

# NUCLEAR MONITOR

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## MONITORED THIS ISSUE:

## THORP, LIVING ON A KNIFE-EDGE, TO BE CLOSED FOR SEVEN MONTHS

**Sellafield Ltd, the company that operates THORP (Thermal Oxide Reprocessing Plant) under contract to the Nuclear Decommissioning Authority (NDA), is facing yet another extended shut-down of THORP - this time for an estimated 7 months - when the only High Level Waste Evaporator configured to deal with THORP's high level waste is taken off line for a major investigation.**

**(690.5959) CORE** - The closure comes as little surprise given that Company reports and presentations over the last year have clearly anticipated the need to take action on the plant's operational future because of increasing problems in managing the dangerous high level waste (HLW) produced not only by THORP, but also by the Magnox reprocessing plant (B205) and the effluents from the site's Vitrification plant (WVP).

At the heart of the problem are the site's three HLW Evaporators A, B & C, which condense the liquid HLW from the site's reprocessing plant and the effluents arising from the subsequent vitrification of HLW. THORP, by design, is configured for use with Evaporator C only, whilst A and B have historically been used to process WVP and Magnox wastes respectively - both the latter given priority over THORP wastes by the Nuclear Installations Inspectorate (NII) for 'hazard reduction purposes'. As a consequence, if either A or B break down and have to be taken out of service (as has happened in recent years), THORP's Evaporator C is pressed into service to process Magnox or WVP wastes, leaving THORP effectively with no 'evaporative capacity' and therefore unable to reprocess.

THORP's future operations at anything like a full commercial rate are therefore

dependent on the regular and reliable operation of A & B. Their unreliability in recent years however has resulted in Sellafield Ltd having to place orders for 2 new Evaporators (D & E). Of similar design to C, the first of the new Evaporators is not expected to come into operation before 2014, the project currently being only at the stage of site foundation work. The original cost of BP 90 million is understood to have escalated to some BP 400 million (US\$654 million, 470 million Euro)

In May 2008, in rationing the use of Evaporator C between the various facilities, the NII approved its further use for THORP - but only up to a maximum of 300 tons of oxide fuel derived HLW. Whilst this placed a limit on THORP reprocessing, it ensured that should the operation of A or B remain problematic, the prioritised Magnox and WVP wastes could at least be diverted for processing in Evaporator C if needs be.

Against this background of uncertainty over the reliability of Evaporators, Sellafield Ltd's recent reports and presentations have assessed a number of possible options for THORP's future - one being a moratorium on reprocessing at the plant and another being to operate THORP for part of the year only - with its workforce redeployed to other work on site. The prospect of such options becoming a reality came a step closer on

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the May 18 this year when Sellafield Ltd announced that Evaporator B had been shut down following the discovery of a rise in radioactivity levels in one of its internal heating/cooling coils.

Though the closure of B for inspection was relatively short lived, Sellafield Ltd was forced to refute opposition claims that THORP faced imminent closure, and to assure its workforce that, despite the problem with Evaporator B, there *'was no danger of any plant closures'*.

In early June the claim of no plant closures was however thrown into disarray when confirmation was given to CORE, at a meeting with the NDA, Sellafield Ltd and Sellafield's new parent body organisation Nuclear Management Partners (NMP), that Evaporator C was shortly to be taken out of service for a thorough investigation. As Evaporator C is the only Evaporator configured to process THORP HLW, THORP would have to close down for 7 months - the projected duration of the Evaporator investigation. This would include not only the physical investigation itself (thickness measurement of internal cooling coils), but also the subsequent evaluation of the data from the investigation, the making of a new Safety Case for the Evaporator, and gaining approval from the Nuclear Installations Inspectorate (NII) for future use of the Evaporator for THORP reprocessing.

The prospect of a further 7-month closure of THORP, following the large number of unplanned 'outages' that have blighted the plant's operational life, will do little to calm the increasing concerns of its reprocessing customers. Already known to be highly critical of Sellafield's inability to operate THORP properly, overseas customers must now reconcile themselves to having to wait even longer for their contracts to be completed - perhaps 13 or more years late.

When THORP opened in 1994, its contracted customers had been assured by the then owners British Nuclear Fuels plc (BNFL) that, as Sellafield's 'flagship' plant, THORP would reprocess 7000 tons of spent

fuel in its first ten years of operation (the base load contracts). At the end of that 10-year base load period, THORP had struggled to complete 5000 tons of that order book.

Originally scheduled to close 'with all contracts completed' around 2010/11, the closure date had to be put back to around 2016 when, with a total 5729 tonnes reprocessed, THORP was closed down in April 2005 following the major accident (INES Level 3) when 83,000 litres of dissolved spent fuel leaked undetected from a fractured pipe in THORP's Feed Clarification Cell. Re-opened in 2007, and still with contracts for 800 tons of overseas fuel and 2000-3000 tons of UK AGR fuel to complete, THORP has reprocessed a further 300 tons to date, including 50 tons of overseas fuel (Dutch and Swiss), bringing the overall total reprocessed since 1994 to 6000 tons.

The throughput target for the current financial year 2009/10 - the plant's 16th year of operation - is just 200 tons, 17% of its original design throughput of 1200 tons per year, and a rate previously described to CORE by BNFL as being commercially uneconomic for THORP. As a result of the imminent 7-month closure for Evaporator C investigation, THORP is now projected to close (with all contracts completed) in 2017, though any combination of further Evaporator failures, delays to new Evaporators or any other unexpected technical failures within THORP itself, could see reprocessing operations continuing to 2020 or beyond.

The NII's current 300-ton limit for THORP's use of Evaporator C is expected to be reached at some point in July this year. Once reached, and with the Evaporator taken out of service and THORP closed, the burden of processing Sellafield's Magnox and WVP wastes will fall entirely on Evaporator B which only came back on line in July 2008 after a 43-month outage for repair. Evaporator A will be kept on stand-by.

Built some fifty years ago, A & B are fitted with a cooling/heating jacket around the base and sides of the evaporator and four internal coils,

which can be used alternately for heating and cooling the HLW under process. By comparison, Evaporator C was commissioned in 1990 and has 6 internal coils. Corrosion and vibration pose the greatest threat to the integrity and lifetime of these evaporators, particularly the coils and stainless steel base of the evaporators which are subject to high temperatures and hot-spots within the bottom layer of the waste sludge's.

