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Editorial

Dear readers of the WISE/NIRS Nuclear Monitor,

In this issue of the Monitor:

- Charly Hultén from WISE Sweden writes about the problems facing French nuclear giant Areva.
- Miles Goldstick writes about plans for disposal of spent nuclear fuel in Sweden.
- Jim Green writes about the restart of a reactor at Takahama in Japan, despite woefully inadequate emergency planning.
- Tim Judson and Michael Mariotte write about unfolding nuclear power debates in New York.

The Nuclear News section has reports on a French government report which questions 'passive' reactor safety systems; a victory in Poland with the removal of the ecologically sensitive Lubiatowo Dunes as a potential site for a nuclear power plant; and a European Commission report which outlines the bleak future facing the nuclear power industry in EU.

Thanks to readers who spotted a typo and an error in the last issue. In the last paragraph on p.3, €14.8b should read €1.48b and US$30,000 should read US$30 million. Those errors don't affect the conclusion that if all the capital invested in multiple Generation IV projects in the U.S. ($1.6 billion) was invested in a single project, it still wouldn't suffice to commercialize a new reactor type.

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

Regards from the editorial team.

Email: monitor@wiseinternational.org

Monitored this issue:

French nuclear giant Areva melts down

Author: *Charly Hultén – WISE Sweden*

NM818.4533 Chronically and heavily indebted, Areva, the once world-leading nuclear conglomerate, is no more. Areva was formed in 2001 with the fusion of two companies: Cogéma (uranium mining, reactor fuels and waste management) and Framatome (reactor engineering).

The crisis has been long in the making, but became obvious in February 2015, when Areva published its financial report for 2014 with net losses of €4.8 billion that year alone on a total turnover of roughly €8.3 billion.

Press reports attributed a good share of the loss in 2014 to Areva's involvement in Finland's fifth nuclear reactor, an EPR, at Olkiluoto. At that point Areva bore an accumulated credit debt of €5.8 billion.

2014 was the worst, but this year the company has reported losses for five years running. Had Areva been a private company, bankruptcy would have been a prospect years earlier, but – like Electricité de France (EDF) – Areva is over 80% government-owned.

The (dis)solution

In early 2015, the prime minister and pertinent cabinet members decided to transfer Areva's reactor technology division, Areva NP, to EDF. CEO Jean-Bernard Lévy declared a willingness to absorb the division, but only on the condition that EDF be granted "immunity" against any further costs relating to the Olkiluoto venture.

The ministers emphasize the strategic advantages of restructuring the country's nuclear sector. There have been too many actors, competing against, or at best merely stumbling over, each other rather than pulling together. As Minister of the Economy Macron told *Figaro* in March 2015:

"Areva is paying ... the price of years of a lack of transparency and poor relations with EDF. ... It is our hope and, very clearly, there is a need for a thoroughgoing reorganization, a re-founding, of the historic partnership between these two groups – to the benefit of both."

On 27 January 2016, the French government announced the details of its plan for the reconstruction of what remains of the former industrial flagship. Areva is envisioned to "reassume the perimeters" of pre-fusion Cogéma and confine its focus to the fuel cycle proper. EDF will absorb the company's nuclear power division, and pay Areva €2.5 billion. Not all of this price will be borne by EDF in the longer term. Approximately 40% of Areva's current activity (contracts, etc.) will be distributed among Mitsubishi Heavy Industries and Chinese and British interests, according to *Le Monde*. These transactions are expected to bring in about half the initial outlay.

Minority posts in what remains of Areva will be acquired by China National Nuclear Corporation, which already holds a small share in the company and KIA (Kuwait), currently a partner.

The unions – CGT, FO and CFE-CGC – have all been skeptical of EDF's commitment to "save" Areva. The company is already strained with debts in excess of €30 billion, they point out. They also point to the looming renewal of an aging distribution network and numerous power generating units. Reported problems at EDF's EPR at Flamanville are yet another serious concern. (For the same reasons, the unions have opposed EDF's €16 billion involvement in Hinkley Point in the UK and, of course, taking on any responsibility for the EPR at Olkiluoto.)

