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Dear readers of the WISE/NIRS Nuclear Monitor,

In this issue of the Monitor:

- Pete Roche writes about the implications of Brexit for the UK's nuclear industry, in particular the country's plan to leave Euratom.
- We discuss the near-bankruptcy of giant Japanese conglomerate Toshiba, struggling to survive because of its investments in nuclear power.
- We discuss pro-nuclear responses to the various crises facing nuclear utilities and companies in the West. These responses range from denial to despair to the hope that the industry might be able to gradually rebuild.

The Nuclear News section has reports on the ongoing protests against a nuclear waste dump in Bure, France; a court ruling against a lifespan extension for a South Korean reactor; and an EDF executive arguing that the centralized model of power production is dying.

Feel free to contact us if you have feedback on this issue of the Monitor, or if there are topics you would like to see covered in future issues.

Regards from the editorial team.

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Monitored this issue:

Brexatom – Bonkers or an opportunity?

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NM838. 4620 A footnote in the Parliamentary Bill published on January 26 to authorise Brexit confirmed that the UK intends to leave Euratom as well as the European Union.[1] Up until that point this was a grey area, with disagreements over whether Brexit meant the UK would also have to leave Euratom.

The balance of opinion seemed to confirm that, although Euratom is legally distinct from the European Union, the UK would have leave both once Article 50 was triggered.[2] This was confirmed at a meeting I attended at the Scottish Government last September when most of the nuclear industry representatives and regulators appeared to be resigned to leaving Euratom. On the other hand, the European nuclear lobby group – Foratom – thought the UK could decide to negotiate to remain a member (or agree some form of associate membership). The EU has numerous association agreements with other countries. For instance Switzerland is an associate member of Euratom and the Ukraine has joined the Euratom Research and Training Programme. A blog on the Euractiv website goes even further saying that the idea that Euratom is included in the exit clause of the Lisbon Treaties is false.[3]

The decision has wide-ranging implications for Britain's nuclear industry, research, access to fissile materials and the status of approximately 20 nuclear co-operation agreements that it has with other countries around the world. The UK is going to have to strike new international agreements with all these countries to maintain access to nuclear power technology – crucially with the US because several of the UK's existing and planned nuclear reactors use US technology or fuel. A new bilateral agreement will also be needed with the International Atomic Energy Agency. Nuclear co-operation agreements can take considerable time to agree and ratify. It may not be possible to complete them before Britain leaves the EU in 2019.

New reactors in jeopardy?

The concern now in the UK nuclear industry is that leaving Euratom will complicate and delay the UK's plans to build a new generation of nuclear power stations. "The new wave of British nuclear power stations was in jeopardy" said *The Times*. Withdrawal could cause "major disruption" according to the Nuclear Industry Association (NIA), particularly for Horizon and Nugen, which are developing plans for reactors on Anglesey and in Cumbria because their plans involve co-operation with US nuclear companies. Former Labour MP Tom Greatrex, now chief executive of the NIA, said: "The UK nuclear industry has made it crystal clear to the government before and since the referendum that our preferred position is to maintain membership of Euratom."[4] Although Horizon, whose reactors would use US nuclear fuel, says it is reassured by the government's commitment to put new regulatory arrangements in place quickly.[1]

The Hinkley Point C station in Somerset could also face renewed problems. EDF has warned that Brexit could increase "the costs of essential new infrastructure developments and could delay their delivery". EDF, which also operates Britain's existing nuclear plants, has said it would prefer if the UK stayed within Euratom and that if not it would be "essential that the UK establishes equivalent safeguards arrangements".

"However, if the UK ceases to be part of Euratom, then it is vital the government agree transitional arrangements, to give the UK time to negotiate and complete new agreements with EU member states and third countries including the US, Japan and Canada who have nuclear co-operation agreements within the Euratom framework," EDF said.

EDF is also worried that Brexit will affect the movement of people and delay the delivery of Hinkley Point C.[5] It could also impact upon its costs. For the reactor builders, being outside the nuclear common market as well as the single market and having no freedom of movement may lead to higher prices if tariffs and customs checks are introduced or if restrictions are imposed on foreign nuclear scientists and engineers.[6]

Nuclear safeguards implications

Leaving Euratom is also likely to add to the workload of the UK's nuclear regulator, the Office for Nuclear Regulation (ONR), which is busy assessing designs for new nuclear reactors including the Chinese Hualong One design. "The main burden of the UK leaving Euratom will be the need for it to cover its nuclear non-proliferation safeguards commitment and for this it will have to either set up a separate, independent agency or bring these treaty responsibilities into the Office for Nuclear Regulation," says nuclear engineering consultant John Large.[5]

The Green Party's only UK MP Caroline Lucas raised the safeguards issue in Parliament last August when she asked the business and energy secretary "what steps would be needed to replace EU Atomic Energy Community safeguards inspectors with International Atomic Energy Agency (IAEA) Inspectors to implement safeguards provisions." The reply did not address the fact that currently international inspections of UK nuclear plants and materials to ensure there is no diversion of materials to military misuse is verified by Euratom on behalf of the IAEA.[7]