Failure of the coils through corrosion has resulted in A & B being forced out of service on numerous occasions in the last few years and both now have to be operated with less than their full complement of heating/cooling coils. Heating and cooling provision for Evaporator B, for example, is restricted to its jacket and just two (of the original four) heating/cooling coils. In its Quarterly report on Sellafield (July to September 2008) the NII considered the operational life of B could be quite considerable 'provided that waterside corrosion does not cause premature failure of the remaining two heating/cooling coils'.

For its part, Evaporator A, with its jacket and just one serviceable coil, is kept on stand-by 'as a contingency' to deal with the wastes from WVP which have a lesser heat loading than those from reprocessing and are therefore less demanding on the Evaporators.

It is ironic that as the worldwide economic downturn forces household-name businesses into liquidation across the UK, reprocessing at THORP - arguably the UK's largest white-elephant of all - should continue to get the backing of the UK Government and the plant's owners the NDA despite its woeful performance and its increasingly poor commercial prospects. It apparently owes its survival, not on any merit as a spent fuel management option, but solely because of the revenues it continues to bring in from the now disgruntled overseas customers who signed up with THORP decades ago. The NDA, funded by the taxpayer, uses the revenues to offset some of its spiralling clean-up and decommissioning costs at Sellafield and other UK sites.

Whilst Sellafield Ltd will be keeping its fingers crossed that the site's Evaporator problems can be overcome, it will also be working hard to understand and improve the weakness in associated facilities that similarly threaten THORP's future. One such is the continuing underperformance of WVP whose ability to deal with the HLW from reprocessing is essential in reducing the overall stocks of HLW at Sellafield (currently just under 1000 cubic meters) as required by the NII's 2001 Specification, to a buffer stock of 200 cubic meters by 2015. Then there is the condition of the storage tanks in which the HLW is stored prior to

vitrification. Having been subject of particular NII concern over recent years because of corrosion problems, plans are now being drawn up to build new tanks, though their installation and operation is not envisaged for at least ten years.

Whilst THORP is owned by the NDA, its operators Sellafield Ltd now come under the management of Sellafield's new Parent Body Organisation (PBO) appointed late last year by the NDA. The PBO - Nuclear Management Partners Ltd (NMP) is a consortium of the US Washington International Holdings Ltd., AMEC and AREVA. NMP

will hold shares in Sellafield for the next 17 years under a contract estimated at some BP 22 billion (US\$ 36 billion, 26 billion Euro). As relative newcomers to Sellafield, NMP's view on the future of THORP and reprocessing remains unknown.

**Source and contact:** Cumbrians Opposed to a Radioactive Environment (CORE). Dry Hall, Broughton Mills, Broughton-In-Furness, Cumbria, LA20 6AZ England.  
Tel/Fax: +44 1229 716523  
Email: info@corefurness.co.uk  
Web: www.corecumbria.co.uk

## "NEW" NUCLEAR REACTORS, SAME OLD STORY

**The dominant type of new nuclear power plant, light-water reactors (LWRs), proved impossible to finance in the robust 2005-08 capital market, despite new U.S. subsidies approaching or exceeding their total construction cost. New LWRs are now so costly and slow that they save 2-20 times less carbon, approximately 20-40 times slower, than micro power and efficient end-use.**

**(690.5960) Amory Lovins** - As this becomes evident, other kinds of reactors are being proposed instead - novel designs claimed to solve LWRs' problems of economics, proliferation, and waste. Even climate-protection pioneer Jim Hansen says these "Generation IV" reactors merit rapid R&D. But on closer examination, the two kinds most often promoted - Integral Fast Reactors (IFRs) and thorium reactors - reveal no economic, environmental, or security rationale, and the thesis is unsound for any nuclear reactor.

### **Integrated Fast Reactors (IFRs)**

The IFR - a pool-type, liquid-sodium cooled fast-neutron reactor plus an ambitious new nuclear fuel cycle - was abandoned in 1994, and General Electric's S-PRISM design in 2003, due to both proliferation concerns and dismal economics. Federal funding for fast breeder reactors halted in 1983, but in the past few years, enthusiasts got renewed Bush Administration support by portraying the IFR as a solution to proliferation and nuclear waste. It's neither.

Fast reactors were first offered as a way to make more plutonium to augment and ultimately replace scarce uranium. Now that uranium and enrichment are known to get cheaper while

reprocessing, cleanup, and nonproliferation get costlier - destroying the economic rationale - IFRs have been reframed as a way to destroy the plutonium (and similar transuranic elements) in long-lived radioactive waste. Two or three redesigned IFRs could in principle fission the plutonium produced by each four LWRs without making more net plutonium. However, most LWRs will have retired before even one commercial-size IFR could be built; LWRs won't be replaced with more LWRs because they're grossly uncompetitive; and IFRs with their fuel cycle would cost even more and probably be less reliable. It's feasible today to "burn" plutonium in LWRs, but this isn't done much because it's very costly, makes each kg of spent fuel 7x hotter, enhances risks, and makes certain transuranic isotopes that complicate operation. IFRs could do the same thing with similar or greater problems, offering no advantage over LWRs in proliferation resistance, cost, or environment.

IFRs' reprocessing plant, lately reframed a "recycling center," would be built at or near the reactors, coupling them so neither works without the other. Its novel technology, replacing solvents and aqueous chemistry with high-temperature pyrometallurgy and electro refining, would incur different but major

challenges, greater technical risks and repair problems, and speculative but probably worse economics. (Argonne National Laboratory, the world's experts on it, contracted to pyroprocess spent fuel from the EBR-II - a small IFR-like test reactor shut down in 1994 - by 2035, at a cost DOE estimated in 2006 at approximately 50x today's cost of fresh LWR fuel.)

Reprocessing of any kind makes waste management more difficult and complex, increases the volume and diversity of waste streams, increases by several -to manifold the cost of nuclear fueling, and separates bomb-usable material that can't be adequately measured or protected. Mainly for this last reason, all U.S. Presidents since Gerald Ford in 1976 (except G.W. Bush in 2006-08) discouraged it. An IFR/pyroprocessing system would give any country immediate access to over a thousand bombs' worth of plutonium to fuel it, facilities to recover that plutonium, and experts to separate and fabricate it into bomb cores - hardly a path to a safer world.

