

# *Nuclear Free Local Authorities* new nuclear monitor



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Number 49, September 2017

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## **UK New Nuclear Policies: Recent Changes and Likely Developments**

### **i. Overview of Policy Briefing**

This edition of the NFLA's New Nuclear Monitor is provided by kind permission from the NFLA Scotland Policy Advisor, Pete Roche and was jointly developed by him and Professor Steve Thomas and Dr Ian Fairlie. The report was profiled at a workshop on 'nuclear energy or a renewable energy revolution?' at the Medact / IPPNW International Conference at York University on the 6<sup>th</sup> September by Dr Fairlie, an independent consultant on radioactivity in the environment. The NFLA Secretary also thanks Dr Fairlie for permission to develop this report as NFLA New Nuclear Monitor. The NFLA Secretary and Reinhard Uhrig of Global 2000 / Friends of the Earth Austria were also official speakers at this workshop, which was chaired by Dr Angelika Claussen, Vice President of IPPNW (International Physicians for the Prevention of Nuclear War).

There were two other workshops on nuclear energy at the conference – one on the global nuclear legacy and dealing with a huge radioactive waste burden, and the other about the global uranium industry. When these presentations are made available they will be linked to the NFLA website – <http://www.nuclearpolicy.info> – where this briefing will also be available for download.

The report focuses on the deep national and international crisis affecting the nuclear industry at present, and considers how prospects for new nuclear power stations and UK nuclear energy policy in general will develop in the near future.

### **1. Introduction**

Steve Thomas, Emeritus Professor of Energy Policy at the University of Greenwich, argues many of the issues that arise with Hinkley Point C (HPC) that might derail the project apply equally to the whole UK Government new nuclear programme. Professor Thomas says we are probably at the point where we are looking at a public spending disaster. Financing HPC will stretch EDF Energy to the limit and maybe beyond. Professor Thomas thinks there is no possibility of Sizewell C being built on the timetable that the Government is looking at. Professor Thomas comments that we are in a surreal situation where the UK is host to the planning for the two largest construction projects ever built on UK soil – HPC and Moorside – and we are contemplating buying the equipment from bankrupt and disgraced companies using technologies that have abjectly failed wherever they have been built. None of the three consortia (excluding Bradwell which is further off in the future) are financeable in their present state.

Here we look at the evidence presented by Steve Thomas and others which questions whether any of these projects will ever be successfully completed. On the other hand, continuing with these projects will seriously damage renewable and energy efficiency programmes and delay real action to combat climate change.

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**37 YEARS AS THE LOCAL GOVERNMENT VOICE ON NUCLEAR ISSUES**

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## Current UK New Nuclear Reactor Proposals

Proposed reactor	Capacity	Reactor Type	Investors
Hinkley Point C	2 X 1,600 MW	EPR	EDF 67% CGN 33%
Moorside	3 X 1,150 MW	AP1000	Toshiba / Westinghouse
Wylfa B	2 X 1,350 MW	ABWR	Horizon Nuclear / Hitachi –GE
Sizewell C	2 X 1,600 MW	EPR	EDF 80% CGN 20%
Oldbury B	2 X 1,350 MW	ABWR	Horizon Nuclear / Hitachi –GE
Bradwell B	2 (?) X 1,150 MW	Hualong One	CGN 66.5% EDF 33.5%
<b>TOTAL</b>	<b>17.55 GW</b>	<b>4 different reactor types</b>	

If Hinkley Point C (HPC) costs are a guide the total cost, including financing costs, could be around £125 billion undiscounted. (1)

## 2. Financial Issues

### (a) HPC's construction costs are extremely high - £20 billion +

Following a “full review” carried out over several months, it was announced in July 2017 that the cost of Hinkley Point C (HPC) had increased, yet again to £19.6bn. It was also announced there is a possibility of an extra 15 month delay, which would increase the cost further to £20.3bn. These figures are an increase on the £18bn quoted in 2016 and the £16bn figure set in 2015. EDF says £1.5bn of the increase is due to a “better understanding” of the construction work needed and UK regulatory requirements. The French energy group is still hoping to complete the project by the end of 2025 but further delays could stretch this to 2027. In 2007, Vincent De Rivaz, EDF Energy's then Chief Executive, predicted that by Christmas in 2017, “turkeys would be cooked using atomic power from new reactors at Hinkley”. (2)

For more info see:

<http://www.no2nuclearpower.org.uk/nuclearnews/NuClearNewsNo97.pdf>

### (b) Delayed beyond 2025 – 8+ years after original target

2025 was already a delay of eight years. If there is another 15 month delay HPC would be virtually a decade later than originally planned.