A quarter of all time spent on nuclear inspections throughout the EU is carried out in Britain, due to the scale of nuclear fuel fabrication and waste management facilities, such as Sellafield. Without Euratom ONR will need to undertake many more inspections to meet IAEA requirements. The Government will have to find extra cash, but it will struggle to hire and train the necessary new staff especially when ONR is already struggling to keep up with the assessment of several new reactors designs (EPR, AP1000, ABWR and Hualong One).[6]

As proliferation expert Dr David Lowry puts it: "It is now time energy and foreign ministers and their advisors turn their attention to what they are going to do to ensure nuclear safeguards continuity in the UK post Brexit to avoid the UK becoming a nuclear rogue state."[7]

Fusion – nuclear research scientists angry

Membership of Euratom is also a condition for Britain hosting what is currently the largest nuclear fusion experiment in the world. Based at the Culham centre in south Oxfordshire, the Joint European Torus project involves some 350 scientists exploring the potential of fusion power, backed by funding from almost 40 countries in the EUROfusion consortium. According to *Nature*, scientists are shocked and angry about the Euratom exit.

Depending on whether and how the UK negotiates a way back in to the organization, the move could endanger British participation in the world's largest fusion experiment, the International Thermonuclear Experimental Reactor (ITER) in southern France. It could also curtail operations at the Joint European Torus (JET), a nuclear-fusion facility in Culham. The facility is a half-sized version of ITER which currently receives around €56 million annually from Euratom. Steven Cowley, a theoretical physicist at the University of Oxford who until last year was director of the Culham Centre, described the decision to leave Euratom as "bonkers".[10]

According to the trade union representing nuclear scientists, the Culham Centre signed a €283m contract in 2014 for running the Joint European Torus facility until 2018, with similar contracts expected in the future. This accounts for more than a quarter of the overall European Fusion Programme budget over the same period – a budget funded in part by the Euratom Horizon 2020 programme. The UKAEA also brings Euratom money directly to the region and UK industry by winning ITER (global fusion project) contracts.[11]

Wider impact in Europe

The political impact in the EU remains equally unclear. Britain has been one of Europe's most active supporters of nuclear power. Brexit could tip the balance of member states towards an anti-nuclear majority. The complications around the UK withdrawal from Euratom could also put a spotlight onto the Euratom Treaty itself, whose legal status and many of its functions are out of step with the modern EU and may once again lead to calls for it to be abolished.[6]

Euratom Mark II

The UK secretary of state for exiting the European Union, David Davis, told parliament on 31 January 2017 that the UK will seek an alternative agreement with the International Atomic Energy Agency (IAEA) if it fails to negotiate "some sort of relationship" with the European Atomic Energy Community (Euratom) during Brexit negotiations.[12]

The idea of a new pan-European nuclear group is also being floated, according to former conservative MP Tim Yeo who chairs the trade group New Nuclear Watch Europe. The successor group is envisaged as a wider Europe-based pro-nuclear club including the 27 European Union member states as well as countries outside the bloc that are also developing new nuclear power plants. As well as the UK, the group could include Turkey, Ukraine, Belarus and potentially Russia.[13]

Time for reform

The UK nuclear establishment is going to have its work cut out to make sure that Brexatom does not add to the delays in its proposed new nuclear reactor programme already in prospect as a result of financial problems at EDF, Areva, Toshiba, Engie and Hitachi.[14]

There will be widespread support for efforts to avoid any hiatus in the safeguarding of the huge quantity of fissile material in the UK. But as Hans-Josef Fell, president of the Energy Watch Group and a former member of the German parliament for the Greens points out the UK's exit from Euratom should be seen as an opportunity. It's a clear sign that it is possible for anti-nuclear countries like Austria, Ireland and Germany to unilaterally leave the Treaty – even a unique chance to dissolve Euratom.

He says the core task of Euratom is to support the nuclear industry. After Chernobyl and Fukushima ending that support is long overdue.[15]

The UK Nuclear Free Local Authorities (NFLA) recently pointed out that it sees "the Euratom Treaty as one of the most direct ways the nuclear industry has promoted nuclear power in Europe over the past 60 years. It has often been the inside track from which pro-nuclear governments have ensured support for nuclear power within the European Commission."[16]

For instance, in 2014 the European Union's Competition Commissioner Margrethe Vestager had less leeway in evaluating the UK's Hinkley Point C financial support scheme than it would have done for a non-nuclear project because of the Euratom Treaty, which is meant to support and encourage investment in nuclear projects where needed. "This means that if member states choose to invest in nuclear energy, the Euratom's objective to facilitate that investment becomes an objective of common interest that the Commission should take into account in its state aid assessment," she said.[17]

So the Commission approved the UK Government's plans to subsidise Hinkley Point C despite the fact that even the UK government itself expects solar and wind power to be cheaper than new nuclear power by the time Hinkley Point C is completed.[18] Not surprising then that the NFLA sees "this as an ideal time for a major and all encompassing reform of the Euratom Treaty to take account of the changed energy market in the EU, where renewable energy is rapidly expanding and nuclear power is in decline."[16]

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Nuclear industry for sale – renovator's dream?