Instructed to take immediate measures to shrink its budget by €1 billion by 2017, Areva has announced cuts of senior staff (15% in France, 18% abroad) for the period 2015–2017. This is the second round of austerity measures the company has had to undertake since 2011. Still, the forced measures come nowhere near covering the financial needs of the coming three years: an estimated €7 billion, according to Areva's management.

Asked in 2015 how much in the way of public funds would be required to make the new Areva viable, both President Hollande and Minister of Finance Macron declined to comment, saying only that the question was "premature", and that investment of public money was "not, by any means, a priority". Reports this past month (January 2016) speak of public monies making up "a very large part" of the approximately €5 billion needed to keep Areva afloat. In his announcement President Hollande specified that the government would be mindful of EU restrictions on government aid to enterprise.

Highlights from the road to perdition

Vertical integration of enterprises was in vogue back in 2001, and then CEO Anne Lauvergeon wanted her company to be able to deliver the entire range of nuclear products and services. To that end – and in line with widespread concerns about dwindling uranium supplies at the time – Areva paid a considerable sum of money to acquire a uranium mine. Areva also ventured boldly into renewables (wind, solar and biomass) and even shale gas. Hence the company's enormous debt.

In retrospect Areva's 'shopping spree' in the energy sector is now widely seen as first steps toward rack and ruin. (If, as some analysts now would have it, Lauvergeon suffered from delusions of grandeur, she was hardly alone in that. In roughly the same time frame, Sweden's Lars G Josefsson, CEO of state-owned Vattenfall, went so far as to pawn the whole company in his striving to become a world-ranking player.)

Perhaps the rashest venture that Areva entered into was to contract in 2003 to single-handedly supply Finland's fifth nuclear reactor, an EPR, with a design capacity of 1600 MW. The project was the first EPR ever to be built; moreover Areva had no previous experience of managing such a large project. The deal was controversial from the start. Many considered the €3.2 billion budget a gross underestimate and the four-year time-frame optimistic. The contract stipulated no ceiling on the penalties Areva might suffer for any delays, which in the case of unproven technology might prove to be a "time bomb" as the former general manager of Cogéma put it at the time. All these 'negatives' are now put down to the CEO's burning ambition to beat out both EDF and 'les américains'.

The time bomb detonated in 2008, when Areva (then partnered with Siemens) and their Finnish client, TVO, filed multibillion euro claims/counterclaims for damages for arbitration under the auspices of the International Chamber of Commerce. The conflict remains unresolved. But with the dissolution of Areva and the transfer of participation in the project to EDF, efforts have stepped up to reach some agreement.

Olkiluoto 3 is currently nine years behind schedule, and costs are triple the original budget. At the start of 2016 Areva had poured €4.6 billion into Olkiluoto 3, *Le Monde* reports.

Looking back, looking forward

The most dispassionate assessment of the Areva debacle I have seen comes from Areva's current CEO Philippe Knoche: "The amplitude of the net losses for 2014 illustrate the dual challenge that Areva faces: prolonged stagnation in the nuclear sector, lack of competitive strength and the difficulty of risk management in projects of great size."

Otherwise, there has been a pronounced tendency in the French press to personalize, even psychologize, the debacle. That, and to blame Fukushima.

The 'wisdom of hindsight', by definition anachronistic, often masks whatever rationality may have supported past decisions, especially when grand plans have gone awry. No-one in 2003 was aware of the finance crisis – and ensuing 'Great Recession' – a mere five years down the road. Nor could the tsunami that caused multiple meltdowns, fires and explosions at Fukushima in 2011 be foreseen. Areva's management can hardly be faulted for the collapsing demand for nuclear services that ensued. Areva had lost out to American competitors and Russia's Rosatom now and then, but serious competition on the part of China or South Korea was not yet in the picture. In short, the prospects for healthy financial returns dimmed appreciably *after* the daring first steps had been taken.

