxpayer will be on the hook for the all too predictable shortfall.”*

Chris Huhne, former energy secretary for the coalition government, said the remit for the enquiry by Steve Holliday was not broad enough and it needed to look at the total cost of nuclear decommissioning. *“It is a complete mess, it's deeply embarrassing but it's actually I'm afraid only the latest in a long line of embarrassments,”* Huhne told BBC Radio 4. *“We're not even scraping the surface with the problem that this legal case has exposed.”* Huhne, who was energy secretary between 2010 and 2012 and left the before the contract was awarded, said the cost of decommissioning the UK's old nuclear fleet had increased £107bn in the last five years to £161bn. *“In terms of industrial strategy this makes every other disaster in the post-war period pale into insignificance.”* He said the problem stemmed from how early reactors stations were complex bespoke constructions made without consideration to how they would later be disassembled. *“We ordered a whole series of Savile Row suits rather than a bunch of work-a-day Marks & Spencer suits... Every single one of those reactors is different. Even the fuel rods in every single one of those reactors are different – crazy.”* (8) Huhne called on the government not to allow subsidies for new reactors. That was the coalition government policy. It should be the policy again but the government seems to be relenting - it's opening the door to exactly a repetition of the sort of disaster that we see today. (9)

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3. Hunterston B and Hinkley Point B

The UK's Office for Nuclear Regulation (ONR) has published its assessment of the Periodic Safety Review (PSR) for Hunterston B (HNB) and Hinkley Point B (HPB). ONR has also accepted EDF's revised graphite core safety case for both sites, but has included a number of recommendations as part of this acceptance. Acceptance of the safety case is reliant on a revised inspection and monitoring strategy. (1)

To comply with a nuclear site licence, a periodic review - a comprehensive study of plant safety - is carried out every ten years to justify continued safe operations. This requirement means that the site licence company regularly reviews and reassesses safety at nuclear sites, making improvements where necessary. The four Hunterston B and Hinkley Point B advanced gas-cooled reactors (AGRs) started up in 1976 are scheduled to close in 2023.

Graphite

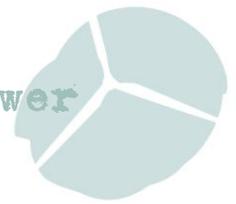
The graphite core of each of the reactors is made up of around 6000 graphite bricks - 3000 of these are the graphite bricks containing fuel channels - which are all connected together. Graphite ageing is one area used to determine the lifespan of an AGR nuclear power station. EDF says greater understanding of the ageing process by sampling and modelling can lead to them operating safely for longer.

In November 2015, EDF Energy said it had found cracks in three of the graphite bricks in one of the Hunterston B reactors. Similar cracks were found in October 2014 in two of the graphite bricks of the other reactor. A recent BBC Radio Programme revealed that the ONR was considering doubling the limit it had set on the percentage of cracked bricks it is willing to accept from 10% to 20%. This has been a particularly controversial part of this process with people living near these reactors finding it difficult to understand why the definition of "safe" seems to be changing.

ONR has now agreed to this increased limit. It says:

"Continued operation of HPB/HNB reactors is now supported by NGL's [EDF's] safety case NP/SC 7716 which sets an operational limit of 20% cracking in the core. The justified period of operation of each reactor at HPB/HNB is therefore dependent upon the findings from the inspections at each outage."

The ONR is also concerned about a very specific form of cracking. The keyway is a slot that holds each brick to the adjacent brick, the bricks underneath and the bricks on top. These keyways, which are acknowledged to be the limiting factor in the life of these reactors, are beginning to fracture. John Large points out that this will make the graphite blocks a very loose set of bricks. Seven of the keyways have been discovered to have cracks at Hunterston B. John Large believes the presence of keyway cracks casts doubt on the safety of the reactor in the event of an emergency like an earthquake. If the core becomes misaligned, and the fuel modules get stuck in the core, the fuel temperature will get raised and could undergo a melt. If the radioactivity gets into the gas stream and the reactor is venting because it's over pressurised then you have a release to the atmosphere and you have dispersion and a contamination problem.