Author: *Jim Green – Nuclear Monitor editor*

NM838. 4621 The French government is selling assets so it can prop up its heavily indebted nuclear utilities. Électricité de France (EDF) announced in 2015 that it would divest €10bn (US$10.6bn) of assets by 2020 to ease its debt load – which now stands at €37.4bn (US$39.7bn) – and EDF is acquiring parts of its bankrupt sibling Areva. Meanwhile, Japanese industrial giant Toshiba would like to sell indebted subsidiary Westinghouse, but there are no buyers so Toshiba must instead sell profitable assets to cover its nuclear debts and avoid bankruptcy.

One site where these problems come together is Moorside in the UK. A Toshiba / Engie consortium was planning to build three AP1000 reactors, but Toshiba wants to sell its stake in the consortium in the wake of its massive losses from AP1000 construction projects in the US. Engie reportedly wants to sell its stake in the consortium, and the French government has already sold part of its stake in Engie ... to help prop up EDF and Areva! Deck-chairs are being shuffled.

The latest dramas occur against a backdrop of industry malaise, with the receding hope of even modest growth resting squarely on the shoulders of China. A February 15 piece in the *Financial Times* said: "Hopes of a nuclear renaissance have largely disappeared. For many suppliers, not least Toshiba, simply avoiding a nuclear dark ages would be achievement enough."[1]

Toshiba – downfall of a titan

Nuclear-watchers around the world tuned in for Toshiba's February 14 announcement concerning its financial position and future plans. Great theatre ensued as the deadline passed with no announcement and the share price plunged 8%. Toshiba said it needed more time as its lawyers and auditors probe Westinghouse, in particular a whistleblower's claim that senior managers exerted "inappropriate pressure" over the calculation of assets and liabilities for the construction company it bought from Chicago Bridge & Iron (CB&I).[2,3]

The CB&I saga – detailed in *Bloomberg* pieces titled 'Toshiba's Nuclear Reactor Mess Winds Back to a Louisiana Swamp'[4] and 'Toshiba's Record Fall Highlights U.S. Nuclear Cost Nightmare'[5] – concerns delayed and over-budget AP1000 reactor projects in the US. The cost to complete four AP1000 reactors – two each in South Carolina and Georgia – will "far surpass the original estimates", Toshiba said.[6] Combined, the cost overruns exceed US$10 billion.[7,8] And since there is still a long way to go before construction of the four reactors is complete, there is plenty of scope for further cost overruns.

"The [Feb. 14 reporting] delay shows that the company is in a mess," said Makoto Kikuchi, from Myojo Asset Management. "We can assume that the company is not delaying its earnings release for good news."[9]

Despite the earlier anticlimax, Toshiba released unaudited financial figures later on February 14. The company said it expects to book a US$6.3 billion (€5.9bn) writedown on Westinghouse – more than the US$5.4 billion it paid when it bought a majority stake in Westinghouse from the British government's BNFL in 2006 – and it expects to report a net loss of US$3.4 billion (€3.2bn) in the fiscal year to March 2017.[10]

Audited figures are now due on March 14. Ominously, Toshiba cautioned that a major revision was possible.[2]

The reactors under construction in South Carolina and Georgia are the only reactors under construction in the US. "There's billions and billions of dollars at stake here," said Gregory Jaczko, former head of the US Nuclear Regulatory Commission. "This could take down Toshiba and it certainly means the end of new nuclear construction in the US."[4]

Toshiba said its shareholder equity has fallen into negative territory, a situation it hoped to rectify before the March 31 fiscal year-end.[3] The company's stock value has fallen by more than half since mid-December, wiping out more than US$7 billion in market value.[4] It faces a "very real" risk of being delisted from the Tokyo Stock Exchange according to JPMorgan's Hisashi Moriyama.[1,11]

Bankruptcy looms, with the risk heightened by the potential for further delays and cost overruns with the AP1000 reactors in the US, and unresolved litigation over those projects.[4] Amir Anvarzadeh from BGC Partners in Singapore is a little more optimistic: "Toshiba is being torn apart. It's going to survive, it's not going to go bankrupt. But it's the end of Toshiba as a company with any hopes to grow."[12]

Former Westinghouse boss Shigenori Shiga, appointed as chair of Toshiba following a US$1.3 billion accounting scandal in 2015, stood down from the position on February 14.[2]

"I apologise deeply for all the inconvenience we have caused our stakeholders," Toshiba chief executive and president Satoshi Tsunakawa said at a news conference.[3] The *Financial Times* reported: "After a day of chaotic communication, a stock sell-off and a $6.3bn writedown that may destroy one of Japan's greatest industrial names, the Toshiba president's bow of apology finally came. Satoshi Tsunakawa's head nodded for just one perfunctory second on Tuesday. Most assume there will be much deeper, longer bows to come as Toshiba leads investors, customers, employees and Japan as a whole through the country's first downfall of a nuclear industry titan."[1]