IFRs might in principle offer some safety advantages over today's light-water reactors, but create different safety concerns, including the sodium coolant's chemical reactivity and radioactivity. Over the past half century,

the world's leading nuclear technologists have built about three dozen sodium-cooled fast reactors, 11 of them Naval. Of the 22 whose histories are mostly reported, over half had sodium leaks, four suffered fuel damage (including two partial meltdowns), several others had serious accidents, most were prematurely closed, and only six succeeded. Admiral Rickover canceled sodium-cooled propulsion for USS Seawolf in 1956 as "expensive to build, complex to operate, susceptible to prolonged shutdown as a result of even minor malfunctions, and difficult and time-consuming to repair." Little has changed. As Dr. Tom Cochran of NRDC notes, fast reactor programs were tried in the US, UK, France, Germany, Italy, Japan, the USSR, and the US and Soviet Navies. All failed. After a half-century and tens of billions of dollars, the world has one operational commercial-sized fast reactor (Russia's BN600) out of 438 commercial power reactors, and it's not fueled with plutonium.

IFRs are often claimed to "burn up nuclear waste" and make its "time of concern . . . less than 500 years" rather than 10,000-100,000 years or more. That's wrong: most of the radioactivity comes from fission products, including very-long-lived isotopes like iodine-129 and technetium-99, and their mix is broadly similar in any nuclear fuel cycle. IFRs' wastes may contain less transuranic s, but at prohibitive cost and with worse occupational exposures, routine releases, accident and terrorism risks, proliferation, and disposal needs for intermediate- and low-level wastes. It's simply a dishonest fantasy to claim that such hypothetical and uneconomic ways to recover energy or other value from spent LWR fuel mean "There is no such thing as nuclear waste." Of course, the nuclear industry wishes this were true.

No new kind of reactor is likely to be much, if at all, cheaper than today's LWRs, which remain grossly uncompetitive and are getting more so despite five decades of maturation. "New reactors" are precisely the "paper reactors" Admiral Rickover described in 1953:

An academic reactor or reactor plant

almost always has the following basic characteristics: (1) It is simple. (2) It is small. (3) It is cheap. (4) It is light. (5) It can be built very quickly. (6) It is very flexible in purpose. (7) Very little development will be required. It will use off the shelf components. (8) The reactor is in the study phase. It is not being built now.

On the other hand a practical reactor can be distinguished by the following characteristics: (1) It is being built now. (2) It is behind schedule. (3) It requires an immense amount of development on apparently trivial items. (4) It is very expensive. (5) It takes a long time to build because of its engineering development problems. (6) It is large. (7) It is heavy. (8) It is complicated.

Every new type of reactor in history has been costlier, slower, and harder than projected. IFRs' low pressure, different safety profile, high temperature, and potentially higher thermal efficiency (if its helium turbines didn't misbehave as they have in all previous reactor projects) come with countervailing disadvantages and costs that advocates assume away, contrary to all experience.

#### **Thorium reactors**

Some enthusiasts prefer fueling reactors with thorium -an element 3 times as abundant as uranium but even more uneconomic to use. India has for decades failed to commercialize breeder reactors to exploit its thorium deposits. But thorium can't fuel a reactor by itself: rather, a uranium- or plutonium fueled reactor can convert thorium-232 into fissionable (and plutonium-like, highly bomb-usable) uranium-233. Thorium's proliferation, waste, safety, and cost problems differ only in detail from uranium's: e.g., thorium ore makes less mill waste, but highly radioactive U-232 makes fabricating or reprocessing U-233 fuel hard and costly. And with uranium-based nuclear power continuing its decades-long economic collapse, it's awfully late to be thinking of developing a whole new fuel cycle whose problems differ only in detail from current versions.

Spent LWR fuel "burned" in IFRs, it's claimed, could meet all humanity's energy needs for centuries. But renewables and efficiency can do that forever at far lower cost, with no

proliferation, nuclear wastes, or major risks. Moreover, any new type of reactor would probably cost even more than today's models: even if the nuclear part of a new plant were free, the rest - two-thirds of its capital cost - would still be grossly uncompetitive with any efficiency and most renewables, sending out a kilowatt-hour for ~9-13¢/kWh instead of new LWRs' ~12-18+¢. In contrast, the average U.S. wind farm completed in 2007 sold its power (net of a 1¢/ kWh subsidy that's a small fraction of nuclear subsidies) for 4.5¢/kWh. Add ~0.4¢ to make it dispatchable whether the wind is blowing or not and you get under a nickel delivered to the grid. (1 US\$ = 0.7 Euro)

Most other renewables also beat new thermal power plants too, cogeneration is often comparable or cheaper, and efficiency is cheaper than just running any nuclear- or fossil-fueled plant. Obviously these options would also easily beat proposed fusion reactors that are sometimes claimed to be comparable to today's fission reactors in size and cost. And unlike any kind of hypothetical fusion or new fission reactor -or LWRs, which have a market share below 2%- efficiency and micro power now provide at least half the world's new electrical services, adding tens of times more capacity each year than nuclear power does. It's a far bigger gamble to assume that the nuclear market loser will become a winner than that these winners will turn to losers.

#### **Small reactors**

Toshiba claims to be about to market a 200-kWe nuclear plant (~5,000x smaller than today's norm); a few startup firms like Hyperion Power Generation aim to make 10¢/kWh electricity from miniature reactors for which it claims over 100 firm orders. Unfortunately, 10¢ is the wrong target to beat: the real competitor is not other big and costly thermal power plants, but micro power and negawatts, whose delivered retail cost is often ~1-6¢/kWh. Can one imagine in principle that mass-production, passive operation, automation (perhaps with zero operating and security staff), and supposedly failsafe design might enable hypothetical small reactors to approach such low costs? No, for two basic reasons:

- Nuclear reactors derive their claimed advantages from highly concentrated sources of heat, and hence also of radiation. But the shielding and thermal protection needed to contain that concentrated energy and exploit it (via turbine cycles) are inherently unable to scale down as well as technologies whose different principles avoid these issues.
- By the time the new reactors could be proven, accepted by regulators and the public, financed, built, and convincingly tested, they couldn't undercut the then prices of negawatts and micro power that are beating them by 2-20x today- and would have

gained decades of further head start on their own economies of mass production.

In short, the notion that different or smaller reactors plus wholly new fuel cycles (and, usually, new competitive conditions and political systems) could overcome nuclear energy's inherent problems is not just decades too late, but fundamentally a fantasy. Fantasies are all right, but people should pay for their own. Investors in and advocates of small-reactor innovations will be disappointed. But in due course, the aging advocates of the half-century-old reactor concepts that never made it to market will retire and die, their credulous

young devotees will relearn painful lessons lately forgotten, and the whole nuclear business will complete its slow death of an incurable attack of market forces. Meanwhile, the rest of us shouldn't be distracted from getting on with the winning investments that make sense, make money, and really do solve the energy, climate, and proliferation problems, led by business for profit.