### (c) HPC Cost to UK consumers -£50 billion

The cost to UK consumers could mushroom to £50bn (3). The new official estimate is more than eight times higher than the £6bn that the National Audit Office estimated the plant would cost consumers when ministers first struck a subsidy deal to support it in 2013. The reason for the increase is the decline in electricity prices, which in turn have hugely inflated the subsidies Hinkley is expected to require. Under the terms of the deal HPC will receive a guaranteed price of £92.50 for every megawatt-hour of power that the plant generates for 35 years. If wholesale prices are below that level, the difference will be subsidised by consumers through levies on their energy bills. Wholesale prices and projections of future prices have both fallen significantly since 2013. This has increased the estimates of the subsidy payments that will be required for Hinkley Point, making the project appear increasingly poor value. Government figures show that, as of September last year, the **lifetime costs of HPC were estimated at £49.9 billion. That compares with an estimate of £36.9 billion in 2015 and £14.5 billion in 2014.**

For more info see:

<http://www.no2nuclearpower.org.uk/nuclearnews/NuClearNewsNo98.pdf>

#### **(d) Renewables just keep getting cheaper**

Michael Grubb, Professor of International Energy and Climate Change Policy at University College London, told the House of Lords Select Committee on Economic Affairs that, although he had supported new nuclear during his time on the Committee on Climate Change, he felt “times and conditions had substantially changed.” He said renewables are now clearly cheaper - costs have halved in the past few years. Committing to a 35-year contract for Hinkley Point C at the level agreed “was economically inappropriate”. (4)

The cost of wind and solar has dropped 60% since 2009 and another nearly 40% reduction is expected over the next ten years. What started as a decarbonisation process, thanks to better technology, is becoming a process driven by costs. You could see governments and countries adding more and more wind and solar without any impact on final consumers. Larger turbines are reducing wind costs by producing power at much lower wind speeds. Effectively what used to require 20 knots, now only requires 10 knots. Goldman Sachs forecast that by 2020 renewables will cost less than the current average power price. This will trigger acceleration in investment - about \$3 trillion over the next 20 years. The transition to a low carbon economy is accelerating. (5) The falling cost of offshore wind power could mean that it turns out to be 25% cheaper than energy from Hinkley Point C. (6)

Solar power, once so costly it only made economic sense in spaceships, is becoming so cheap that it will push coal and even natural-gas plants out of business faster than previously forecast according to Bloomberg New Energy Finance (BNEF). (7)

If all of these reactors go ahead it would be a significant detriment to the renewables industry because, as simple maths tells you, there would not be much capacity left for the renewables to supply. Hinkley Point’s power will be inflexible - running with constant output, 24/7, month to month. What we need is flexible power that complements wind and solar, otherwise we will need to keep wasting resources and turning renewables off when demand is low, because we can’t keep turning nuclear stations on and off. (8) Electricity demand has fallen by 15% over the last decade and renewable costs keep falling. By the time Hinkley is producing electricity, which consumers will have to take because they have already paid for it, renewables will be offering electricity to the grid, probably between April and October for all our requirements at a cheaper price. In the future energy ministers will face the daunting task of explaining to consumers why they are paying renewable generators to switch off cheaper electricity in order to take the expensive electricity we have already bought from HPC. Imagine how much more difficult that task will be if we have by then bought the rest of the Government’s proposed programme. (9)

#### **(e) All agencies, international or UK, unwilling to fund - except China (but recent reports indicate Chinese Government cooling its enthusiasm after Westinghouse bankruptcy.)**

According to Matt Ridley writing in The Times, it is not clear China wants to go ahead with HPC. They increasingly realise that the Hinkley design is a dead end, as costs escalate and delays grow. (10)