Sell-off

Toshiba cannot currently raise cash by issuing shares because of restrictions imposed by the stock exchange after the 2015 profit-padding scandal.[13] Toshiba says it would likely sell Westinghouse if that was an option – but there is no prospect of a buyer.[1,14] The nuclear unit is, as *Bloomberg* noted, "too much of a mess" to

sell.[15] And since that isn't an option, Toshiba must sell profitable businesses instead to stave off bankruptcy. The sell-off will be all the more difficult because asset sales following the 2015 accounting scandal eliminated many of the easy choices.[15]

The company planned to make nuclear operations and microchips its two growth areas. But now the company plans to sell most – perhaps all – of its profitable microchip business to prop up the nuclear mess and avoid bankruptcy.[16]

Toshiba might get US$13–17 billion by selling its entire stake in its microchip business, said Joel Hruska from ExtremeTech. "That would pay off the company's immediate debts, but would leave it holding the bag on an incredibly expensive, underwhelming nuclear business with no prospects for near-term improvement."[17]

Macquarie analyst Damian Thong said that since Toshiba cannot sell its nuclear business, it is left with the "second-best outcome, selling off the crown jewels."[18] Masayuki Kubota, chief strategist at Rakuten Securities, said: "Usually in a corporate turnaround plan, the company would keep its most competitive business after selling nonperforming businesses. This turnaround plan gives no hope for Toshiba's future."[11]

Analysts have speculated that a partnership between Toshiba, Hitachi and Mitsubishi Heavy Industries could be formed to rescue Toshiba. Restructuring decisions are reportedly being led by Toshiba's biggest bank lenders, Mizuho and Sumitomo Mitsui Financial Group.[1] However both Hitachi and Mitsubishi said they had no plans to acquire Toshiba's nuclear business.[19,20] And Hitachi has its own problems – the company is expected to report a US$620m (€583m) non-operating loss at the end of March 2017, largely due to GE Hitachi Nuclear Energy's withdrawal from a laser uranium enrichment joint venture that is going nowhere.[21]

Toshiba is saddled with loans totaling around US$7 billion and has been pleading with banks for time to meet its obligations. One trust bank is preparing to sue Toshiba for damages after the 2015 profit-padding scandal caused a share price collapse, and two others may do the same.[22]

Government funding, in one form or another, may be necessary to save Toshiba. But that brings with it another set of risks. Tom O'Sullivan, a Tokyo-based energy analyst, told the *Washington Post*: "This is one of Japan's historic corporations and it's very important to the Japanese economy, so this could be very significant for Japan. It would even impact Japan's sovereign credit rating if there's a knock-on effect."[23]

Nuclear projects and plans

Toshiba plans to exit the high-risk reactor construction business and focus its nuclear business on design, equipment supply and engineering services.[2]

In **Japan**, Toshiba will assist with the restart of idled nuclear power plants, maintenance operations and decommissioning. Elsewhere, Toshiba's future role is unclear except in broad terms: the company plans to significantly reduce its role in the nuclear industry and, where possible, to get out of reactor construction altogether.[2]

One of the two long-delayed, over-budget AP1000 reactors under construction in Georgia, USA.

For current overseas reactor projects – in particular, the partially-built AP1000 reactors in the US and China – Toshiba aims to "reduce risk" by implementing "comprehensive cost reduction measures."[24]

Plans for three AP1000 reactors at Moorside in the **UK** are in doubt. Toshiba has a 60% stake in the project consortium NuGen, with French utility Engie holding 40%. Toshiba said it would still "consider participating" in Moorside, without taking on any risk from carrying out actual construction work, but is seeking to sell its stake in NuGen.[24] According to a February 3 *Reuters* report, Engie also wants to pull out of NuGen (Engie declined to comment).[25] The French government sold part of its stake in Engie in January 2017 to help prop up EDF and Areva.[26]

Cumbrians Opposed to a Radioactive Environment (CORE) reported on February 2: "The financial fog swirling around the Moorside new-build project in West Cumbria continues to thicken by the day. The development consortium NuGen must inadvertently have added to the gloom with its recently published statement that "NuGen's shareholders [Toshiba and Engie] are committed to the development of the Moorside project." Folks with longish memories will recall an identical statement (though with names changed) coming just a few short weeks before the widely predicted departure from NuGen of Scottish & Southern Energy (SSE) in 2011 and in 2013 when Spain's Iberdrola also pulled out of the project."[27]

Cumbrians will be glad to see the back of corruption-plagued Toshiba – but corruption-plagued South Korean utility KEPCO might take its place. CORE commented: "KEPCO is itself still emerging from a major scandal that surfaced in 2012 involving bribery, corruption and faked safety tests for critical nuclear plant equipment which resulted in a prolonged shut-down of a number of nuclear power stations and the jailing of power engineers and parts suppliers."[27]

A debate is raging in the UK as to whether the government should take a direct stake in NuGen.[28] CORE commented: "Picking the UK taxpayer pocket to support a technology past its sell-by date wholly undermines the Government's erstwhile promise that

the full costs of developing, constructing and operating new-build reactors would be borne by the developer and is not likely to go unchallenged."[27]

Plans for six AP1000 reactors in **India** may not survive the Toshiba / Westinghouse meltdown. Theoretically, Westinghouse might still supply the reactors with someone other than Toshiba taking on the civil engineering works. That arrangement was put to *Reuters* by Sekhar Basu, secretary of India's Department of Atomic Energy,[29] but it was dismissed as "wishful thinking" by a pro-nuclear commentator.[30] Toshiba said that India's liability legislation – which provides some recourse to sue vendors in the event of an accident – would have to be changed to promote reactor projects in India.[24] The project is now almost impossible according to three industry sources contacted by *Reuters*.[25] Nuclear Power Corporation of India has not yet signed a contract with Westinghouse.