**Source and contact:** Amory B. Lovins, Rocky Mountain Institute. 2317 Snowmass Creek Road, Snowmass, Colorado 81654-9199, U.S.A.  
Tel: +1 970 927-3851  
Web: [www.rmi.org](http://www.rmi.org)

# GERMAN ENVIRONMENT MINISTER: NUCLEAR INDUSTRY IS LYING

**Sigmar Gabriel, the German environment minister has accused the nuclear power industry of decades of lying to the public about a nuclear dump that is in danger of collapsing and is taking in 12 cubic meters of radioactive brine daily.**

**(690.5961) Diet Simon** - Sigmar Gabriel, a Social Democrat, told a newspaper: "We have now found files with proof that the claim that Asse was an exploratory mine was a pack of lies. It was intended to be a final repository right from the start - the nuclear industry used Asse to even save the costs of interim storage. The waste was just tipped in and they even had the audacity to demand that costs be kept as low as possible."

The dump in question is Asse II at Wolfenbüttel near Braunschweig, some 225 km southwest of Berlin. It was meant to be the pilot for a final repository in salt at Gorleben, 135 kms northeast, where illegal plans have just been revealed.

Gabriel demands that the operators of nuclear power stations pay the more than two billion euros it will cost to fix Asse II and that they make a public apology. Gabriel cites an exchange of letters in November and December 1969 between the AEG Company and the then operator of Asse II, the Gesellschaft für Strahlenforschung (Society for Radiation Research).

The correspondence explicitly refers to the final storage of radioactive wastes. The operator states that storage capacity would last "until the year 2000". Gabriel says the operator had even confirmed in writing to the nuclear industry "that the future price of the storage of radioactive waste materials will not be calculated according to strict commercial principles".

He adds that the environment ministry only received the files after massive pressure and a long delay. "The present-day claim that Asse was a research mine is an audacious, fat lie." It was now clear that the responsibility for the catastrophic conditions in Asse II lies with the nuclear industry and its former operator, the Society for Radiation Research.

The minister told the paper: "There was a shameless gang at work. I can only call on the nuclear industry to finally accept its responsibility and apologize publicly." It would have an opportunity to do so next week at a conference of the energy and water industries.

"And the nuclear power station operators must pay for fixing the problem even before lawmakers get

active. We can't accept that costs of more than two, perhaps three or four billion euros for fixing a cheap final repository in Asse are dumped on the taxpayers."

A spokesman for the local activists fighting dumping at Gorleben, Wolfgang Ehmke of the Bürgerinitiative Umweltschutz Lüchow-Dannenberg, said Gabriel could use the same drastic words about Gorleben. "We didn't even speak as plainly when it emerged recently that already in the 90s the Gorleben salt dome was being constructed as a final repository." Ehmke adds that since the 80s the nuclear power industry even cited the "exploratory mine" as proof of disposal although not a gram of waste was stored in it and the salt is highly contentious among experts. "Anyone who claims that open-ended research is being done in Gorleben and a fair, transparent search of alternate sites is being done is lying," says Ehmke.

Environment Minister Gabriel appealed to Chancellor Angela Merkel to make the nuclear industry foot the bill for fixing Asse II. Merkel belongs to the conservative Christian Democrat party, which leads the government, in which

the Social Democrats are the junior coalition partners.

It's a fraught relationship and with an election due in September its differences are becoming ever more obvious. Merkel's party backs nuclear power and wants Gorleben officially declared the final waste repository

although geologists warn that it has the same problems as Asse.

Germany officially has four deposits for nuclear waste. A pit was dug in salt at Gorleben to explore its suitability and a surface hall nearby holds containers of highly active waste in "interim" storage. Morsleben is an abandoned rock salt

mine. Schacht Konrad is a former iron mine.

**Source:** Diet Simon  
**Contact:** BI Lüchow Dannenberg, Rosenstr. 20, D-29429 Lüchow, Germany. Tel: +49 - 5841-4684  
Email: buero@bi-luechow-dannenberg  
<http://www.bi-luechow-dannenberg.de>

## AREVA AND EDF: BUSINESS PROSPECTS AND RISKS IN NUCLEAR ENERGY

**A new report from the Public Services International Research Unit at the University of Greenwich casts doubt on the ability of the nuclear industry to deliver its promised new reactors. The report "Areva and EDF: Business prospects and risks in nuclear energy", published on June 16, is written by Professor of Energy Policy Steve Thomas and commissioned by Greenpeace International. It examines the financial situations of EDF and Areva and, in particular, what the impact of problems at the Olkiluoto (Finland) and Flamanville (France) nuclear construction sites will be on these companies and their shareholders. It looks at how dependent these companies are on the achievement of their objective to obtain orders for at least 35 more EPRs in the next decade and it examines what part these companies will have in financing these orders.**

**(690.5962) Steve Thomas** - The ownership of both companies is dominated by the French government and the government has consistently used its ownership of these companies as an arm of government policy. For example in the 1970s and 1980s, EDF and Areva's predecessor, Framatome, was given whatever resources and backing needed to carry through the government's nuclear ambitions. The French government continues to use these companies as a policy instrument and is therefore unlikely to want to lose control of these companies. While there is a likelihood that the French government will sell some more EDF shares and that private capital will come into Areva, for example through Bouygues, ownership is likely to continue to be dominated by the French government.

For the foreseeable future, the shareholders of the two companies will essentially be the French government, especially after the withdrawal of Siemens from Areva NP. The withdrawal of Siemens from Areva NP, apparently because it was unable to influence Areva NP's policies sufficiently, will also remove a potential obstacle to the French government influencing Areva's policies to meet its own priorities. However, the withdrawal of Siemens from Areva NP does present financial

problems because of the need to find the capital to buy Siemens out. It remains to be seen whether it will lose significant technical expertise and how quickly Siemens can emerge as a major competitor in nuclear markets.

Government ownership is a strength and a weakness to both companies. It gives both companies huge financial strength and strategic backing in world markets, for example through loan guarantees for exports orders. However, the French government's policy objectives might not always align with the corporate interests of the two companies. For example, the French government could impose restructuring on Areva, such as privatisation, merger with Alstom or a partnership with Bouygues, which are not in Areva's own interests.