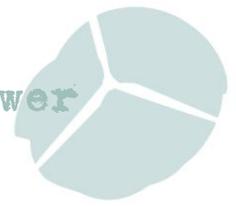


John Large says that if the cracks get any worse it could jeopardise the reactor's stability in the event of a significant disaster – such as a small earthquake – and make it impossible to lower control rods to shut the reactor down. He said: *“These keyways are beginning to fracture... that means the locking together – the way that force can be transferred from one brick to another – is lost, so it becomes a very loose stack of bricks.”* Allan Jeffrey of Stop Hinkley added: *“This weakness in the graphite core could end up distorting the channels the fuel and the boron control rods use. In cases of emergency there are sudden changes in temperature and pressure which could all end up starting to deform these channels. If you can't get the control rod down then you can't control the temperature inside the reactor and you're heading for accidents – possibly even meltdowns.”* (2)

ONR said that EDF had attempted to predict the rate of KWRC. Originally the first cracks were not expected to occur until 2019, but the first KWRC was observed at Hunterston B in 2015.

Inspection will *“play a crucial role in supporting the period of safe operation of the reactor in later life,”* the regulator said, adding that certain improvements are necessary, such as the development of a capability to measure the condition of control rod channels. EDF Energy should develop improved inspection and monitoring technology; in particular equipment capable of performing visual inspection and dimensional measurements of control rod channels, it said.

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1. ONR Press Release 24th February 2017 <http://news.onr.org.uk/2017/02/hinkley-point-b-and-hunterston-b/> and World Nuclear News 1st March 2017 <http://www.world-nuclear-news.org/RS-EDF-Energy-graphite-review-gets-regulatory-guidance-01031701.html> and Nuclear Engineering International 6th March 2017 <http://www.neimagazine.com/news/newsonr-publishes-safety-review-of-uk-hunterston-and-hinkley-5756308>
 2. NFLA 2nd March 2017 <http://www.nuclearpolicy.info/news/nfla-concerned-onr-decision-approve-edfs-periodic-safety-reviews-hinkley-point-hunterston/>
 3. See also: Plant Life-Time Extensions for Scotland's Ageing Reactors the Lack of Public Participation in the Decision-Making Process A report for the Green MSPs by Pete Roche Published January 2017 <https://greens.scot/sites/default/files/Nuclear%20lifetime%20extensions%20-%20Pete%20Roche.pdf>



4. A United Nations body has asked the UK to suspend Hinkley Point C pending an environmental assessment.

A United Nations body has asked the UK to suspend Hinkley Point C pending an environmental assessment. A United Nations committee has asked the U.K. to suspend construction of the Hinkley Point C nuclear power plant pending assessment of the environmental impact. The UN Economic Commission for Europe (UNECE) requested the pause until it established whether “a notification under the Espoo Convention” was useful. (1) The Espoo Convention sets out the obligations of countries to “assess the environmental impact of certain activities.” The UK has failed to properly consult neighbouring countries over the potential environmental risks of building the new reactors in Somerset. Germany, Norway and the Netherlands have now formally requested a transboundary environmental impact assessment is carried out. So UNECE has asked the UK to suspend work at Hinkley until the assessment has been carried out. (2)

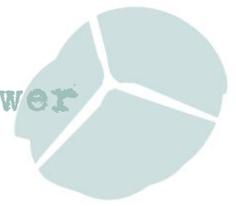
Stop Hinkley Spokesperson, Roy Pumfrey said: *“This is yet another embarrassment for the Government and its obsession with outdated, dangerous nuclear technology. This month we have already seen the Daily Telegraph (3) warn that the old energy order is drawing to a close and that Theresa May’s Government will be cursed for locking us into Hinkley Point C’s ruinously high prices. Commentators and energy experts from all shades of opinion have told her that this phenomenally expensive project is an unnecessary form of power generation. Unlike previous Prime Ministers we know she is not averse to the occasional U-turn, so she should take the opportunity presented by the United Nations Committee to call a halt to this project now.”*

For further information on this issue see the Friends of the Irish Environment Press Release and associated documents here: <http://www.friendsoftheirishenvironment.org/press-releases/17429-threat-to-work-at-hinkley-c-nuclear-plant-call-on-minister-to-assert-irish-rights>