Toshiba's demise would not greatly concern the nuclear industry if it was an isolated case, but it is symptomatic of industry-wide problems. Nick Butler from Kings College London wrote in a *Financial Times* online post: "Toshiba is just one company in the global nuclear industry, but its current problems are symptomatic of the difficulties facing all the private enterprises in the sector. Civil nuclear power involves huge up-front capital costs, very long pay-back periods and high risks that are compounded by a lack of experience, especially in managing nuclear construction projects after a long period with few new plants. For all those reasons, private investors avoid the sector and prefer to put their money where they see faster and safer returns."[31]

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Pro-nuclear perspectives on the nuclear industry crisis – 'an unusually grim outlook'

Author: *Jim Green – Nuclear Monitor editor*

NM838. 4622 The nuclear industry and its supporters have responded in varying ways to the crises facing nuclear utilities and the industry's broader problems. Some opt for head-in-the-sand delusion and denial. Others are extremely pessimistic about the industry's future. Others are more optimistic, painting a picture of serious but surmountable problems.

In broad terms, there is agreement that nuclear industries in the US, Japan and the EU – in particular their nuclear export industries – are in deep trouble. A February 2017 *EnergyPostWeekly* article says "the EU, the US and Japan are busy committing nuclear suicide."[1] Michael Shellenberger, from the Breakthrough Institute and sundry other pro-nuclear lobby groups, notes that: "Nations are unlikely to buy nuclear from nations like the US, France and Japan that are closing (or not opening) their nuclear power plants."[2]

The Japanese government's plan to establish a major nuclear export industry is greatly weakened by Toshiba's demise. Hitachi isn't in nearly the same mess, but it has taken a hit on a failed laser enrichment venture and may struggle to fund projects such as the plan for two reactors at Wylfa in Anglesey, Wales.

Westinghouse, Toshiba's US-based subsidiary, hoped to build dozens of AP1000 reactors around the world but its prospects are greatly weakened by the disastrous AP1000 projects in Georgia and South Carolina.

French EPR reactors have been worse than AP1000s, with multi-year delays and multi-billion dollar overruns in both France and Finland. *Bloomberg* noted in April 2015 that Areva's EPR export ambitions are now in "tatters".[3] That point still holds, and now Areva itself is in tatters.

Shellenberger said: "From now on, there are only three major players in the global nuclear power plant market: Korea, China and Russia. The US, the EU and Japan are just out of the game. France could get back in, but they are not competitive today."[4]

That's good news for the nuclear industries in South Korea, China and Russia. But they might end up squabbling over scraps – there were just three reactor construction starts last year. South Korean companies have failed to win a single contract since the contract to build four reactors in the UAE.[4] Likewise, China has made no inroads into export markets other than projects in Pakistan and Argentina.[4]

Russia's Rosatom has countless non-binding agreements to supply reactors – and loan funding – mostly in developing countries. But Russia can't afford the loan funding and most of the potential customer countries can't afford to pay the capital costs for reactors. Former World Nuclear Association executive Steve Kidd says it is "highly unlikely that Russia will succeed in carrying out even half of the projects in which it claims to be closely involved".[5]

Pro-nuclear responses

There has been more than the usual amount of head-in-the-sand delusion and denial from the nuclear lobby in recent weeks. First prize for alternative facts goes to the Breakthrough Institute. Last year was "another record year" for nuclear power, according to the Institute's Jessica Lovering, with 10 reactors coming online around the world.[6] But as many reactors came online in 2015, and 10 or more reactors came online in 20 years between 1967 and 1990.[7] There will be many "exciting new additions" to the global reactor fleet in 2017, according to Lovering, and the UAE will be the first country to join the nuclear power club since China in 1991 (in fact the most recent newcomer countries were Romania in 1996 and Iran in 2011). Lovering has nothing to say about the crises facing nuclear utilities, or the aging of the global nuclear fleet and the hundreds of exciting reactor shutdowns expected over the next quarter-century, or any of the other problems facing the industry.