### **The French market for Areva and EDF**

Any plausible cost overruns at Flamanville, which will represent less than 2% of EDF's generating capacity in France, can probably easily be absorbed, while the output is not needed to meet French demand so construction time overrun will also have little impact. However, it seems implausible that the European Commission will allow EDF to continue to have a *de facto* monopoly in the

French electricity market and at least one major competitor, probably GDF Suez, is likely to be given or allowed to take a significant proportion of the market. What this will mean for the existing nuclear plants is far from clear. Transferring a proportion of them to a competitor would be highly contentious and would be fiercely resisted, but even if EDF retains these, it seems likely that EDF's ability to use its French customer base to underwrite foreign investments will be reduced. The proposal to extend the lives of the existing plants to 60 years probably makes economic sense to EDF. However, if the plants were kept in operation for an additional 20 years, the market for EPRs in France would be very small and it would make it hard for EDF to retain its capabilities as a nuclear plant designer and engineer.

For Areva, it will be difficult for any competitors to make any impression on the French market share but even the threat of limited competition could erode Areva's profit margins.

The company's reprocessing business is likely to shrink unless the trend to plan to dispose of spent fuel directly is reversed. EDF will be reluctant to reprocess its spent fuel if, as seems likely, direct disposal is cheaper. EDF's proposal to extend the lives of its existing plants to 60 years means that

the huge replacement market for reactors in France that Areva was expecting would dominate its EPR sales is effectively indefinitely postponed and its future reactor sales can only be a small proportion of those previously expected.

### Foreign markets

EDF has adopted a new policy in the last year of investing heavily in electric utilities in markets where it hopes to build and operate EPRs and it has announced it expects to invest up to EUR 50 billion (US\$ 70 billion) in new nuclear power plants worldwide by 2020. In the UK and the USA, EDF has bought existing nuclear power plants as well as planning to build new ones. It has bought British Energy for about EUR 15 billion, 49.9% of Constellation's nuclear assets for about EUR 6bn (USA). Its British Energy and Constellation investments have been criticised for being overpriced.

Losses with existing plants can mount up very fast, as was illustrated in the UK in 2002 when British Energy collapsed alarmingly quickly because the cost of its power fell marginally below the market price. If the nuclear markets in USA and UK do not materialise, EDF could be left with some very expensive assets of limited value. For China, EDF has taken a minority stake in a company building new nuclear plants, while its role in South Africa, if any, is not yet clear. If the projected sales of EPRs other than those in USA and the UK do not materialise, the impact on EDF will probably not be major. It would have acquired the resources it would need to fulfil these plans and if the plans do not

materialise, it will simply not acquire these resources.

Areva is also investing heavily in foreign markets, especially the USA, where it is expecting to build major new facilities. For future reactor sales, Areva NP is heavily committed to just one reactor design, the EPR, with its other options a long way from commercial application. Its projections of reactor sales do not seem realistic and if the manufacturing facilities it is building are left under-utilised, this could be costly to them. If the EPR continues to encounter technical problems or if the US (or UK) safety regulatory processes throw up significant issues, Areva NP will have serious problems remaining a credible reactor vendor, especially after its errors with its previous design, the N4. Unless it can salvage the Olkiluoto project, which is three years late and at least 50% over-budget, very quickly, the damage to its reputation will be severe. Prospective customers will hardly be impressed by a vendor locked in a bitter struggle with one of its customers, appearing to try to renege on a turnkey contract.

### Finance, debt and credit ratings

Both EDF and Areva have long had a stream of secure business with limited competition that dominates their financial position. In the case of EDF, it is the French electricity market, where it has an effective monopoly over most sectors of the market. For Areva, there are its reactor servicing and fuel supply businesses especially in France where it has had a market for the 58 operating reactors with little realistic competition. These large, relatively secure markets are on such a scale that the losses

even from major failures such as the Olkiluoto project and perhaps the Flamanville project can be absorbed over 3 or 4 years with relatively little impact on their overall profits. They have also allowed the companies to take on relatively risky investments, such as EDF's investments in South America secure in the knowledge that these would be underwritten by their core businesses. However, both companies appear to be moving in to a period where these secure businesses will become more risky. This comes at a time when their strategic plans call for major investments, which will tend to significantly increase their debt levels, perhaps putting their high credit rating at risk. Both companies have said they want to sell existing businesses to keep their indebtedness under control, but whether they can find businesses to sell that will not damage their corporate prospects and will raise enough money to achieve this remains to be seen. A weakening of their credit rating will have consequences that will be felt throughout their businesses.

**Source:** "Areva and EDF: Business prospects and risks in nuclear energy." Steve Thomas. Professor of Energy Policy. Public Services International Research Unit (PSIRU). Business School, University of Greenwich, U.K. The report is commissioned by Greenpeace International and available at: [http://www.greenpeace.org.uk/files/pdfs/nuclear/Areva\\_EDF\\_Final.pdf](http://www.greenpeace.org.uk/files/pdfs/nuclear/Areva_EDF_Final.pdf)  
**Contact:** Greenpeace International, Otto Heldringstraat 5, 1066 AZ Amsterdam, The Netherlands. Tel: +31-0-207182229

## SWEDISH NUCLEAR INDUSTRY WANTS REACTOR WASTE FACILITY AT FORSMARK

**On 3 June 2009 the Swedish Nuclear Fuel and Waste Management Co (SKB) announced its decision to apply to build a reactor-waste storage facility on the coast of the Baltic Sea at Forsmark, in the municipality of Östhammar, about 120 km north of Stockholm. The method, called KBS3, involves placement of the waste in copper canisters surrounded by clay and put in tunnels 500 meters underground in bedrock.**

**(690.5963) Miles Goldstick** - The announcement was made at a highly orchestrated press conference with the heads of the two competing municipalities of Oskarshamn and

Östhammar obediently taking part. The decision came despite many fundamental issues remaining to be determined. Environmental groups have been quick to point out that a location

can not be chosen before a method is approved and that in any case an inland location is preferred from the perspective of risking further radioactive pollution of the Baltic Sea.

Further, it is uncertain if the bedrock is suitable from the perspective of geological stability and groundwater flow, and if the local conditions will result in copper corroding at an unacceptable rate. None-the-less, SKB has reason to be so bold as they have won almost unanimous support in all quarters other than from environmental groups.