Over the past year China’s own nuclear programme has continued to slow. Although there are 21 units under construction, representing 23.1GWe, there have now been no new approvals for 18 months. Delays to AP1000 and EPR reactors being built in China has been a source of concern for the Chinese who have suffered a severe dent in their confidence about imported reactor technology, such as the AP1000, not helped by Westinghouse’s bankruptcy. (11) Confidence in EPRs has also been dented by manufacturing defects encountered at the EPR being built at Flamanville in France. Similar defects exist at the two EPRs being built at Taishan, in the south-east of China. The two pressure vessels were manufactured at Le Creusot in France. The same anomalies in the carbon concentration discovered in the steel used for the pressure vessel and the lid at Flamanville are also a problem at Taishan. Chinese nuclear regulators will have to decide

whether to force CGN to replace the pressure vessels lids at Taishan. These two reactors are due to start operating between the end of 2017 and the end of 2018. (12)

Meanwhile, China has more than doubled its solar power target for 2020, with new installations dramatically outstripping expectation. By the end of July this year, China's solar PV capacity topped 112GW, after installing a stunning 35GW in just seven months — more than twice as much as installed by any other country in all of 2016. As a result, total solar PV capacity now exceeds the government's 2020 goal of 105GW, set as recently as last year. The National Energy Administration (NEA) has now set a new target of 213GW by 2020 — which is five times larger than current capacity of the United States. That would mean covering an area of land equivalent to greater London – 1500km<sup>2</sup> – with solar panels. Current growth rates suggest China could even surpass that new, higher target. (13)

China has now opened a solar farm near the North Korean border on a site previously earmarked for a nuclear power plant, in an apparent sign that the authorities have abandoned plans to build a reactor on that site. The planned power plant was one of two Chinese nuclear projects proposed near the North Korean border. Ground-clearing work on the site, meant to house four AP1000 nuclear reactors, was completed in 2013. (14)

China is also on track to install at least 110.4 GW in onshore wind capacity over the next three years. This would increase the country's cumulative wind power installation by 2020 to about 264 GW – far exceeding the original target of 210GW. It is considerably more than the total wind power capacity of all of Europe (including the UK). (15)

**(f) If Flamanville is not in commercial service by end 2020, UK loan guarantees will be withdrawn.**

When the European Union signed off on the UK Treasury's guarantee of loans to EDF to build Hinkley Point, it insisted it be conditional on Flamanville having “completed the trial operation period” and other operational milestones by December 2020. (16)

A group of experts at the French nuclear safety authority – the ASN - have cleared EDF's Flamanville 3 nuclear reactor to start as planned at the end of 2018 – despite weak spots in its steel. The group's non-binding recommendation will be used by ASN, to formulate a final ruling in October. Completion of the EPR reactor had been thrown into doubt after the discovery in 2015 of weak spots in the steel which prompted an extensive safety review by the ASN. The stakes are high for French nuclear groups EDF and Areva because it would cost billions of euros to fix if the ASN had ruled that the steel was too brittle. The sign off by the ASN is also a European Commission pre condition for approving EDF's planned takeover of Areva's reactor business. The group of experts did recommend, however, that EDF put in place a new pressure vessel by 2024. (17) ASN will give a final decision in the autumn of 2017 after a period of public consultation. (18)

Flamanville is already running six years behind schedule and €7bn over budget. It remains to be seen whether a trial operational period can be successfully completed by the end of 2020.

**(g) No loan guarantees, no Hinkley**

Financing Hinkley will stretch EDF to the limit and maybe beyond. EDF's financial problems include:

- Debts of €37 billion (£34 billion)
- A €50 bn bill for upgrading about half of its nuclear power reactors in France plus another €55bn for decommissioning the remaining reactors according to a report by French Government auditor – the Cour des Comptes.
- The French waste agency Andra has estimated that the cost of its deep geological disposal project could be as high as €30bn rather than the €20bn estimated by EDF.