Looking forward, the horizon is not entirely cloud-free. New legislation in France aiming to cut the country's reliance on nuclear power for electricity from 75% to 50% by 2025, took effect last summer (see Nuclear Monitor #817). Moreover EDF has found it difficult to find the €16 billion in investments for its share of the EPR project at Hinkley Point in the UK. The board of governors is deeply divided on whether to proceed. Some analysts predict that the Finnish EPR may be a 'white elephant' if and when it ever comes online. In short, the problems facing the nuclear sector today may turn out to be more general and perhaps more persistent than many observers close to the nuclear scene in France have been willing to contemplate.

Last gasp for Hinkley C?

On February 16 in France, EDF's board will meet and may make a decision on whether it will proceed with the ill-fated Hinkley C new nuclear plant in the UK. The Board of the state-owned company is split, with union representatives warning that the project could bankrupt EDF, which already faces massive financial difficulties.

People working on the campaign to stop Hinkley C are asking for your support, by organising or joining a protest at any EDF premises on Monday February 15, or by emailing French representatives and executives, spreading information far and wide, etc.

#OccupyEDF

OccupyEDF: www.facebook.com/events/1701320780082423/

Stop Hinkley: www.facebook.com/StopHinkley/

Osborne's NRG Folly: www.facebook.com/OsbornesNRGfolly/

South West Against Nuclear: www.facebook.com/southwestagainstnuke/

www.southwestagainstnuclear.wordpress.com/

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Spent fuel storage proposal in Sweden released for public comment

Author: *Miles Goldstick – Swedish Environmental Movement's Nuclear Waste Secretariat*

NM818.4534 On 29 January 2016 the nuclear industry's application to construct a spent fuel repository beside the Forsmark nuclear power station and an encapsulation facility near the Oskarshamn nuclear power station was released for public comment by both the Swedish Radiation Safety Authority (*Strålsäkerhetsmydigheten*, SSM) and the Land and Environmental Court (*Mark- och miljödomstolen*, MMD). SSM examines the application according to the Nuclear Activities Act and MMD according to the Environmental Code.

On 5 February 2016, for all countries around the Baltic Sea, the Swedish Environmental Protection Agency announced consultation on the application according to articles 4 and 5 of Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention) and EU Directive 2011/92/EU for interim storage, encapsulation and final disposal of spent nuclear fuel. Comments are requested no later than 15 April 2016.

The application is to construct a spent fuel repository using a method the Swedish nuclear industry calls KBS-3 (an abbreviation of *kärnbränslesäkerhet*, nuclear fuel safety; the "3" refers to the third variation). It is a KBS type facility that the Finnish government approved 12 November 2015. The method consists of storing

spent fuel in cast iron canisters encapsulated in copper and placed, surrounded by bentonite clay, in holes in the floor of tunnels about 500 meters under the surface in crystalline rock.

An important milestone for Sweden and internationally

Releasing the application for comment is an important milestone in the Swedish regulatory process. It is also an important milestone internationally. The nuclear industry worldwide is keeping a close eye on the process, eagerly hoping for approval of the project and thus being able to claim the spent fuel management problem is solved.

In Finland, the application process is less rigorous than in Sweden. In Finland, a facility about 500 meters below the surface was constructed before the government approved moving forward with a testing phase. In Sweden, if the government approves the application, excavation cannot begin until conditions are set by SSM and the MMD.

The Swedish nuclear industry, via its company SKB, submitted its KBS application to SSM and MMD on 16 March 2011. The period from then until 29 January 2016, almost five years, was needed for SSM and MMD to determine if the application was of adequate quality to be released for public comment. The application was examined to determine if anything was missing. MMD had three rounds of public comment in this phase. As well, SSM made several requests to SKB to supplement the application with further information, e.g. regarding the risk of copper corroding in oxygen free water. MMD however made no such requests but only asked SKB to respond to comments from others. SKB responded by providing very limited supplementary information to both SSM and MMD. Comments by environmental organizations were in generally ignored by SKB and did not result in submission of more information by the company.

Even though the phase of determining if the application was adequate for release for public comment took almost five years, both SSM and MMD have now given the public only a few months to comment on the proposal. The deadline for comments set by MMD is 30 March 2016 and the deadline set by SSM is 30 April 2016.

The next step in the MMD review process is a “main hearing” where oral presentations can be made. Information presented in written form cannot also be given orally. The hearing is scheduled for some time between October and December 2016.

