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Editorial

Dear readers of the WISE/NIRS Nuclear Monitor,

In this issue of the Monitor,

Michael Mariotte from the Nuclear Information and Resource Service writes about the remarkable recent decline of nuclear power in the US, with a string of announcements about the closure of existing reactors and the abandonment of plans for new ones.

Editor Jim Green writes about the never-ending series of water management problems at Fukushima, likened by a government minister to the Whac-A-Mole game – as soon as one problem is dealt with, another emerges.

Benjamin Sovacool from Aarhus University / Vermont Law School places the ongoing problems at Fukushima in broader perspective, noting that complicated technological systems have unavoidable problems that can't be designed around. Research consultant David Lowry writes about the UK's role in fanning weapons proliferation via civil nuclear exports.

The Nuclear News section includes updates from Slovakia, Denmark / Greenland, Kazakhstan, Lithuania, Belarus, the UK and the US.

Feel free to contact us if there are issues you would like to see covered in the Nuclear Monitor.

Regards from the editorial team.

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Vermont Yankee and the collapse of the US nuclear power industry

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Only eight months through, 2013 is already a remarkable year for the anti-nuclear power movement in the US.

767.4327 Only eight months through, 2013 is already a remarkable year for the anti-nuclear power movement in the US. Where Germany is following a deliberate government-mandated path to phase out nuclear power entirely, in the US the atomic industry is simply collapsing on its own – aided by concerted and strategic grassroots organising campaigns and legal actions. Entergy Corporation's August 27 announcement of the pending shut-

down of the Vermont Yankee reactor at the end of its current fuel cycle was just the latest blow to the industry, which already has seen four other reactor shutdowns (the most in one year ever) and the abandonment of six proposed new reactors, not to mention cancellation of several power uprates. And more may be coming.

As economist Marc Cooper of the Vermont Law School's Institute for

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Energy and the Environment put it, "What we are seeing today is nothing less than the rapid-fire downsizing of nuclear power in the United States. It is important to recognize that the tough times the U.S. nuclear power industry faces today are only going to get worse."

And indeed, there are several – perhaps the word should be many – other reactors, both operating and proposed, that sit on the edge of the same intersection of cost and safety concerns that are bringing the industry down faster than anyone would have imagined just a year ago.

Conventional wisdom holds that it is the current abundance and dirt-cheap prices for natural gas brought about by the fracking boom that is undermining nuclear power, making it impossible for marginal ageing reactors to compete economically, much less for utilities to even consider extraordinarily expensive new reactors. When Duke Energy took a second look at its \$24 billion Levy County, Florida project for example, it didn't take long for it to realise it could build the same amount of natural gas-fired capacity for a fraction of that amount.

Conventional wisdom isn't always wrong. And the availability of cheap natural gas is certainly taking its toll on the industry. There is no doubt that Wisconsin's Kewaunee reactor – by all accounts about as problem-free as an old reactor gets – would still be operating today if it could compete with low-cost gas. The UBS investment firm predicted Vermont Yankee's demise months ago, arguing that it couldn't compete in the regional marketplace.

Renewable energy

But over the long term, natural gas isn't what the nuclear industry should be most worried about. Clean alternatives to nuclear power, especially solar and wind, are growing at a frenetic pace as costs plunge. A rooftop photovoltaic system is now being installed in the US every four minutes, and that will become every 90 seconds by 2016.[1].

John Wellinghoff, the chairman of the Federal Energy Regulatory Commission, said in August 2013 that "Solar is growing so fast it is going to overtake

everything." If a single drop of water on the pitcher's mound at Dodger Stadium is doubled every minute, Wellinghoff said, a person chained to the highest seat would be in danger of drowning in an hour. "That's what is happening in solar. It could double every two years," he said.[2]

The goal of a nuclear-free, carbon-free energy system by mid-century suddenly seems quite attainable. According to the Energy Information Administration, for the first five months of 2013, renewable energy sources (including hydropower) provided 18.48% more energy to the US than nuclear power. Solar grew by 32.26% from a year ago while wind grew by 20.99%, continuing a trend of the past few years. And this actually underestimates solar power: non-utility and small-scale (residential and commercial rooftop) photovoltaic systems don't show up as electric generation since to the utilities that provide generation statistics they represent only a reduction in demand.

Indeed, no one seems to know just how much rooftop solar power there is in the US, but with a new installation every four minutes, the amount is growing rapidly.