- EDF will need to invest in renewable energy across France to meet the Government's aim of reducing the share of electricity provided by nuclear power from 75% to 50%. The Cour des Comptes says this could lead to the closure of 17 to 20 reactors. (19)
- EDF is looking to raise about £4-5bn in equity to finance its own share of the project. Its profits are only around €2 bn per year, so it is organising a fire sale of assets and issuing bonds. The French State is buying €3 bn out of €4 bn of the bonds and the only sale of assets it has made is its share of the transmission company which it sold to a French State bank, so there is not a lot of interest in the equity. Any equity it can raise has a much more urgent use which is extending the life of its existing reactors. (20)

### **3. Problems with the EPR design**

Areva, which, before its proposed merger with EDF, was 87 per cent owned by the French state, is the company supplying the European Pressurised water Reactors (EPRs) for HPC and Sizewell C. In March 2015, Areva announced losses for the fifth consecutive year, this time of nearly €5bn and it became clear it could not continue to trade without substantial assistance. (21) The French government provided short-term loans to allow it to continue to trade while a rescue was put in place.

Areva comprised two main businesses, the fuel cycle business, Areva NC, and the reactor business Areva NP, and the rescue involves the splitting up of Areva into two new companies. These are provisionally being called New Co for fuel cycle and New NP for the reactor business. In November 2016, EDF was forced by the French Government to agree to buy 75% of New NP under certain conditions. (22) These conditions are onerous and it is by no means certain that the takeover will proceed.

Areva began building the first EPR at Olkiluoto in Finland in 2005 with a target for completion by 2009 at a cost of €3.2bn. The latest timetable would see it open almost a decade late at the end of 2018 and nearly three times over budget at €8.5bn. Olkiluoto liabilities were among the main factors which led the French government to arrange a €5bn bailout of Areva, and force it into a tie-up with EDF. Responsibility for Olkiluoto will remain in a separate "old Areva" to protect state-controlled EDF from the Finnish company - TVO's compensation claim, which would ultimately be borne by French taxpayers.

EDF is leading the construction of another EPR at Flamanville in Normandy. The Flamanville plant is six years late and €7bn over budget, with the risk of further delays beyond the current 2018 opening target as French regulators scrutinise potential faults with reactor components.

Two further EPRs are under construction at Taishan in China by state-controlled CGN in partnership with EDF and Areva. These have proceeded more swiftly. One is on course to become the first operational EPR worldwide by the end of 2017, a mere four years late. (23)

### **4. Manufacturing anomalies in composition of steel for the EPR reactor -**

In April 2015 the completion of the EPR reactor at Flamanville was thrown into doubt by the discovery of weak spots in the steel used for the reactor vessel head and reactor vessel bottom head. (24) This prompted an extensive safety review by the ASN. The stakes are high for EDF and Areva because it would cost billions of euros to fix if the ASN rules that the steel is too brittle.

In June 2017 a group of experts at ASN cleared EDF's Flamanville 3 nuclear reactor to start as planned at the end of 2018 – despite the weak spots in its steel. The group's non-binding recommendation will be used by ASN, to formulate a final ruling in October after a period of consultation. The sign off by the ASN is also a European Commission pre condition for approving EDF's planned takeover of Areva's reactor business. The group of

experts, however, also recommended that EDF put in place a new pressure vessel by 2024. (25)

The decision by France's nuclear watchdog threw a renewed spotlight on to growing safety concerns at the heart of the French atomic industry. ASN said: "The anomaly . . . entails a reduction in the margins with respect to the fast fracture risk." Anticipating the ruling, EDF is understood to have ordered a replacement pressure vessel head at a cost of several hundred million euros. The discovery of the anomaly caused a French nuclear industry scandal. EDF discovered a similar anomaly in 12 functioning reactors in France. (26) The defective components were all made at a factory in central France, where Areva has been found to be falsifying Quality Control records for up to 50 years. (27)

Pierre-Franck Chevet, chairman of ASN, said components made for other EPRs, notably in China, might be similarly affected. The pressure vessels for the two EPRs being built at Taishan were manufactured at the same forge as the Flamanville vessel - Le Creusot. The Chinese regulators will have to decide whether they also impose changes to the lids of the Taishan EPRs. These two reactors are due start between the end of 2017 and the end of 2018. (28) This could cause an expensive dispute with China. (29)

In March this year ASN said the equipment at Areva's Le Creusot Forge is not up to the job. Remy Catteau, the head of nuclear equipment at the ASN, said that an inspection of the plant late last year showed that it 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". He also said "The inspection brought to light the fact that the safety culture in the plant is not sufficient to produce nuclear components." (30)

EDF's takeover of Areva's New NP is conditional on the completion and satisfactory conclusions of the quality audits at Le Creusot and two other plants. These are expected to continue well into 2018.