The next step is for SKB to present a preliminary environmental impact assessment (EIA) for review by all stakeholders, which is currently

planned for mid-2010. SKB's schedule it to submit the final EIA to the Environmental Court during 2010. That review is expected to take about a year. Once the Environmental Court makes its decision, the government must then give its position, which can be to either agree or disagree partly or completely. Finally, the municipality of Östhammar must also agree or disagree partly or completely. In other words, SKB has a long way to go, and several bridges to cross that could result in long delays, before their method and location gets final approval.

For more information see the following websites: [www.nonuclear.se](http://www.nonuclear.se), [www.mkg.se](http://www.mkg.se), [www.oss.avfallskedjan.se](http://www.oss.avfallskedjan.se), [www.milkas.se](http://www.milkas.se), [www.folkkampanjen.se](http://www.folkkampanjen.se)

**Source:** Miles Goldstick

**Contact:** FMKK, Tegelviksgatan 40, 116 41 Stockholm. Sweden.  
Tel: +46 8 - 84 14 90  
Email: [info@folkkampanjen.se](mailto:info@folkkampanjen.se)  
Web: [www.folkkampanjen.se](http://www.folkkampanjen.se)

# Summer school nuclear energy and climate

**Zeeland, the Netherlands, August 2-7, 2009**

## What?

This summer WISE organizes a Summer School for people with an above average interest in the public debate on climate change, nuclear power and future energy supply. During one week, the participants will be educated on climate change and nuclear energy. You will talk and think actively about the problems and solutions. There will be input from reputable and interesting speakers.

## Who?

One hundred young people from all over Europe (including fifty from the Netherlands): students, activists, young people of environmental and development organizations, and others who are interested in the subject matter. Anti-nuclear activists, campaigners and resource persons.

## Why?

Because climate change calls for action NOW. Because more and more people say that nuclear energy is a part of the solution. Because in December the Climate Conference in Copenhagen, Denmark, have to lead to a new treaty. And because with thirty of the participants we will go to Copenhagen to be close to the negotiations to create new ideas and influence them.

## When?

From Sunday evening (arrival) August 2<sup>nd</sup> until Friday August 7<sup>th</sup> 2009.

## Where?

In the out-door centre in Veere, Zeeland (the Netherlands). That way we have one day to go to the climate action camp (near Belgium), and a day to visit the nuclear reactor in Borssele.

## What are the costs?

200 euros per person. But you'll get an interesting program, accommodation and meals. Students will receive a discount. And there is travel re-imbusement up to 70% of your travel costs (unless you fly...) Is the money a huge problem; contacts us to discuss possibilities.

## Language?

English

## What to do?

Sign up! Call +31 (0) 20-6126368, mail [wisemc@antenna.nl](mailto:wisemc@antenna.nl), or look for more information on [www.tegenstroom.nl](http://www.tegenstroom.nl)

## IN BRIEF

**Indonesia: Tender postponed indefinitely.** Indonesian State Minister of Research and Technology Kusmayanto Kadiman announced late last month (May) that the tendering process for new nuclear power plants, expected to be completed by the end of the year, have been postponed indefinitely. The process has lacked political support and with presidential elections due in July, the government has pulled the plug. Kusmayanto said, 'It's impossible to decide now. For the fastest, it will possibly take at last six more years.' This destroys plans to have a nuclear power plant operating in the 2016-2019 timeframe established by Indonesian Law No. 17/2007.

**Nuclear Reaction, 18 June 2009**

**Sweden: smiling sun banned from Parliament.** Seven antinuclear activists who went to the Swedish Parliament to listen to the energy debate on June 16, were forced to leave the public gallery and were thereafter taken into inquiry by the police. This has never happened before. The reason was that five of them were wearing t-shirts with the smiling sun, the well known antinuclear symbol. Most of them activists were members of the Swedish antinuclear movement and some belong to the Swedish Green woman.

**Email: Eia Liljegren-Palmær, 19 June 2009**

**U.K.: Serious accident averted at Sizewell.** A serious accident at the Sizewell A Magnox reactor was only averted because a worker cleaning clothes in a laundry noticed cooling water leaking from a spent fuel storage pond. In January 2007 40,000 gallons of radioactive water (1 gallon (UK) is about 4.54609 liter) leaked from a 15ft (4.5 meter) split in a pipe in the cooling pond, containing 5,000 spent fuel rods and alarms failed to warn staff or were ignored. If the pond had emptied of water and exposed the highly-radioactive rods would have caught fire with an airborne release of radioactivity. Thanks to the worker in the laundry staff were able to contain the leak - discharging the radioactive waste into the sea - and re-fill the pond. A new report on the accident has now been published. It is written by nuclear consultant Dr John Large, commissioned by the Shut Down Sizewell Campaign and based on Nuclear Installation Inspectorate reports released under Freedom of Information. The NII report highlighted a number of serious concerns surrounding the accident. Not only did the pond alarms fail, but had it worked it would have triggered another alarm that had already been on for two days but ignored by staff. There was also poorly designed and poorly installed instrumentation and control equipment. The NII report also suggests that it chose not to prosecute the operators because of staff shortages.

**N-base briefing 618, 17 June 2009**

**Spain: renewal of operation license Garona?** On June 8, the five-member board of *Spain's Nuclear Safety Council (CSN)* unanimously agreed to recommend that the Garona nuclear plant in northern Spain should get a new 10-year operating licence if it upgrades its safety equipment. The 38-year-old nuclear plant's licence expires on July 5. Nuclear Safety Council chairwoman Carmen Martinez Ten said the decision was taken on technical and security grounds and not for reasons of "energy policy, economics or another nature".

The Spanish government will have to take a clear stand for or against nuclear power before July 5, when it decides whether to renew the operating licence Garona, the oldest of the country's six nuclear plants. Prime Minister Jose Luis Rodriguez Zapatero, whose socialist government has backed the development of renewable energy sources such as solar and wind power, has said he wants to phase out nuclear energy in the country when the life span of its six nuclear plants expires. A decision to prolong the life of the Garona plant would be a major u-turn for Zapatero, who pledged to gradually phase out nuclear power during general elections in 2004 and 2008. However, the prime minister said. "The decision regarding Garona will be coherent with the commitments in our election programme as long as the supply of power is guaranteed." This statement was seen by some observers as a sign that the government was leaning towards renewing, maybe for a short period. Later in June, CSN said the government asked their opinion about renewing the permit for two, four or six years, rather than the 10 years. The 500 megawatt Garona plant provided just 1.3 percent of Spain's electricity last year and grid operators say its closure would pose no supply problems.