The Breakthrough Institute also offers alternative facts to its own alternative facts, with this cataclysmic assessment by Michael Shellenberger:[8]

"Nuclear energy is, simply, in a rapidly accelerating crisis:

- *Demand for nuclear energy globally is low, and the new reactors being built may not keep up with the closure of nuclear plants around the world. Half of all U.S. nuclear plants are at risk of closure over the next 13 years.*
- *Japan has only opened two of its 42 shuttered nuclear reactors, six years after Fukushima. Most experts estimated it would have two-thirds open by now. The reason is simple: low public acceptance.*
- *While some still see India as a sure-thing for nuclear, the nation has not resolved key obstacles to building new plants, and is likely to add just 16 GW of nuclear by 2030, not the 63 GW that was anticipated.*
- *Vietnam had worked patiently for 20 years to build public support for a major nuclear build-out before abruptly scrapping those plans in response to rising public fears and costs last year. Vietnam now intends to build coal plants.*
- *Last month Entergy, a major nuclear operator, announced it was getting out of the nuclear generation business in states where electricity has been de-regulated, including New York where it operates the highly lucrative Indian Point."*

And more cataclysm from Shellenberger in another article on the "crisis that threatens the death of nuclear energy in the West":[9]

"The looming insolvency of Toshiba has set off a chain reaction of events that threatens the existence of nuclear power in the West:

- *Britain's plan to build six new nuclear plants – based on four different plant designs – in order to phase out coal by 2025 is now up in the air.*
- *Britain's turmoil creates uncertainty for the French and Chinese nuclear industries – as well as for another Japanese company, Hitachi – that had won contracts to build other British plants.*
- *In response to Toshiba's failings, one of India's leading nuclear policy experts is calling for the government to scrap existing plans with Areva, Westinghouse and Russia's Rosatom, and "Make Nuclear Indian Again" by scaling up the country's indigenous design.*
- *On Wednesday [Feb.15] Mitsubishi's CEO told the Financial Times that the company is not considering a merger with Toshiba. The reason? Toshiba's nuclear design "is a totally different technology" from Mitsubishi's.*
- *A proposal by Southern Company to build a third nuclear plant based on Toshiba's Westinghouse AP1000 design in Georgia is increasingly unlikely."*

Also at the ultra-gloomy end of the spectrum is this assessment by pro-nuclear commentator Dan Yurman in a February 5 post:[10]

"A sense of panic is emerging globally as Toshiba, troubled by extensive losses and fake financial reports, heads toward a complete exit from the commercial nuclear energy industry. The two countries that will be hardest hit by the expected actions will be the UK and India. Unlike the situation following the Fukushima crisis, in which the Japanese government in effect nationalized TEPCO, no bailout of Toshiba is expected to come to its rescue. ...

"After nine years of writing about the global nuclear industry, these developments make for an unusually grim outlook. It's a very big rock hitting the pond. Toshiba's self-inflicted wounds will result in long lasting challenges to the future of the global nuclear energy industry.

"Worse, it comes on top of the French government having to restructure and recapitalize Areva, its state-owned nuclear power corporation, so that it can complete two 1650 MW EPR reactors that are under construction in Europe and to begin work on the Hinkley project the UK. ...

"The risks that Westinghouse faces even if the reactor division is able to establish itself as an independent vendor to EPC [Engineering, Procurement, and Construction] firms and investors include keeping its work force intact during what could be a lengthy transition. Layoffs and cost cutting could reduce the core competencies of the firm and its ability to meet the service needs of existing customers much less be a vendor of nuclear technologies for new projects."

Will Davis, a consultant and writer for the American Nuclear Society, doesn't downplay the nuclear industry's problems but he sees them as surmountable teething problems, a "start-from-scratch scenario" for countries and companies that have largely lost the necessary expertise and infrastructure to build nuclear plants over the past generation.[11]

Davis notes that Toshiba will probably end its venture into nuclear power plant design and construction, that Toshiba/Westinghouse AP1000 projects in the US are "not going according to plan", that AREVA's construction of EPR plants in Finland and in France "is also not going well", and that "AREVA has collapsed, and a bailout is in progress" while "Toshiba is approaching that possibility."[11]

Davis offers this explanation for the troubled AP1000 and EPR projects:[11]

"All are FOAK or First Of A Kind Plants. Both the AP1000 and the EPR are overall new nuclear power plant designs which supposedly incorporate some previous experience and some new design features (such as modular unit construction, for example) meant to mitigate previously experienced delays in construction. Any "first ever" project – even one intended to simplify things – is likely to run into unforeseen delays and complications, which then should be translated as "lessons learned" to the later projects of the exact same design to fully achieve efficiencies. The first of either of these types of plants has not even been finished even though they've been under construction for years, so that what exactly the sum total of lessons learned is, is not yet even fully perceived.

"All are FOAG or First Of A Generation. By this I mean that both the AP1000 and the EPR are intended to be "Gen-III+" plants, in which certain design features, additions, or improvements deeply reduce the chances of a core damage accident when compared with previous light water reactors. This factor's full impact is not yet known or perhaps even fully analyzed, but it becomes quite significant when one realizes that the plain Gen-III plants being built by South Korea and by China are not experiencing any construction delays. It will only be after the Gen-III+ projects are completed that a full assessment can be made as to whether or not this particular point is a factor, but for historians it's already clear that this is a comparison that needs to be monitored, fully analyzed and recorded.

"All are being built by nations which have a multi-decade gap in the process of designing and constructing nuclear power plants. It only takes a generation to lose the base to successfully construct nuclear power plants, as was plainly put by Framatome in the 1970's (this was AREVA's predecessor) when it implored the French government to order a nuclear plant a year "or else lose the whole nuclear enterprise." This did not occur, and the enterprise was lost. By "enterprise" I mean the institutional knowledge gained from years of constant nuclear plant building, which really is a "design-construct-learn-design-construct-learn" process that requires constant work. The loss of institutional knowledge, industrial capability and construction capability is keenly felt now in both nations' projects. It should be noted that decades of continuous work have been going on in China and South Korea, and their projects are running vastly better than the US and French projects.