Even when the reviews are complete, there is the issue of whether any liabilities will arise. Clearly, given its relatively poor financial state EDF cannot contemplate facing large scale liabilities arising from QC issues and will only buy New NP if the French government covers them.

Professor Steve Thomas asks if it is politically credible to order equipment for the two largest projects ever undertaken in UK (Hinkley Point C and Sizewell C) from bankrupt, disgraced companies using failed technologies? (31)

## 5. **Legal problems with developing Hinkley Point C**

### a) **'Brexit' and 'Brexatom'**

The UK's exit from the European Union will also involve leaving the Euratom Treaty. Without a replacement for the Euratom Treaty there will be a cessation of the movement of nuclear materials and no verification for the non-proliferation of nuclear material. Antony Froggatt, a research fellow at the Chatham House think-tank, says: "Outside of Euratom and the single market, the movement of nuclear fuel, equipment and trained staff will be more complicated." (32)

Failing to replace Euratom would have a "dramatic impact" on Hinkley Point C and other new power stations around the country, according to the Nuclear Industry Association. "If the UK has not replaced the Euratom safeguards regime with its own system by the time it left Euratom, normal business could be disrupted right across the nuclear industry." Nuclear cooperation agreements (NCAs) would need to be put in place with key nuclear countries outside the EU, including the US, Japan and Australia, because the UK's agreements with those governments are currently based on its membership of Euratom. The UK's new build

plans, existing operations and the waste and decommissioning sector all depend, to some extent, on cooperation with other nuclear states. (33)

#### **b) Austrian Government Legal Complaint**

Austria filed a legal challenge at the European court of justice against EU-granted state subsidies for a new nuclear power plant in Britain. The country argues that the Hinkley Point C project is in breach of European law and risks distorting the energy market. This case is still outstanding. (34)

### **6. Almost nobody wants Hinkley to go ahead**

According to Matt Ridley, writing in The Times, “Almost nobody wants Hinkley to go ahead”. He says it’s time to scrap it. (35) The Financial Times agreed. (36)

In October 2014, the European Commission decision on HPC and State Aid revealed that Infrastructure UK – a wing of the Treasury - had evaluated the investment in HPC as “speculative BB+”. The following year there were rumours that Treasury officials would not be disappointed if Hinkley never happened. “They have been foot-dragging for at least a year.” One Tory figure said: “I think the Treasury don’t really want that deal to work.” (37)

In June, the National Audit Office (NAO) condemned HPC because it “has locked consumers into a risky and expensive project with uncertain strategic and economic benefits”. It said HPC could lead to requests for more cash and electricity payment top-ups worth £29bn discounted. (38) Nils Pratley, writing in The Guardian says NAO does not use excitable phrases like “utter shambles.” But the spending watchdog’s verdict on HPC amounts to the same thing. The 80-page report confirms one’s worst fears about how ministers fell in love with Hinkley. First, they wedded themselves to an inflexible financial model. Then they agreed commercial terms with developer EDF in 2013, when energy prices were sky-high, and ploughed on regardless when the economic case for Hinkley started to crumble. The document tells a depressing tale of inadequate scrutiny and successive governments ignoring the energy revolution taking place beyond their spreadsheets. (39)

### **7. Problems in developing the Moorside site**

NuGen is a nuclear company which is currently planning to build a new nuclear power station of up to 3.6 GW at a site in Cumbria called Moorside – adjacent to the Sellafield nuclear facility. NuGen was originally owned by the French company GDF Suez, the Spanish company Iberdrola, and Scottish and Southern Energy (SSE). Scottish and Southern Energy (SSE) withdrew from the consortium in September 2011 and sold its stake to GDF Suez and Iberdrola. Then in January 2014 Toshiba-owned Westinghouse Electric Company agreed to buy all Iberdrola’s stake and another 10% from GDF-Suez (now called Engie) giving it a 60% controlling stake.

On 29th March 2017, Westinghouse Electric Company, 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. ENGIE (33% owned by the French Government) then 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.