The Spanish branch of Greenpeace has urged the government not to renew the licence of the plant, arguing it is unsafe. It has called it the "plant of 1,000 fissures". The two utilities running the plant, Iberdrola and Endesa, estimate it will cost 50 million euros (US\$70 million) to carry out the upgrades to the plants safety equipment recommended by the CSN.

Spain, along with Denmark and Germany, is among the three biggest producers of wind power in the European Union and the country is one of the largest world producers of solar power.

**AFP, 11 June 2009 / Reuters, 19 June 2009**

**Blows for IAEA Fuel Bank proposal.** Developing countries blocked plans by the International Atomic Energy Agency (IAEA) for nuclear fuel banks that aim to keep countries from acquiring sensitive nuclear technology by offering them alternatives. The Vienna-based agency and Western countries had hoped the IAEA's governing board would give the green light for fleshing out plans to sway countries to buy rather than make nuclear fuel, by offering an insurance in case their supply is cut off for political reasons. But a June 18, joint statement by the Group of 77 (a coalition of developing countries and the Non-Aligned Movement) said that "none of the proposals provide a proper assurance of supply of nuclear fuel." The plans "should

not be designed in a way that discourages states from developing or expanding their capabilities in the nuclear fuel cycle". The 35 members of the board agreed only that the nuclear agency "may continue its consultations and discussions" to further work on the fuel bank proposals, according to diplomats at the meeting.

The idea of the IAEA Fuel Bank was to keep countries from acquiring uranium enrichment and reprocessing technologies, which can be used not only for energy purposes, but also for making nuclear bomb material. However, developing countries fear that such plans would pressure them to give up their right to peacefully using nuclear energy.

Meanwhile, in May the Dutch minister of Foreign Affairs Verhagen, concluded that the British, German and Dutch (the countries that form the Urenco enrichment consortium) initiative for assured supply for low enriched nuclear fuel failed. In May he wrote to Dutch Parliament that "many countries see this condition (giving up enrichment and reprocessing) as discriminating and an unacceptable violation of their rights under the non-proliferation treaty".

Another blow for the concept of Multilateral Approaches, which is seen by many proponents of nuclear power as one of the main ways to counter proliferation worries.

**Earthtimes, 18 June 2009 / Laka Foundation, 18 May 2009**

**Discussion on new-build in Germany heats up.** Germany's economy minister ruled out building new nuclear power stations but said the life of some reactors might be extended and the development of alternative technologies stepped up. "We need limited extensions until we are able to work with sensible alternative technologies in an economical and environmentally friendly manner," Karl-Theodor zu Guttenberg told the Sueddeutsche Zeitung daily in an interview, published on June 19.. "That includes the possibility of equipping existing nuclear power stations with state-of-the-art technology in order to make them even safer and more efficient," the conservative minister said. "But I see no need to build new nuclear reactors." General elections are due in September. On September 5, a nationwide demonstration will take place in Berlin.

**Nuclear Reaction, 22 June 2009**

**Japan: MOX target delayed.** Japanese plans for 16-18 reactors to be using mixed oxide (MOX) fuel by 2010 have been put back by five years, the country's Federation of Electric Power Companies (FEPCO) has announced. Up until 1998, Japan sent the bulk of its used fuel to plants in France and the UK for reprocessing and MOX fabrication. However, since 1999 it has been storing used fuel in anticipation of full-scale operation of its own reprocessing and MOX fabrication facilities. Japan Nuclear Fuel Ltd's (JNFL's) reprocessing plant under construction at Rokkasho-mura is scheduled for completion in August 2009, but earlier this year the company put back the completion date for its planned J-MOX fabrication facility from August 2012 to August 2015. Construction work on the fabrication facility is scheduled to begin in November 2009. Four shipments of reactor-grade plutonium recovered from used fuel have been sent back to Japan from European reprocessing plants since 1992. The most recent arrived in Japan from France in May 2009.

**World Nuclear News, 12 June 2009**

**Australia: union action on radioactive waste.** The Australian Conservation Foundation (ACF) has welcomed the support of Australia's peak trade union body ACTU in pushing for an end to any federal government move to impose a radioactive waste dump on the Northern Territory and developing a credible and responsible approach to radioactive waste management in Australia. On June 4, the ACTU Congress in Brisbane passed a resolution critical of the government's delay in delivering on a 2007 election commitment on radioactive waste management and called for an independent and public inquiry into the best options for dealing with radioactive waste.

"The ACTU's active support in this issue is powerful and very welcome," said ACF nuclear campaigner Dave Sweeney. "The federal government was elected on a promise to scrap the heavy handed waste dump laws and make radioactive waste policy responsible and transparent. It has failed to deliver on this promise and this resolution is an important reminder to the government and to Resources Minister Ferguson that the community expects better."

The ACTU now joins a broad range of environment and public health groups, Indigenous organisations and state, territory and local governments concerned by the federal government's lack of responsible and inclusive action on this issue.

**ACF Press release, 5 June 2009**

**U.S.: doubts about decommissioning funds.** Two days after Associated Press reported that operators of nearly half of the US' 104 nuclear reactors are not setting aside enough funds to cover projected decommissioning costs, the NRC has contacted owners of 18 nuclear power plants asking them to explain how the economic downturn has affected funds they must set aside to cover future decommissioning costs. The AP report said the shortfalls have been caused by a combination of falling investments and rising decommissioning costs. Plant operators are required to establish funding during a reactor's operating life to ensure the reactor site will be properly cleaned up once the plant is permanently closed, the NRC said, adding that its review of the latest reports from reactor operators "suggests several plants must adjust their funding plans." Tim McGinty, director of policy and rulemaking in the NRC's Office of Nuclear Reactor Regulation said: "This is not a current safety issue, but the plants do have to prove to us they're setting aside money appropriately."

**Platts, 19 June 2009**

## WISE/NIRS NUCLEAR MONITOR

The Nuclear Information & Resource Service was founded in 1978 and is based in Washington, US. The World Information Service on Energy was set up in the same year and houses in Amsterdam, Netherlands. NIRS and WISE Amsterdam joined forces in 2000, creating a worldwide network of information and resource centers for citizens and environmental organizations concerned about nuclear power, radioactive waste, radiation, and sustainable energy issues.