In a further twist a member of the public in Germany has just won a case because she asked her country to guarantee her right to public participation under the Aarhus Convention in the Hinkley Point C environmental assessment. See:

https://www.unece.org/fileadmin/DAM/env/pp/compliance/C2013-92/Correspondence_Party_concerned/C92_Germany_DraftFindings_18.11.2016_for_parties__comments.docx

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1. Bloomberg 18th March 2017 <https://www.bloomberg.com/news/articles/2017-03-18/un-asks-u-k-to-pause-hinkley-nuclear-plant-work-for-assessment>
 2. The full document from the UNECE released 18th March, is available here https://www.unece.org/fileadmin/DAM/env/eia/documents/ImplementationCommittee/2017/IC_38/ece.mp.eia.ic.2017.2_IC38report_13.03.2017_as_adopted_for_web.pdf
 3. Daily Telegraph 4th March 2017 <http://www.telegraph.co.uk/business/2017/03/04/old-energy-order-draws-close-amid-battery-storage-revolution/>



5. Old Energy Order Draws to a Close

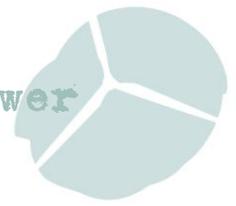
The old energy order is drawing to a close as a battery storage revolution takes off, according to the *Telegraph*. Over the last two years, battery costs have fallen 40%, with further falls to come as economies of scale take hold. Rapid growth in the market for battery storage, forecast by Goldman Sachs to increase by a thousand-fold from \$258m (£210m) last year to \$258bn in 2025, should in turn remove a number of the key economic constraints on renewable forms of energy. Wind and solar are intermittent forms of energy, and hitherto have therefore required complementary back-up generation to ensure there is enough power in the grid at all times to service demand. The great promise of storage is that it should lend renewables the same “always on” characteristics of more conventional forms of power, allowing electricity to be drawn when the wind is blowing, and given out again when it is not.

Paul Massara – a former chief executive of Npower who now runs his own battery storage business, North Star -says it seems plausible that at least half of all UK households will have installed battery storage facilities within 10 years. In such a world, energy supply ceases to be the linear business of delivering power from the generator to the consumer as and when it is required, and becomes much more about smart grids and data management. There will always be a need for National Grid and the District Network Operator Companies, but they may have to radically change their charging methods from a metered usage basis to a single, all-you-can eat rental charge, to cater for this new, much more diffuse form of power provision. That’s what happened to BT. Far less certain is that there will be any need for Hinkley Point C. This will in time be seen as a phenomenally expensive and unnecessary form of power generation; Theresa May’s Government will be cursed for locking us into such ruinously high prices. (1)

Britain’s energy system is poised for a rapid expansion of batteries, with 4 gigawatts likely to be operating by 2033, official forecasts show. Renewables will also play a bigger role than forecast, resulting in far fewer gas-fired power stations being built than expected, according to an analysis published by the government in March. No carbon capture and storage plants are likely to be built by 2030, according to the documents, which show the government’s best estimate of the future energy mix if policies are continued.

Large-scale battery technology is still in its infancy, with initial projects totalling 200 megawatts being built. New government forecasts project that this will increase to 1GW by 2021, 2GW by 2025, 3GW by 2029 and 4GW by 2033. Last year’s forecast included no battery capacity but the government said that it had “*continued to see significant reductions in the cost of batteries*”. The government now forecasts 45GW of renewable capacity will be built by 2035, compared with 33GW a year ago. Forecasts for new gas power plants have been reduced by an amount corresponding to the increase in renewables. (2)

Local authorities have been told they need to develop energy storage strategies, or get left behind. Speaking at the Association for Public Sector Excellence’s (APSE) energy conference, Ray Noble said the price of energy storage systems will come down “*faster than solar*” and “*every onshore wind and solar farm will have one in the future. They [councils] need to put in place the right strategy or work with government to produce the right networks to make certain it happens in their area,*” he said. “*Local authorities have got to recognise that this is going to*



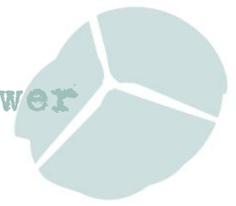
happen. They need to be seen to be ahead of the game, and telling people in their area why they are doing this.” Noble said storage will change the face of the energy market beyond recognition. (3)