This movement toward small-scale distributed generation is turning the traditional utility model on its head and in the process scaring the pants off of utility officials. David Crane is CEO of NRG Energy, itself a major utility and operator of the two existing South Texas nuclear reactors. But after Fukushima, NRG dropped out of a project to build two new reactors there and is now betting heavily on solar power. Crane recently predicted to Business Week that "in about the time it has taken cell phones to supplant land lines in most U.S. homes, the grid will become increasingly irrelevant as customers move toward decentralized homegrown green energy." [3]

This coming change in the fundamental structure of electric utilities bodes poorly for large baseload power plants of any kind – especially nuclear power which cannot be powered up and down quickly – and has become another reason utilities are scrapping marginal power plants, both nuclear and coal.

Still, dinosaurs thrashing their tails didn't always go down easily, and neither do nuclear reactors. They have to be helped along by effective grassroots opposition.

Grassroots opposition

No one can doubt that Southern California Edison would still be trying to run the San Onofre reactors, even after their botched steam generator repair job, if it weren't for the sustained and stunningly-effective opposition mounted by Friends of the Earth and numerous grassroots groups in southern California, aided by the Nuclear Free California network formed in August 2011.

At Vermont Yankee, the history of protest and opposition dates back to the 1970s. While Clamshell Alliance protests at Seabrook were larger and got more attention, Vermont Yankee was a Clamshell target as well. The New England Coalition has been filing legal challenges in every venue possible for just about as long.

After having successfully closed the Yankee Rowe reactor in nearby western Massachusetts, the Citizens Awareness Network turned its attention to Vermont Yankee and the first Nuclear Free New England action camp was held there in 1998. Twenty-one people were arrested at the plant gates at the culmination of that camp on August 27, 1998. The reactor closed 15 years later to the day.

During those 15 years, CAN, the New England Coalition, VPIRG and more protested, lobbied, filed legal briefs, and never let up. New groups were formed, like the Shut It Down affinity group – composed entirely of women over 70 – which held monthly protests for more than eight years and often were arrested and the Sage Alliance, an umbrella group which brought together perhaps the largest Vermont Yankee protest ever in March 2012, more than 1,000 people in Brattleboro (which has a population of about 12,000), resulting in more than 130 arrests.

By the end, just about the entire state of Vermont was united against the reactor. The State Senate had voted 26-4 to close the reactor. The Gover-

nor wanted it shut, so did the entire Congressional delegation. Entergy had fought vigorously against all these efforts, and in early August had pretty much won a court victory that determined the state could not close the reactor on safety grounds, and that it was safety issues that had dominated the Senate's vote (though the decision left open the door for some different state actions that might have closed the reactor).

Some believe that Entergy closed the reactor now to keep that court victory as a precedent and prevent other state action that might also be viewed as precedent – Entergy also owns the much larger Indian Point reactors near New York City, where another major grassroots campaign, supported by Governor Andrew Cuomo, is under-way to prevent relicensing and close them permanently.

The nuclear “renaissance” in the US began in the summer of 2007, when the first license application in more than 30 years was filed with the Nuclear Regulatory Commission, for the Calvert Cliffs-3 reactor in Maryland. On March 11, 2013 – the second anniversary of the Fukushima disaster – the NRC Commissioners upheld the denial of a license for that reactor, the first in this year's remarkable sequence of shutdowns, cancellations and abandonments. All that's left are two reactors under construction in Georgia (which state officials now admit they might not have approved in today's climate), two in South Carolina, and one old TVA reactor that's been under construction for three decades.

Instead of a renaissance, the nuclear industry is being routed. Its ageing reactors face safety issues, big repair bills and growing public opposition.

Its new reactors are too expensive to build. And, scariest of all for nuclear utilities, their entire business model of large, inflexible baseload power plants is being challenged not by off-the-grid hippies, but by other utility executives who see the writing on the wall.

The 2013 collapse of the U.S. nuclear power industry may seem astounding today. Over the next few years, it's more likely to seem routine.

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Fukushima leaks, lies, cover-ups, Whac-A-Mole

A huge storage tank from which about 300 tons of highly radioactive water leaked at Fukushima may have deteriorated as a result of being moved and reassembled, TEPCO says.

767.4328 The tank was first installed at a different location in June 2011 but, after its foundation was found to have cracked after the tank sank in the ground, it was dismantled and reassembled at its current location where the leak occurred.**[1,2]**

The leak was rated Level 3 on the International Nuclear Events Scale by Japan's Nuclear Regulation Authority (NRA) – making it the most serious incident since the March 2011 disaster in the NRA's view. Level 3 can be assigned when there is “severe contamination in an area not expected by design, with a low probability of significant public exposure.”