The following step is for MMD to make its statement to the government, which is scheduled for some time between February and June 2017. SSM intends to make its statement to the government about the same time. There may still be delays in the process.

After considering the statements by SSM and MMD, the government can reject the application. If the government is considering approving the application, it must first ask the approval of the Municipality of Östhammar (where Forsmark is located) and the Municipality of Oskarshamn before making its decision. If one or both of the municipalities do not approve, the government can in any case still approve the project. As the next Swedish general election (federal, regional and municipal) is 9 September 2018, the government could postpone its decision until after the election.

If the government approves the application, it is then up to MMD and SSM to set conditions for implementation of the project. SKB can then begin construction. The MMD’s decision on conditions can be appealed.

Main technical issues

The main technical issues are not unique to Sweden. These include the method in general (e.g. retrievability and monitorability, including limitation of nuclear proliferation risks), location (e.g. proximity to water bodies, other nuclear facilities and population centers), and geologic conditions regardless of placement on the surface or at some depth. Each method in turn has its own specific technical issues depending on where it is located.

Two main issues of the proposed KBS-3 facility are the corrosion rate of copper and the behaviour of bentonite clay under different hydrological conditions. Both topics are highly technical and comprehensible only to advanced specialists. The same goes for determination of adequate geological stability. Estimation of earthquake risk is very complicated. SKB specialists have not found any technical problem that blocks their project. Independent specialists are however not in agreement.

There are aspects of the KBS-3 proposal that do not require technical expertise, e.g. if monitorability should be required (none is currently included), and placement inland instead of on the Baltic coast to lower the risk of contaminating the Baltic Sea. Both these aspects do not fall into the category of being determinative regarding rejection of a KBS facility. A monitoring system could be added and a site found inland.

The law according to the Environmental Code requires examination of alternative methods. To date, SKB has not according to several stakeholders adequately examined very deep bore holes, dry storage at shallow depths or inside mountains, nor hardened on-site storage (HOSS) of the type discussed in the US. It is up to the MMD to interpret if the legal requirement for examination of alternatives has been met.

Political timing and sustainable development

The issue of political timing is perhaps the most important issue from the perspective of sustainable development. Establishment of a KBS-3 facility will give the nuclear industry the opportunity of claiming that the spent fuel management problem is “solved” and that thus use of nuclear power can be continued and expanded. At the same time, presently existing waste must be handled in the best manner possible. However, adding to the volume of the waste exasperates the problem and increases costs. Delaying a “solution” until nuclear power is no longer considered viable could result in fewer resources being squandered on nuclear power.

Funding for environmental organizations

The current law regulating funding for environmental organizations to participate in the application process states that funding can only be used up to one year after the application is released for public comment. The government, via the Ministry of Environment and Energy

is however reviewing the law. SSM has recommended that funding be extended until the government decision according to the Environmental Code (i.e. regarding the statement from MMD), but be kept limited to the KBS-3 application. Environmental organizations have requested the funding be made permanent and be broadened to include all forms of nuclear waste and decommissioning of nuclear facilities. As can be expected, the nuclear industry does not want the funding period to be extended nor broadened.

What you can do

Anyone, anywhere in the world, can make a submission to SSM and MMD. All submissions become part of the public record. Submissions sent to MMD are forwarded to SKB for comment and sent out to a distribution list.

Requests can be made for more time to examine the application. Considering the large volume of material making up the proposal, at least a year is reasonable.

Organizations in countries that are parties to the Espoo Convention should send comments to the Swedish EPA with copies to SSM and MMD (see https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-4&chapter=27&lang=en)

Contact information for submissions

Land and Environmental Court
Attention: mmd.nacka.avdelning3@dom.se
Note case number: M 1333-11

Swedish Radiation Safety Authority
Attention: registrator@ssm.se
Note case number: SSM2011-1135

Swedish Environmental Protection Agency
Attention: Åsa Wisén
asa.wisen@swedishepa.se
Note case number: NV-07138-15.