Toshiba has mothballed its NuGen operations until a new owner can be found. (40) The National Grid has also hit the pause button on Moorside’s 102-mile power line connection - the “biggest new power line since electricity network was built”. (41)

Toshiba had already announced that it would not be involved in the construction of new nuclear reactors at Moorside and that it would like to sell Westinghouse.

(see <http://www.no2nuclearpower.org.uk/nuclearnews/NuClearNewsNo93.pdf>)

But there is a very limited field of companies to approach in its hunt for a new partner for the Moorside scheme. South Korea's KEPCO remains the most likely suitor, 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 Regulators undertake a Generic Design Assessment.

(See <http://www.no2nuclearpower.org.uk/nuclearnews/NuClearNewsNo94.pdf>)

In 2015, when the company confessed to falsifying its profits to the tune of more than \$1bn, many felt Toshiba had hit a nadir. (42) But in December 2016, the company revealed that its problems went far deeper and that it faced a multibillion-dollar write-down on its US nuclear business. Credit rating agencies downgraded the company. The market no longer saw a dependable hero lumbering out of trouble, but an accident-prone scoundrel up to its old tricks. In the three days that followed the December 27 bombshell, Toshiba's shares plunged nearly 42 per cent. (43)

In August 2017, work was suspended on the VC Summer nuclear plant in South Carolina, where Westinghouse was building two AP1000 reactors, to stem spiralling costs. The decision by utilities Santee Cooper and Scana Corporation dealt another blow to Westinghouse and Toshiba. VC Summer was one of two plants being built by Westinghouse in the US south-east.

Georgia Power has asked state regulators to approve its proposal to complete its two AP1000 reactors being built at Vogtle. The company, which has partnered with three other utilities on the project, said it expected the new reactors would cost roughly \$19 billion and come online in 2021 and 2022 (an increase on the original cost estimate of \$14bn). In March, Georgia Power took over control of the Vogtle plant from Westinghouse. But it is not certain that the Georgia reactors, first proposed in 2006, will actually be finished. In its filing, Georgia Power said that completion of the project depended on Congress extending a federal tax credit for new reactors. The company is also counting on \$3.7 billion in payments from Toshiba, the parent company of Westinghouse, as part of the latter's bankruptcy agreement. (44)

With the implosion of Toshiba under the weight of the Westinghouse financial collapse, Moorside is under serious threat. If the South Koreans buy NuGen they will want to use their own reactor design. This will mean many more years of delay. By that time, nuclear energy will have become 100% redundant, as renewables, combined with energy efficiency, will almost certainly have completely taken over. (45)

The decision by the newly-elected South Korean president, Moon Jae-in, to gradually phase out nuclear energy will affect both the domestic and export prospects of the Korean nuclear industry.

Although the new Government says it doesn't plan to stop exports the phase-out will decimate South Korea's hope for exporting nuclear technology by undermining credibility, capability, and opportunity. In terms of credibility, it is reasonable to argue that when the Korean president has openly stated that nuclear energy needs to be phased out for the sake of public safety, it will be very difficult to convince other countries to import the exact same kind of technology from South Korea. (46)

A sale of Westinghouse to state-run Chinese companies might run into national security concerns or political challenges in the U.S. and Japan, (47) but the Chinese state-owned State Nuclear Power Technology Corporation (SNPTC) was reported earlier this year to be considering investing in NuGen. Eight senior officials from SNPTC are said to have met

executives from NuGen and Britain's atomic power trade body, the Nuclear Industry Association in May. Sources said SNPTC could seek to power NuGen with its own reactor — a derivative of Westinghouse's AP1000 model, which is planned for the site. (48)

#### **8. Problems developing the Wylfa B (Newydd) site**

Hitachi Ltd is the sole owner of Horizon nuclear which was originally owned by the German utilities – Eon and RWE – who decided to put the joint venture up for sale in March 2012. Investing billions in new reactors would have forced a credit-rating downgrade on RWE, said Volker Beckers, CEO at RWE npower in May 2012 and Tony Cocker, CEO of E.ON UK said E.ON lacks the “financial firepower”.