Between July 2012 and June 2013, the NRA made recommendations or issued instructions around 10 times to increase patrols and to install more observation cameras and water gauges, among other measures. TEPCO only upped its patrols from once a day to twice a day, and installed more

cameras while still leaving blind spots. Since the revelation of the 300-ton leak, TEPCO has said it will increase patrol staff from 10 to 60 people, boost the number of daily patrols to four, and install water gauges in the tanks.**[3]**

Previously, TEPCO assigned only two workers to inspect 1,000 water tanks, during twice-daily patrols of two hours each. That meant that each worker took only 15 seconds to inspect each tank, and radiation levels were not measured unless a worker suspected something was wrong. Although workers sometimes saw puddles of water, they generally assumed that they were rainwater, which tends to collect near the bases of the tanks.**[4,5]**

Economy, Trade and Industry Minister Toshimitsu Motegi visited Fukushima on August 26 and said: “The major problem lies in that TEPCO failed to manage the tanks properly. ... The urgency of the situation is very high, from here on the government will take

charge.”**[6]** He said TEPCO “has been playing a game of Whac-a-Mole with problems at the site.”**[7]**

More than 300,000 tons of contaminated water are being stored at the Fukushima plant, in around 1,000 tanks, with around 400 tons being added every day as water is still being used to cool reactors.

In early September, TEPCO said workers had discovered high levels of radioactivity on three tanks and one pipe. One reading was 1,800 millisieverts per hour (compared to typical background radiation levels of 2–3 millisieverts per year) and another reading was 2,200 millisieverts per hour. It is believed that at least five of the tanks holding contaminated water may have leaked. Officials said that water levels have not dropped in any of the five tanks (whereas the 300-ton leak markedly reduced the level). The tanks were constructed by bolting together sheets of metal, rather than welding them. Welded tanks are more secure but TEPCO chose the bolted type because they are cheaper and faster to construct.**[4,10,11,28]**
A subcontractor who worked on

constructing the tanks said workers were concerned about the integrity of the tanks even as they were constructing them: "We were required to build tanks in succession. We gave priority to making the tanks, rather than quality control. There were fears that toxic water may leak." The life-span of the tanks is only around five years, the subcontractors added, and more contaminated water may leak as they deteriorate.[12,13]

The head of the NRA, Shinichi Tanaka, said there may be no choice but to pump radioactive water from tanks – which are nearing capacity – into the sea but most of the contamination would first be removed. "The situation at Fukushima is changing every day," he said. "Fukushima Daiichi has various risks. The accident has yet to be settled down." [8,9]

Meanwhile, the NRA is urging TEPCO to increase monitoring of seawater to better assess the effects on ocean water as well as fish and other marine life. Shinichi Tanaka said TEPCO's efforts to monitor oceanic radiation levels have been insufficient.[14]

Fishers south of Fukushima Daiichi have not been able to fish commercially since the disaster, while those north of the plant can catch only octopus and whelks. They planned a trial catch in the hope that radiation levels would be low enough to begin sales soon after – but that plan has been aborted in the wake of the recent spills and leaks. Hiroshi Kishi, chair of the Japan Fisheries Co-operative, said: "This has dealt an immeasurable blow to the future of Japan's fishing industry, and we are extremely concerned." Nobuyuki Hatta, director of the Fukushima Prefecture Fisheries Research Centre, said: "People in the fishing business have no choice but to give up. Many have mostly given up already." [15,16,17]

Groundwater

In addition to problems with water tanks, there are ongoing problems

with contaminated water in, around and beneath the reactor buildings. On July 10, the NRA announced it "highly suspected" that the plant was leaking contaminated water into the ocean. TEPCO didn't acknowledge what was happening until July 22; a month after initial suspicions were raised.[18,19] The NRA's Shunichi Tanaka said he believed contamination of the sea had been continuing since the March 2011 catastrophe.[20]

In response to the July revelations, Dale Klein, a member of TEPCO's Nuclear Reform Monitoring Committee and former head of the US Nuclear Regulatory Commission, told TEPCO: "It ... appears that you are not keeping the people of Japan informed. These actions indicate that you don't know what you are doing ... you do not have a plan and that you are not doing all you can to protect the environment and the people." [21]

Barbara Judge, a member of the Nuclear Reform Monitoring Committee and former chair of the UK Atomic Energy Authority, said she was "disappointed and distressed" over the company's lack of disclosure: "I hope that there will be lessons learned from the mishandling of this issue and the next time an issue arises – which inevitably it will because decommissioning is a complicated and difficult process – that the public will be immediately informed about the situation and what TEPCO is planning to do in order to remedy it." [21]

Atsushi Kasai, a former researcher at the Japan Atomic Energy Research Institute, said: "They let people know about the good things and hide the bad things. This culture of cover up hasn't changed since the disaster." [22]