"The factors above are quite enough by themselves to lead any new nuclear project into distress if they're

present, and as we see all of the US construction is in trouble to some degree as are the EPR projects. ... Finally it should be pointed out that none of this indicates that large, gigawatt-class light water reactor nuclear power plants are "dead." In fact, it points out that nations which think nuclear is important should make moves to never halt fully the construction of nuclear power stations. The Chinese, and South Koreans are, once again, delivering on time – so it IS possible with large light water plants. The important thing is to realize that the skills and industry required will evaporate quickly once the last light goes out – and wishing to return and turn the light back on, one will find the whole building missing. It almost is a start-from-scratch scenario."

Solutions

Many of the proposals from the nuclear industry and its supporters involve sacrificing safety in order to reduce costs. Such proposals include weakening safety regulations; abandoning Generation 3/3+ reactors in favour of Generation 2 reactor types (or redefining Generation 2 reactor types as Generation 3/3+); and overturning the established scientific position that even the smallest doses of ionizing radiation can cause morbidity and mortality.

How to convince the public to accept reduced nuclear safety standards? In a word: spin. The game-plan is to sell reduced safety standards dressed up in euphemisms like 'improving social acceptance' or overcoming the 'paradigm of fear'. Shellenberger, for example, wants "higher social acceptance" but he also wants weakened safety regulations such as the repeal of a US Nuclear Regulatory Commission rule designed to strengthen reactors against aircraft strikes.[8] He squares the circle between higher social acceptance and weakened safety regulations with spin and sophistry, claiming (without evidence) that the NRC's Aircraft Impact Rule "would not improve safety" and claiming (without evidence) that the NRC "caved in to demands" from anti-nuclear groups to establish the rule.

Shellenberger rails against the "$500 million annual [anti-nuclear] lobby that does everything it can to deliberately make nuclear expensive."[9] He argues that nuclear power "almost never harms anybody" so "it's simply not clear that making [nuclear] plants any safer is actually possible".[9] So nuclear critics were wrong to call for strengthened regulation, and strengthened earthquake and tsunami protections, before the Fukushima disaster? Shellenberger claims that the "overwhelming amount of harm caused by accidents are due to fear and panic, not radiation exposure."[9]

The weak skills base is widely acknowledged to be a problem. Vast numbers of staff, skilled across a range of disciplines, need to be trained and employed if the nuclear power industry is to move ahead (or even survive). But utilities and companies are firing, not hiring, and making a perilous situation much worse ... possibly irretrievable. As we've seen over the past decade, a weak skills base leads to reactor project delays and cost overruns, and that in turn leads one after another country to abandon plans for new reactors.

Many of the proposals from nuclear advocates involve massive government / taxpayer subsidies to prop up ailing nuclear companies and reactor projects. Some advocate capitalism in its pure form (socializing losses and privatizing profits) with socialism (nationalization of troubled companies and direct government investment in nuclear projects) as a back-up plan.

A contrary view was expressed by Neil Collins in the *Financial Times*: "It's telling that after 60 years of mostly successful operation, commercial viability still eludes the nuclear power industry. ... Appealing for fresh state aid looks like a desperate last throw of the nuclear dice. If an industry cannot finance its own projects after half a century of development, it may be time to try another industry."[12]

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NUCLEAR NEWS

Anti-nuclear protest in South Korea.

South Korea: Wolsong NPP lifespan extension cancelled

On February 7, the Seoul Administrative Court cancelled the decision of the Nuclear Safety and Security Commission (NSSC) to extend the lifespan of Wolsong-1, the second oldest reactor in Korea. Wolsong-1 was supposed to be shut down in 2012 when it reached its design life of 30 years. However, NSSC approved a lifespan extension in Feb. 2015 so that it could operate to 2022.

2166 people, including civil society and local people living close to nuclear power plants, filed a petition to have the lifespan extension invalidated. After 12 trials in total, on-the-spot investigation, and witness examination, it has been confirmed that the lifespan extension permit for Wolsong-1 is improper and should be cancelled. The NSSC shortly after announced its plan to appeal the ruling and will keep operating Wolsong-1 during the appeals process.

The delegates of plaintiffs presented diverse evidence that the NSSC didn't submit a comparison chart showing the facilities and parts before and after the change, did not apply the latest technology standard in the safety assessment, and made a decision which involved two members disqualified from the commission.

The Korea Federation for Environmental Movement (KFEM) demands the suspension of operation of Wolsong-1 and for the resignation of the chair of the NSSC. KFEM executive director Yang Yi Won-young said the Court ruling "clearly shows that the NSSC has arbitrarily applied related law without any consideration for public safety while giving out too many permits to expand lifespan of old nuclear power plants and build new ones with the nuclear industry, that is Korea Hydro & Nuclear Power."