Horizon says it wants to build two Advanced Boiling Water Reactors (ABWRs) at Wylfa. Major onsite work is not expected to begin until at least 2018, and first nuclear construction around 2019. The company has yet to gain approval from the regulator for its reactor design. (49)

Hitachi made a massive loss on investments in laser uranium enrichment technology in the US. On 12 May 2017 the company posted an impairment loss of £1.3bn for the year ended 31 March 2017, and “the major factor” was Hitachi's exit from the laser enrichment project. (50)

It was reported in June that Hitachi is scrambling to divest from Horizon. Hitachi said if it fails to find partners before construction starts in 2019, forcing it to bear practically all the financial risk of the project, it will suspend its plans for the £14bn project. (51) A spokesman for Horizon told BBC Wales that parent company Hitachi had made it clear from the start that new investors would be required to complete the Wylfa Newydd scheme. “It's not Hitachi's intention – and never has been – to completely sell Horizon,” he added. “We're very confident that we will attract the investment required for this project.” (52)

Hitachi claims that Wylfa Newydd is a very different prospect to Westinghouse's nuclear power plant construction business in America, because its plans invited delays by using a new reactor model that had never been in operation. But there are only four operable Advanced Boiling Water Reactors (ABWR) in Japan with two more are under construction. Although it is claimed that the four Japanese ABWRs were built to time and budget, none have a capacity factor above 73% and two have capacity factors of less than 40%. In fact figures given by the IAEA show that all four reactors had average energy availability factors of less than 50% for the period 2007 to 2011. (53) This makes the ABWR one of the least reliable reactors in the world. (54)

The Nikkei Asian Review reports that Japan intends to fully insure bank loans for Hitachi's Wylfa Newydd project in order to encourage domestic lenders to finance this particularly risky type of infrastructure export that Prime Minister Shinzo Abe's government seeks to promote. When Abe met with U.K. counterpart Theresa May at the end of August, the two leaders reaffirmed bilateral cooperation on nuclear plant construction. This would be a rare example of loan insurance for a project in an advanced economy. State-owned Nippon Export and Investment Insurance will write the loan insurance for reactors, which Hitachi will build. The Japanese conglomerate, together with Tokyo and London, will conduct working-level talks to hash out a funding support framework, with the aim of breaking ground in 2019. The project is estimated to cost over 2 trillion yen (\$18.1 billion).

Hitachi, the U.K. government and two state-backed entities - Japan Bank for International Cooperation and the Development Bank of Japan - are expected to pick up part of the tab. But private sector financing will also be needed to close the funding gap. NEXI, which normally indemnifies private lenders for 90-95% of financing, will enter into talks with Japanese banks toward fully guaranteeing loans for the Wylfa project. (55)

Loan guarantees may reassure bankers so that Hitachi can borrow the money to build Wylfa Newydd but investors and lenders will also want to know who is going to actually buy the electricity in 2027.

It is highly unlikely that the UK Government will agree to another deal like HPC so Hitachi will struggle to cover the commercial risk. In order to actually get Wylfa built the Government would have to give Hitachi guarantees that the electricity will be bought. Given that by 2027 it is likely to be far more expensive than electricity for renewables such guarantees would be highly problematical.

## 9. Conclusion

Hinkley Point C (HPC) has some very serious problems, and it is very hard to see how Moorside and Wylfa Newydd can go-ahead without major and substantial UK Government intervention. UK Government direct financial stakes in the projects are likely to be needed.

The question is: why doesn't the Government give up? Perhaps the only reason is that it doesn't have an exit strategy. But the Conservative Manifesto in May 2017 did not mention "nuclear" and the Labour Manifesto was equivocal. In mid-September the gap between the cost of renewables and nuclear will become even more embarrassing when new contracts for offshore wind are announced which are far cheaper than the £100/MWh cost of electricity from HPC. The current minority government depends on a shaky coalition which makes any policy predictions highly uncertain, but the continuing fall in the cost of renewables must present an ideal opportunity to argue for a change of policy.

According to Keith Barnham, Emeritus Professor of Physics at Imperial College London, renewable power expanded exponentially under the Tory-Lib Dem coalition between 2010 and 2015. If this expansion had continued under the next government, an all-renewable UK electricity supply could have been achieved by 2025. And renewable expansion has reduced the wholesale price of UK electricity. Even onshore wind has a far higher public approval rating than the Conservative party's top priorities for energy: nuclear and fracking, so whoever restores renewable subsidies and cancels Hinkley Point C could win themselves a lot more votes. (56)

## 8. References

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