Journalist Mark Willacy described the recurring pattern: "At first TEPCO denies there's a problem at the crippled Fukushima plant. Then it becomes obvious to everyone that there is a problem, so the company then acknowledges the problem and makes

it public. And finally one of its hapless officials is sent out to apologise to the cameras." [23]

Still more problems surfaced in August. Three months earlier, TEPCO realised that contaminants apparently leaking from a maze of conduits near the reactors were responsible for a spike in radiation levels in groundwater elsewhere in the plant. TEPCO began to build an underground "wall" created by injected hardening chemicals into the soil but the barrier created a dam and water pooled behind it eventually began to flow over. In August, government officials said they believed 300 tons of the contaminated water was entering the ocean daily.[24] Shinji Kinjo, head of an taskforce, described the situation as an "emergency" and said the discharges exceeded legal limits of radioactivity.[25]

In early September, Chief Cabinet Secretary Yoshihide Suga said the government would allocate 47 billion yen (US\$470 million) towards dealing with the contaminated water problems, including funding for a massive underground wall of frozen earth around the damaged reactors to contain groundwater flows, and funding to improve a water treatment system meant to reduce radiation levels in the contaminated water.[26]

Mayors from Futaba, Okuma, Tomioka, and Naraha have joined Fukushima Governor Yuhei Sato in formally demanding the decommissioning of all 10 nuclear reactors in Fukushima Prefecture, not just those that were damaged in the 2011 nuclear disaster.[27]

Reactor #3 at Kansai Electric's Oi power plant in Fukui Prefecture has been taken offline for routine maintenance, leaving just one reactor operating in all of Japan: reactor #4 at the same facility. That reactor will go offline on September 15. For the first time in 14 months and only the second time since 1966, Japan will be entirely nuclear free.

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Fukushima Tourism Proposal

A group of authors, scholars, academics and architects has put forward a proposal for a new community on the edge of the Fukushima exclusion zone. Tourists would be able to check into hotels constructed to protect guests from elevated levels of radiation. The village would also have restaurants and souvenir

shops, as well as a museum dedicated to the impact the disaster has had on local people. Visitors would be taken on a tour of “ground zero” dressed in protective suits and wearing respirators. The group said they got the idea from the growth in so-called “dark tourism” such as Ground Zero in New York or the “killing fields” of Cambodia.

– Julian Ryall, 19 August 2013, *The Telegraph*, www.telegraph.co.uk/news/world-news/asia/japan/10251717/Japans-tsunami-hit-Fukushima-nuclear-plant-to-become-tourist-attraction.html

Is Fukushima the new normal for nuclear reactors?

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The new crisis at the Fukushima nuclear power plant in Japan saw radioactive water leak again from the crippled facility, raising fears that groundwater flowing into the Pacific Ocean could be contaminated.[1]

767.4329 The Japanese government also raised the international incident level – the scale used to assess nuclear accidents – from one to three out of seven. The original nuclear meltdown following the 2011 Japanese earthquake was scaled seven. Even if Fukushima was ultimately caused by the 2011 earthquake and

ensuing tsunami, accidents such as this beg the question: can nuclear energy ever be truly safe? There are three reasons to think that nuclear accidents are common, and could increase – and it’s not because of the technology. Let’s have a look at the evidence.

Lessons from history

In the early 1980s, Yale sociologist Charles Perrow argued that the partial meltdown of a nuclear reactor at Three Mile Island was a “normal accident”.

[2] The crux of his argument was that complicated technological systems have unavoidable problems that can’t be designed around.

Perrow’s argument – still relevant today – rested on three pillars. First, people are fallible, even at nuclear reactors. Operator error is still a

very common factor in incidents and accidents.

Second, big accidents almost always have very small beginnings. Nuclear power plants are so complex that relatively simple things — shirt tails, fuses, light bulbs, mice, cats, and candles — can disrupt the entire system.

And finally, many failures are those of organisations more than technology. Given the right event, all these factors can lead to system-wide failure. Perrow concludes that such high-tech, dangerous systems are hopeless and should be abandoned, as the inevitable risks of failure outweigh any conceivable benefits. Nuclear reactors do have inherent advantages over fossil fuels, but Perrow's argument raises serious questions about nuclear safety.

Never-ending accidents

Even so, Perrow was writing in the 1980s. Surely things have improved since then? Well, perhaps not.

If you consider the full range of incidents and accidents reported on the International Nuclear Event Scale [3], there have been hundreds of events over the past few decades. One peer-reviewed study identified 105 nuclear accidents totalling US\$176.9 billion in damages and 4,231 fatalities worldwide from 1952 to 2011. [4] The International Atomic Energy Agency also reports no less than 2,400 separate incidents since the organisation began collecting data in the 1950s.