More information

KBS-3 and the Final Repository Application – A Little Help With the Flow of Information, nonuclear.se/kbs3#en

Swedish NGO Office for Nuclear Waste Review (MKG), mkg.se/en

Espoo Convention information at www.skb.se

www.skb.com/future-projects/the-spent-fuel-repository/our-applications/background-material-for-the-consultation-in-2016/

Third reactor restart in Japan

Author: *Jim Green – Nuclear Monitor editor*

NM818.4535 Kansai Electric Power Co's (KEPCO) reactor #3 in Takahama, Fukui Prefecture restarted on February 1. It had been offline since February 2012 and is the third reactor to restart after two reactors at Kyushu's Sendai plant restarted last year. Forty reactors remain shut down, in addition to those that have been permanently shut down.

The restart of Takahama #3 has been tortuous. KEPCO first applied to the Nuclear Regulatory Authority (NRA) for permission to restart Takahama #3 and #4 in July 2013. It subsequently submitted various amendments to its plans. In February 2015, the NRA gave its permission for KEPCO to make the required safety upgrades. The restart process was delayed by an injunction imposed by the Fukui District Court in April 2015, citing safety concerns, but the ruling was overturned in December 2015.

Risk analysis and emergency planning

The Tokyo-based Citizens Nuclear Information Center argued in early 2015 that the safety analysis presented by KEPCO and accepted by the NRA used numerous arbitrary figures and lacked credibility:[1]

"KEPCO claims that the analysis codes it uses in countermeasure scenarios against severe accidents are appropriate, and the NRA has approved this procedure. ... What this means is that KEPCO has carried out an arbitrary analysis in order to clear the numerical hurdles required by the regulatory requirements, and by saying that the regulatory requirements have been set conservatively, the NRA has then approved the analysis. There are far too many of these arbitrary usages of analysis codes to mention, and this procedure of using codes to whittle away the likelihood of the occurrence of accidents is an extremely serious problem."

The inadequacy of emergency planning is perhaps the most startling problem with the reactor restart process at Takahama and elsewhere. About 180,000 people reside within a 30 km radius of the Takahama plant.

Under the *Act on Special Measures Concerning Nuclear Emergency Preparedness,* prefectural and municipal governments within a 30 km radius of nuclear power plants are given full responsibility for emergency preparedness and evacuation planning. But their plans are not subject to NRA review.[2]

Thus emergency planning is uneven and generally inadequate. The *Asahi Shimbun* reported on 30 January 2016 that local government officials have voiced concern over the Takahama reactor restart as they have yet to map out detailed evacuation plans and to conduct drills.[3]

Nuclear Engineering International reported on 2 February 2016: "While there are plans on paper to evacuate some Fukui residents to Hyogo, Kyoto, and Tokushima prefectures, many municipalities there have no detailed plans for receiving evacuees. Kyoto Governor Keiji Yamada said he did not feel adequate

local consent had been obtained, citing concerns about evacuation issues. Shiga Governor Taizo Mikazuki said there was a lack of sufficient disaster planning."[4] Likewise, Mayor Ryozo Tatami from the port city of Maizuru in Kyoto Prefecture called for strengthened emergency planning.[5]

Kyoto-based Green Action said in a 28 January 2016 statement:[6]

"Nearly 180,000 people must evacuate from Fukui and Kyoto prefectures in the event of a serious accident at the Takahama plant. Small children near the plant remain unprotected. Their parents must battle through congested traffic just to get potassium iodine pills. Green Action as part of a coalition of citizens in the Kansai region has made over 60 visits to cities evacuating and others which are evacuation points. We have learned there is no viable evacuation plan in place for the tens of thousands of people with special needs – inpatients and outpatient at hospitals and various facilities, those in day care, and those with handicaps living at home. When others can flee, there are no vehicles to transport these people nor medical care prepared if and when they reach the evacuation facilities. Restart of the Takahama plant is a human rights injustice toward children and those with handicaps.

"As for evacuation drills, Kansai Electric confirmed back in 2014 that Fukui Prefecture asked for the accident scenario to be sent from the utility to be for a small enough accident so the prefecture's evacuation drills could cope. All drills in the Fukui and northern Kyoto Prefecture region have been grossly inadequate. There is no consideration that there could be heavy snow or an earthquake.