The WISE/NIRS Nuclear Monitor publishes international information in English 20 times a year. A Spanish translation of this newsletter is available on the WISE Amsterdam website ([www.antenna.nl/wise/esp](http://www.antenna.nl/wise/esp)). A Russian version is published by WISE Russia and a Ukrainian version is published by WISE Ukraine. The WISE/NIRS Nuclear Monitor can be obtained both on paper and in an email version (pdf format). Old issues are (after two months) available through the WISE Amsterdam homepage: [www.antenna.nl/wise](http://www.antenna.nl/wise).

Receiving the WISE/NIRS Nuclear Monitor

US and Canada based readers should contact NIRS for details of how to receive the Nuclear Monitor (address see page 11). Others receive the Nuclear Monitor through WISE Amsterdam.

For individuals and NGOs we ask a minimum annual donation of 100 Euros (50 Euros for the email version). Institutions and industry should contact us for details of subscription prices.

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## WISE/NIRS offices and relays

### WISE Amsterdam

P.O. Box 59636  
1040 LC Amsterdam  
The Netherlands  
Tel: +31 20 612 6368  
Fax: +31 20 689 2179  
Email: [wiseamster@antenna.nl](mailto:wiseamster@antenna.nl)  
Web: [www.antenna.nl/wise](http://www.antenna.nl/wise)

### NIRS

6930 Carroll Avenue, Suite 340  
Takoma Park, MD 20912  
Tel: +1 301-270-NIRS  
(+1 301-270-6477)  
Fax: +1 301-270-4291  
Email: [nirsnet@nirs.org](mailto:nirsnet@nirs.org)  
Web: [www.nirs.org](http://www.nirs.org)

### NIRS Southeast

P.O. Box 7586  
Asheville, NC 28802  
USA  
Tel: +1 828 675 1792  
Email: [nirs@main.nc.us](mailto:nirs@main.nc.us)

### WISE Argentina

c/o Taller Ecologista  
CC 441  
2000 Rosario  
Argentina  
Email: [wiseros@ciudad.com.ar](mailto:wiseros@ciudad.com.ar)  
Web: [www.taller.org.ar](http://www.taller.org.ar)

### WISE Austria

c/o Plattform gegen Atomgefahr  
Roland Egger  
Landstrasse 31  
4020 Linz  
Tel: +43 732 774275; +43 664 2416806  
Fax: +43 732 785602  
Email: [post@atomstopp.at](mailto:post@atomstopp.at)  
Web: [www.atomstopp.at](http://www.atomstopp.at)

### WISE Czech Republic

c/o Jan Beranek  
Chytlalky 24  
594 55 Dolni Loucky  
Czech Republic  
Tel: +420 604 207305  
Email: [wisebrno@ecn.cz](mailto:wisebrno@ecn.cz)  
Web: [www.wisebrno.cz](http://www.wisebrno.cz)

### WISE India

42/27 Esankai Mani Veethy  
Prakkai Road Jn.  
Nagercoil 629 002, Tamil Nadu  
India  
Email: [drspudayakumar@yahoo.com](mailto:drspudayakumar@yahoo.com);

### WISE Japan

P.O. Box 1, Konan Post Office  
Hiroshima City 739-1491  
Japan

### WISE Russia

P.O. Box 1477  
236000 Kaliningrad  
Russia  
Tel/fax: +7 95 2784642  
Email: [ecodefense@online.ru](mailto:ecodefense@online.ru)  
Web: [www.antiatom.ru](http://www.antiatom.ru)

### WISE Slovakia

c/o SZOPK Sirius  
Katarina Bartovicova  
Godrova 3/b  
811 06 Bratislava  
Slovak Republic  
Tel: +421 905 935353  
Email: [wise@wise.sk](mailto:wise@wise.sk)  
Web: [www.wise.sk](http://www.wise.sk)

### WISE South Africa

c/o Earthlife Africa Cape Town  
Maya Aberman  
po Box 176  
Observatory 7935  
Cape Town  
South Africa  
Tel: + 27 21 447 4912  
Fax: + 27 21 447 4912  
Email: [coordinator@earthlife-ct.org.za](mailto:coordinator@earthlife-ct.org.za)  
Web: [www.earthlife-ct.org.za](http://www.earthlife-ct.org.za)

### WISE Sweden

c/o FMKK  
Barnängsgatan 23  
116 41 Stockholm  
Sweden  
Tel: +46 8 84 1490  
Fax: +46 8 84 5181  
Email: [info@folkampanjen.se](mailto:info@folkampanjen.se)  
Web: [www.folkampanjen.se](http://www.folkampanjen.se)  
c/o FMKK

### WISE Ukraine

P.O. Box 73  
Rivne-33023  
Ukraine  
Tel/fax: +380 362 237024  
Email: [ecoclub@ukrwest.net](mailto:ecoclub@ukrwest.net)  
Web: [www.atominform.org.ua](http://www.atominform.org.ua)

### WISE Uranium

Peter Diehl  
Am Schwedenteich 4  
01477 Arnsdorf  
Germany  
Tel: +49 35200 20737  
Email: [uranium@t-online.de](mailto:uranium@t-online.de)  
Web: [www.wise-uranium.org](http://www.wise-uranium.org)

# Nuclear Monitor needs more contributors

The Nuclear Monitor exists for more than three decades already. In 1978 the first issue was produced, although it was called "The WISE News Communiqué" at that time.

Since 1978 many things have changed, but to produce 20 issues of the magazine annually is still a struggle. And equally important for that matter. Our readers (you) value both quality and quantity.

The Nuclear Monitor is produced by a very small group of people. We do not pay for articles being written for us, we never did and it's hard to imagine we ever will. But that small group is looking for some help.

In short: we are looking for people, especially in Asia and Africa, but also in Australia and the America's, who are willing to write about local and regional developments concerning (anti-) nuclear issues.

We think that currently the content of the magazine leans too much on West-European sources and contributors. To have a more balanced and global perspective, we need people with knowledge of, and access to, non-English and/or non-German sources and background. There are so many things we are not aware of, even in this digital highway day and age. It is simply not enough to read all the wires from the big agencies, we want the stories from the ground, the grassroots fighting the nuclear industry, the reports of actions and campaigns, the incidents and accidents that not make it to the mainstream media, the analysis no-one wants to make because they are 'too difficult'

So, if you want to contribute - be it regularly or sporadic- to the Nuclear Monitor, or want to become more involved in the (production) of the magazine please contact WISE-Amsterdam at [wiseamster@antenna.nl](mailto:wiseamster@antenna.nl)

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**WISE/NIRS NUCLEAR MONITOR**

c/o WISE Amsterdam  
PO Box 59636  
1040 LC Amsterdam  
Netherlands

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