Most of these incidents involved no major releases of radiation or fatalities. But three emerging trends still cause reason for grave concern.

First, major modern nuclear power accidents are no longer one-off events. Instead, they can span years or even decades, creating a sort of "continuous accident".

The infamous Chernobyl nuclear power accident may have started on April 25 1986, but it continued into the

early 1990s. Secrecy, further accidents, and wildfires in the exclusion zone meant that exposure to dangerous levels of radiation weren't controlled immediately. We can see this same "continuous" trend with the accident at Fukushima. The triple meltdown itself at Fukushima in March 2011 was just the beginning.

In March 2013 a power outage left four underground spent fuel pools without fresh cooling water for several hours. The same month, it surfaced that a TEPCO crew laying down rat-proof netting caused another outage. In April 2013 regulators discovered that thousands of gallons of radioactive water had seeped into the ground from a leaking system of plastic sheeting.

In May, a fire broke out near Fukushima Unit 3 — ostensibly caused by cardboard boxes catching flame. And most recently in August 2013, regulators announced that 300 tons of radioactive water was found leaking from storage tanks.

New designs, new problems

There is some evidence that newer reactor designs and systems are more prone to accidents. Dennis Berry, Director Emeritus of Sandia National Laboratories, explains that the problem with new reactors and accidents is twofold: scenarios arise that are impossible to plan for in simulations, and people make mistakes. [5] As he put it: "Fabrication, construction, operation, and maintenance of new reactors will face a steep learning curve: advanced technologies will have a heightened risk of accidents and mistakes. The technology may be proven, but people are not."

Former nuclear engineer David Lochbaum has noted that almost all serious nuclear accidents have occurred when operators have little experience with a plant. [6] This makes new systems incredibly risky.

Lochbaum cites numerous historical

examples of nuclear reactor accidents, including Three Mile Island and Chernobyl, which suffered accidents immediately or soon after opening. Only Fukushima seems to have defied the trend; it was opened in 1971 and continued operating until the 2011 earthquake.

Electric pressure

The third problem is electric market restructuring. This puts more pressure on nuclear operators to keep costs low, potentially compromising safety.

The problem is, as former Nuclear Regulatory Commission chair Peter Bradford states, "nuclear energy can be cheap, or it can be safe. But it can't be both." [7] And even then, "there's always the possibility somebody will cut a corner". [8]

For example, the pressure to build new generators on existing sites to avoid finding new locations can increase the risk of catastrophe, since there is a greater chance that one accident can affect multiple reactors.

Nuclear waste storage is also becoming more dangerous, with many spent fuel pools packed with more fuel rods to keep costs low, making them hotter and denser. [9] Operators have to add boron to water pool to absorb neutrons, increasing the risk of chain reaction, or criticality, accidents.

The industry has also been trying to tinker with reactor sizes and promote designs that operators have little experience with, making operator training a factor. Some of these new reactor designs use more fuel and create more heat, meaning they have bigger cores containing larger quantities of dangerous fissionable materials, increasing the magnitude of any accident that could occur.

These factors are worrying (to say the least) given the severity of what a single, serious accident can do. Too bad it seems a matter of when, not if, we will see more of them in the future.

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This article is reprinted from The Conversation, 27 August 2013,

<http://theconversation.com/is-fukushima-the-new-normal-for-nuclear-reactors-17391>

The UK's role in nuclear proliferation: then and now

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Dr. David Lowry examines the historical role of Britain's civilian nuclear exports in the weapons programmes of countries like North Korea, and fears that the latest government initiatives will lead to history repeating itself.

767.4330 The veteran Labour politician, Tony Benn, who was responsible for the British nuclear power programme in the late 1960s, was asked by The Times if he had made any political mistakes in his life. He responded: "Yes, nuclear power. I was told, when I was in charge of it, that atomic energy was cheap, safe and peaceful. It isn't." [1]

Since the 1950s there has been widespread sympathy and support – by both political and scientific leaders – for nuclear power. This is despite clear evidence that the spread of civilian nuclear technologies and materials has contributed to nuclear weapons proliferation. This article looks at some examples from Britain's nuclear history, and questions why our government is, once again, ramping up its support for nuclear exports.

Atoms for Peace?

Following the detonation of the two atomic bombs over the Japan in August 1945, many nuclear scientists wanted to put their intellectual expertise to the public good, so horrified were they over the scale of destruction. One of the key focuses was the pursuit of electrical power from nuclear fission.