– Hye Lyn Kim

EDF and decentralised energy

Les Echos, the French business newspaper, carried an extraordinary article from a Senior Vice President of EDF, the largely state-owned French utility that will build the nuclear reactors at Hinkley Point in England. Mark Boillot contends that 'large nuclear or thermal power plants designed to function as baseload are challenged by the more flexible decentralized model'. He says that the centralised model of power production is dying, to be replaced by local solar and wind, supplemented by batteries and intelligent management of supply and demand. Not only will this be cheaper in the long run but customers are actually prepared to pay more for solar electricity and actively work to reduce usage at times of shortage. His conclusion is that 'the traditional model must adapt to the new realities, thus allowing the utilities to emerge from ... hypercentralized structures in a world that is becoming more and more decentralized'. In most jurisdictions Mr Boillot would have been asked to clear his desk. What will EDF do about one of its most senior people openly forecasting the end of the large power station as it tries to raise the ten billion euros necessary to pay for its share of Hinkley?

– Carbon Commentary Newsletter, 19 Feb 2017, www.carboncommentary.com

– Les Echos article: www.lesechos.fr/idees-debats/cercle/0211803366658-le-solaire-peut-il-tout-emporter-dans-lenergie-2065262.php

Banning nuclear weapons in 2017

In one of its final acts of 2016, the UN General Assembly adopted a landmark resolution to begin negotiations on a treaty prohibiting nuclear weapons. This historic decision heralds an end to two decades of paralysis in multilateral nuclear disarmament efforts. The new treaty prohibiting nuclear weapons will strengthen the global norms against using and possessing these weapons. It will spur long-overdue progress towards disarmament.

Eliminating the nuclear threat has been high on the UN agenda since the organisation's formation in 1945. But international efforts to advance this goal have stalled in recent years, with nuclear-armed nations investing heavily in the build-up and modernisation of their nuclear arsenals. More than 20 years have passed since multilateral nuclear disarmament negotiations took place.

Experience shows that the prohibition of a particular type of weapons provides a solid legal and political foundation for advancing its elimination. Weapons that are outlawed are increasingly seen as illegitimate, losing their political status, and, along with it, the resources for their production, modernisation and retention.

The treaty prohibiting nuclear weapons will complement existing bans on other indiscriminate and inhumane weapons, and reinforce existing legal instruments on nuclear weapons, such as the nuclear Non-Proliferation Treaty, regional nuclear-weapon-free zones, and the treaty banning nuclear test explosions. It will strengthen the global taboo against the use and possession of nuclear weapons.

Negotiations on the treaty will begin on March 27 for one week, continuing for another three weeks in June-July. This breakthrough in nuclear disarmament negotiations has come about in the wake of three conferences on the humanitarian impacts of nuclear weapons. A growing global movement of nations are ready to declare nuclear weapons illegal for all. The negotiations are open to all, and blockable by none.

Contact your Foreign Minister and urge your Government to participate constructively in the upcoming negotiations. It's time to make nuclear weapons illegal.

– Gem Romuld **www.icanw.org**

Forest occupation, protests and attacks on the CIGEO nuclear research laboratory in Bure, northeast France

Autonomous Bure Media Collective:

Saturday 18 February – Anti-nuclear protest actions took place today in Bure, northeast France. First a demo in the forest to support its occupation and then at the planned CIGEO nuclear research laboratory. Part of the wall illegally erected in the forest by ANDRA, the French national radioactive waste management agency, was more or less symbolically broken down.

More than 700 people took part in the February 2017 action says in Bure, peaking in the late afternoon today with fierce clashes and massive attacks. For more than a year resistance by the anti-nuclear movement has obstructed CIGEO's dump project. Despite forced evictions, wall construction and juridical attacks and counter-attacks, the occupation is holding and protest against the project is growing, including beyond the region. In recent days there have been manifestations of solidarity in other towns – hundreds of people came to today's action.

On Tuesdays and Thursdays there have been night actions and attacks on the laboratory and its greenwashing department, causing considerable damage to the barriers, which were partly replaced by razor wire. This afternoon a large force of cops prevented an advance right to the buildings. But during a battle lasting several hours, large parts of the remaining fence, reinforcement materials, dead trees and much more were expertly assembled into barricades. Whereas the cops almost incessantly hurled tear-gas and dispersion grenades, for more than two hours many determined protesters attacked the lackeys of nuclear capital. Several people were injured on both sides and there were at least three arrests.

In the coming week and during this spring several decisive court cases are slated. Support the forest squat, dare to come to Bure! Prevent the atomic loo in Bure, break atom firms everywhere!

WISE/NIRS Nuclear Monitor

The World Information Service on Energy (WISE) was founded in 1978 and is based in Amsterdam, the Netherlands.

The Nuclear Information & Resource Service (NIRS) was set up in the same year and is based in Washington D.C., US.

WISE and NIRS joined forces in the year 2000, creating a worldwide network of information and resource centers for citizens and environmental organizations concerned about nuclear power, radioactive waste, proliferation, uranium, and sustainable energy issues.

The WISE / NIRS Nuclear Monitor publishes information in English 20 times a year. The magazine can be obtained both on paper and as an email (pdf format) version. Old issues are (after 2 months) available through the WISE homepage: www.wiseinternational.org

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