The community at Garmony on the Isle of Mull is an example of how things might look in the future. It's not just that the community is running a new 400-kilowatt hydro power plant on an east coast hillside that will plough £2 million into local projects. It's what they are doing about using the electricity. With the help of experts and a government grant, they are trying to solve one of the most paradoxical problems of renewable power: sometimes there is just too much of it. If the river is flowing fast and full and electricity demand is low, there's nowhere for the power to go. There's a limit to how much can be transmitted to the mainland, and no easy way of storing it. The same applies to wind turbines when the wind is blowing hard but homes and factories aren't hungry for power, at night for example. It's why electricity consumers have to fund “constraint payments” to compensate generators forced to turn off turbines to avoid overloading the national grid. What the Mull and Iona Community Trust are trying to do is to develop a much smarter local grid that will enable electricity to be stored rather than wasted. It's called the ACCESS project – Assisting Communities to Connect to Electric Sustainable Sources. It means that electric storage heaters in homes can be automatically switched on and off in order to match the amount of power being generated by the hydro plant. This may not sound like the kind of sophisticated system that is key to the future, but experts insist that it is. It is decentralised, locally owned and community-scale schemes for using renewable energy that have the real potential to revolutionise the energy system.

There are similar initiatives under way on the Orkney islands, where excess electricity from wind turbines can be used to charge community electric vehicles. These are the kind of ideas that, if they are shown to work, could be followed up across the country. *“But we need to get away from thinking of green energy just as a bunch of subsidised windmills or wave or tidal turbines, or thinking only about electricity. Green energy in its widest sense includes energy generation technologies, but also heat pumps, energy efficiency, low emission vehicles and smart meters.” (4)*

The arrival of large scale renewables with zero operating cost is eating away at the businesses of those companies reliant on selling on the open market. The old business model is now 'obsolete'. Lower and lower prices are making it impossible to produce electricity from gas or coal in markets increasingly captured by solar and wind. Equally, no-one can raise the finance to build new power stations, even in those countries with ageing fleets, such as the UK, because of low prices and fewer and fewer hours of operation. This problem will get worse. Whether you are an enthusiast for a fast transition to a renewables-based energy system or are sceptical about the pace of change, the destruction of the traditional utility by the eating away of wholesale prices is not good news. It increases the possibility that the increasingly rapid switch to renewables around the world will be brought to a shuddering halt by governments worried about the security of energy supply because of the intermittency of wind and solar. Although we can make huge progress in adjusting electricity use to varying supply, 'demand response' will never be enough to deal with weeks of low wind speed and little sun in northern countries.

'Power-to-gas' is the critical remaining ingredient of the energy transition, says Chris Goodall. Without a rapid and whole-hearted commitment to this technology, the renewables revolution may ultimately fail. The right way to 'fix the broken utility model' is to link the gas and electricity markets through large-scale application of power-to-gas technologies. Big utilities



talk about understanding the need for decentralisation but the reality is that they will be terrible at moving away from centralised production plants. What they would be good at is running large scale electrolysis and methanation operations that allow them to continue to run CCGT power plants when electricity is scarce. We will not need capacity payments or other complex subsidies and incentive schemes. By creating a continuing role for CCGT we will have found a way to keep our energy supply secure without threatening decarbonisation objectives.

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1. Telegraph 4th March 2017 <http://www.telegraph.co.uk/business/2017/03/04/old-energy-order-draws-close-amid-battery-storage-revolution/>
 2. Times 17th March 2017 <https://www.thetimes.co.uk/edition/business/british-set-to-be-boosted-by-expansion-of-batteries-98q76bf6r> See also Business Green 17th March 2017 <http://www.businessgreen.com/bg/news/3006707/is-the-government-planning-a-post-2020-renewables-power-surge>
 3. Utility Week 16th March 2017 <http://utilityweek.co.uk/news/Councils-must-develop-energy-storage-strategies/1298302#.WOeMoNQrLDc>
 4. Sunday Herald 2nd April 2017 http://www.heraldscotland.com/news/15197914.Can_green_energy_really_revolutionise_the_Scottish_economy_/
 5. Carbon Commentary 2nd March 2017 <https://www.carboncommentary.com/blog/2017/3/2/cgb0bbx2uyubc858ubthhxegetd41n0>