Just over a year after Britain first tested its own atomic bomb, US President Eisenhower delivered his infamous 'Atoms for Peace' speech to the UN

General Assembly in 1953. It proposed the conversion of 'atomic swords' into 'nuclear energy ploughshares'. He stated: "It is not enough to take this weapon out of the hands of the soldiers. It must be put into the hands of those who will know how to strip its military casing and adapt it to the arts of peace." [2]

He proposed the creation of an international atomic energy agency, whose responsibilities would include bringing "abundant electrical energy" to "the power-starved areas of the world." This was the start of a huge promotional drive which led, in 1957, to the creation of the International Atomic Energy Agency (IAEA) as a United Nations agency in Vienna.

The UK was at the forefront of the new technology. In 1956, four 'Magnox' reactors at Calder Hall on the Sellafield site – then called Windscale – were opened by the young Queen Elizabeth II. She announced that: "It may well prove to have been among the greatest of our contributions to human welfare that we led the way in demonstrating the peaceful uses of this new source of power." [3]

But the double-edged nature of this technology was all too apparent in this facility: it was designed to produce plutonium for military purposes, as well as generate electrical power. [4]

Early UK nuclear technology in Iraq, Iran and North Korea.

As the IAEA was being set up, the UK made one of its first forays into international nuclear trade – with Iraq. The Baghdad Pact Nuclear Centre opened on 31 March 1957 [5]. It was part of the UK's own 'Atoms for Peace' efforts. According to a parliamentary reply by Michael Heseltine in 1992, "Iraq ceased to participate in the activities of the training centre when it was transferred to Tehran following the revolution in Iraq in 1959." [6]

In light of subsequent geo-political history in the region, that was out of the atomic frying pan, into the nuclear fire!

Around this time Britain also sold a single Magnox nuclear plant each to Japan and to Italy. [7]

There is also significant evidence that the British Magnox nuclear plant design – which, after all, was primarily built as a military plutonium production factory – provided the blueprint for the North Korean military plutonium programme based in Yongbyon. Here is what Douglas Hogg, a Conservative minister, admitted in a written parliamentary reply in 1994: "We do not know whether North Korea has drawn on plans of British reactors in the production of its own reactors. North Korea possesses a graphite moderated reactor which, while much smaller, has generic similarities to the reactors operated by British Nuclear Fuels plc. However, design information of these British reactors is not classified and has appeared in technical journals." [8] The uranium enrichment programmes of both North Korea and Iran also have a UK connection. The blueprints of this type of plant were stolen by

Pakistani scientist, A Q Khan, from the URENCO enrichment plant in The Netherlands in the early 1970s. [9] This plant was one-third owned by the UK government. The Pakistan government subsequently sold the technology to Iran, who later exchanged it for North Korean Nodong missiles.

A technical delegation from the A Q Khan Research Labs visited North Korea in the summer of 1996. The secret enrichment plant was said to be based in caves near Kumch'ang-ni, 100 miles north of the capital, Pyonyang, where US satellite photos showed tunnel entrances being built. Hwang Jang-yop, a former aid to President Kim Il-sung (the grandfather of the current North Korean President) who defected in 1997, revealed details to Western intelligence investigators.

[10]

So Britain's civilian nuclear export activity has involved provision of direct technical support to both Iraq and Iran, and indirectly to both North Korea and Iran. Given the subsequent nuclear weapons programmes in Iraq and North Korea, and the international concerns about the current nature of Iran's nuclear programme, this is hardly a positive record.

The UK has also been responsible for export of nuclear material from civilian plants specifically intended for weapons manufacture. Keith Barnham and other SGR colleagues demonstrated in a paper published in *Nature* in 2000 how military grade plutonium, created in the UK's Magnox reactors, was exported to the United States. [11]

The NPT as a vehicle for proliferation

In 1968, the Nuclear Non-Proliferation Treaty (NPT) was endorsed by the United Nations General Assembly to try to put the brakes on the further spread of nuclear weapons. The IAEA was explicitly given an enforcement role. But the treaty involved a 'grand bargain': that non-nuclear weapon states should renounce all possession of nuclear weapons in exchange for civilian nuclear assistance. Indeed, the NPT affirms nations' "inalienable right ... to develop research, production and use of nuclear energy for peaceful purposes." [12] To this end, the treaty

included clauses aimed at a major expansion of nuclear trade, including scientific and technological cooperation and sales of nuclear equipment and nuclear materials. The risk that this could lead to further proliferation has been downplayed by the IAEA and nuclear exporting countries ever since.

New UK nuclear exports

In the last few years, Britain's main political parties have demonstrated a deeply disturbing interest in a major expansion of the export of nuclear technology. This is despite claiming to be acutely aware of the dangers of proliferation.

In 2009, Chris Bryant, then a foreign office minister, commented during a parliamentary debate on nuclear proliferation: "It is clearly important that we secure fissile material. One of the greatest dangers to security around the world is the possibility of rogue states or rogue organisations gaining access to fissile material." [13]

Yet, only a few days later, the Labour government published a document which, while claiming to "lay out a credible road map to further disarmament", actually proposed increasing the civilian nuclear trade across the world. [14] The document was aimed at ongoing international non-proliferation negotiations.

In my judgment, whatever its laudable aims on nuclear disarmament, this document was in effect a blueprint for nuclear proliferation, undermining government aims to create a more secure world.

The Coalition government has continued to pursue this nuclear export path. In March this year, the Department for Business, Innovation and Skills – significantly, not the Department for Energy and Climate Change – published a suite of documents promoting nuclear power development in the UK and abroad, backed with £31 million of new taxpayers' money. [15]

In one of the documents, Long-term Nuclear Energy Strategy, the government committed to international action, including:

- further increasing its presence and impact in international nuclear

forums, "in particular those relating to nuclear R&D";

- working with "like-minded" EU nations to provide "a positive and informed political environment for the civil use of nuclear power both domestically and globally"; and
- working with embassies, industry and academia "to better showcase the UK's knowledge, expertise and facilities to the international market." [16]

While extra funding was being provided to promote nuclear technology, including exports, figures released to parliament this year revealed that the Coalition was simultaneously cutting the budget for nuclear non-proliferation. The 2013-14 spending will be reduced to £23.7m – a cut of £3.5m from 2012-13. [17] The budget for the Capital Global Threat Reduction Programme will also fall: from £6.6m to £5.0m. The Coalition's changing priorities are all too clear.

There is the additional problem of what to do with the UK's current plutonium stockpile, created from the reprocessing of spent nuclear fuel. This currently stands at 110,000 kg. [18] While this is classified as 'reactor grade' because of its high content of heavy plutonium isotopes, it is widely acknowledged – including by the Royal Society [19] – that even reactor grade plutonium can be used to fabricate crude but powerful nuclear weapons. Depending on the isotopic content and the weapon design, a single nuclear bomb could be constructed with as little as 5 kg. [20]

The government's currently preferred option for dealing with this stockpile is to convert it into MOX (mixed plutonium-uranium oxide), which could be used to fuel nuclear power stations both in the UK and abroad. [21] But MOX fuel can be chemically separated into its constituent parts, so the proliferation risks of exporting this fuel are again all too real. Furthermore, to fabricate this MOX fuel, upwards of £1 billion, some suggest as much as £5-6 billion, of UK taxpayers' money would be needed for construction of a new manufacturing plant at Sellafield. [22,23]

The two Cabinet ministers responsible for the UK's nuclear export strategy

are Business Secretary, Vince Cable and Energy and Climate Change Secretary, Ed Davey. Ironically, both were elected in 2010 on a Liberal Democrat manifesto that opposed all nuclear power projects.

Nuclear worries

The very real risk is that the UK's promotion of nuclear power – especially

the export of nuclear technologies and materials – will lead to more military stand-offs such as those with North Korea and Iran, and will further hasten the day when another mushroom cloud rises above a city with hundreds of thousands lying dead beneath it. The easiest way to minimise the risk of such attacks is stop promoting and distributing the technologies that could

be used to undertake them.

Tony Benn regarded his support of nuclear power as a major political mistake – not least because of the problems of proliferation. How long will it be before the current generation of British politicians – and indeed the scientists and engineers advising them – realise they are making the same mistake?

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www.sgr.org.uk/resources/uk-s-role-nuclear-proliferation-then-and-now

NUCLEAR NEWS

Legal challenges against nuclear power projects in Slovakia and UK-

Slovakia's nuclear watchdog violated the law when it issued a building permit for ENEL's 3.7 billion-euro nuclear reactor project, the Supreme Court has ruled. The Italian utility's local unit, Slovenske Elektrarne AS, began building two new reactors at the Mochovce nuclear power plant in 2009 after receiving a permit by the Office for Nuclear Supervision. The Supreme Court has directed the regulator to reopen the public consultation process.[1] The battle continues – the Slovak nuclear regulator UJD said it would order a new round of public consultation but that ENEL can continue with construction.

Greenpeace, along with Ireland's heritage group An Taisce (the National Trust for Ireland), have launched two independent legal challenges to the UK government plans for new nuclear power plants at Hinkley Point, Somerset. The reactor plan is being challenged on the basis of the EU's Environmental Impact Assessment Directive, which requires that affected EU members states are informed and consulted during the planning stage of infrastructure projects that "could have a significant impact on the environment". Irish people were not properly consulted on the proposals.[2]

In a separate case, Greenpeace is challenging the UK Government's decision to grant planning permission for the reactors because it hasn't found a site to store the new nuclear waste, following Cumbria's resounding rejection of a national nuclear waste site in the area.[2]

1] www.bloomberg.com/news/2013-08-21/enel-nuclear-building-permit-violated-law-slovak-court-says.html

[2] www.theecologist.org/News/news_analysis/2006847/legal_challenges_to_new_nuclear_can_we_trust_government.html

Greenland uranium ban may be lifted

The ban on uranium mining in the Danish realm is expected to be lifted in the Greenlandic parliament in the

coming months. The first reading of the new uranium bill will be on October 1, the second on October 24 and the third in Spring 2014. The decision will then have to be confirmed in the Danish parliament. The Greenlandic government decision will be preceded by publication of two reports – one scientific and independent and one political – on the consequences of lifting the ban. The scientific report has already been written, but the government has so far refused to make it public, a fact that has caused outrage among the opposition parties.

The Greenlandic Minister of Industry and Labour has also stated that a comprehensive public debate on uranium mining is unnecessary, before the ban is lifted, because the government was given a clear mandate to do so during the recent elections.

Abolishment of the uranium zero tolerance policy is not only a hot topic in Greenland, but also in Denmark. Even though the Danish government has given notice that it favours the bill, it could still be voted down in the Parliament. The Danish government is a minority government and even within the government itself there is opposition to lifting the ban.

Avataq, the Danish Ecological Council and NOAH FoE Denmark have weighed in on the debate and last month they published a feature article in Politiken, one of the biggest Danish dailies. The article has been translated into English: www.ecocouncil.dk/en/releases/articles-pressreleases/chemicals-and-climate/2203-keep-the-ban-on-uranium-mining-in-the-danish-realm – Niels Hooge

Uranium smuggling arrest at JFK airport.

Patrick Campbell of Sierra Leone was recently caught at Kennedy Airport with uranium hidden in his shoes and luggage. He was charged with plotting to sell 1,000 tons of uranium to an FBI agent posing as a broker for Iranian buyers. He had allegedly responded to an advertisement in May 2012 on the website Alibaba.com. Campbell clai-

med to represent a mining company in Sierra Leone that sold diamonds, gold and uranium, and is accused of seeking to arrange the export of uranium from Sierra Leone to the Iranian port of Bandar Abbas, packed in drums and disguised as the mineral chromite. www.nypost.com/p/news/local/nuke_powder_terror_arrest_at_jfk_MvQxJ-cRf5oyHqYhzc0XIEI
www.bbc.co.uk/news/world-us-canada-23825972

Plutonium and enriched uranium removed from nuclear test site in Kazakhstan.

Working in top secret over a period of 17 years, Russian and US scientists collaborated to remove hundreds of pounds of plutonium and highly enriched uranium — enough to construct at least a dozen nuclear weapons — from a remote Soviet-era nuclear test site in Kazakhstan that had been overrun by impoverished metal scavengers, according to a report released in August by the Belfer Center for Science and International Affairs at Harvard. The report sheds light on a mysterious US\$150 million cleanup operation paid for in large part by the US, whose nuclear scientists feared that terrorists would discover the fissile material and use it to build a dirty bomb.

www.nytimes.com/2013/08/18/world/asia/a-secret-race-for-abandoned-nuclear-material.html

UK – Heysham shut down after electrical fault.

Heysham 1 Power Station shut down both of its nuclear reactors after an electrical fault in a gas turbine generator. Firefighters were called to the plant on August 22. EDF Energy, which operates the plant, said it had been shut down as a precaution. In May, a reactor was shut down after smoke was seen coming from a turbine due to smouldering lagging on a turbine. www.bbc.co.uk/news/uk-england-lancashire-23808744
<http://uk.reuters.com/article/2013/08/27/uk-nuclear-idUKBRE97Q0LB20130827>
www.bbc.co.uk/news/uk-england-lancashire-22394359

Lithuania opposes new reactor in Belarus.

The Lithuanian government has made known its deep concerns about Belarus's nuclear power project near Ostroverts, and is demanding work be halted until safety issues are addressed and international treaties are complied

with. Two diplomatic notes have been sent to Belarus over the past month to protest earth-moving and other initial work for the plant. "We have many concerns about safety and information we've asked for hasn't been provided,"

Lithuanian Prime Minister Algirdas Butkevicius said. A UN committee said in April that Belarus wasn't abiding by the terms of the Espoo Convention on cross-border environmental issues.

www.powerengineeringint.com/articles/2013/08/lithuania-express-concern-on-belarusian-nuclear-project.html

ESPOO Convention: www.unece.org/env/eia/eia.html

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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