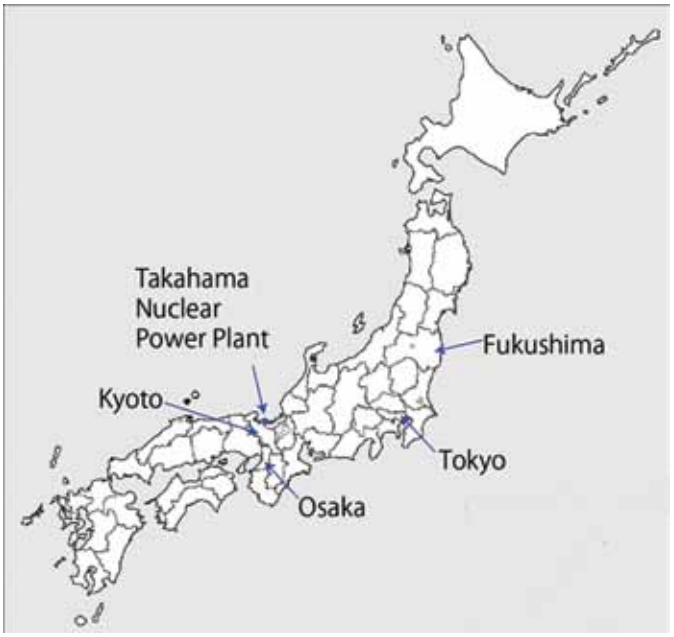
"The government and Kansai Electric has ignored repeated calls by the 8 prefectures and 4 cities of the Union of Kansai Governments which state since they are in the region that can be affected by a serious accident, therefore they should have consent rights when it comes to reactor restart issues."

Green Action noted that the Takahama plant still lacks a seismic isolation emergency control room. Executive director Aileen Mioko Smith said: "Restart of Takahama violates the NRA seismic safety standard. Operating a Japanese reactor without a seismic isolation emergency control room is negligence in the extreme. Tens of thousands of children including babies and those with special needs not being protected under current emergency management planning is an outright human rights violation."[6]

Fire hazards

According to Greenpeace and Green Action Japan, representatives of the NRA admitted at a meeting held in the National Diet on 21 January 2016 that they do not know whether Takahama 3 and 4 reactors are in violation of their own fire safety regulations, in particular, the integrity of cabling.[7]

Safety-related cabling in a reactor must be separated to ensure that in the event of fire or other singular incident, critical redundant safety systems and power supplies are not lost. Kendra Ulrich from Greenpeace Japan said on January 26: "This latest example of



complete negligence by the NRA just days before the Takahama unit 3 reactor is scheduled to restart is wholly unacceptable. It's like allowing an airliner packed with passengers to take off without knowing whether the fuel lines and the control wires are crossed. If an accident happens, the power and backup safety systems could be taken out at once, and the plane is going down."[7]

A coalition of NGO's have petitioned the NRA on a ranges of safety issues at Takahama, including safety cabling and earthquake risks. There are 14 petitioners including Green Action, Friends of the Earth, Greenpeace Japan, and numerous local NGOs.[7]

Broader regulatory problems

Some of the problems associated with the regulatory process for KEPCO's Takahama reactors were also seen with the Kyushu Sendai reactor restart process. There are overarching problems, neatly summarized last October by Prof. Yoshioka Hitoshi, a Kyushu University academic who served on the government's 2011– 12 Investigation Committee on the Accident at the Fukushima Nuclear Power Stations:[2]

"Unfortunately, the new regulatory regime is ... inadequate to ensure the safety of Japan's nuclear power facilities. The first problem is that the new safety standards on which the screening and inspection of facilities are to be based are simply too lax. While it is true that the new rules are based on international standards, the international standards themselves are predicated on the status quo. They have been set so as to be attainable by most of the reactors already in operation.

"In essence, the NRA made sure that all Japan's existing reactors would be able to meet the new standards with the help of affordable piecemeal modifications – back-fitting, in other words. In practice, they need only to add a new layer of emergency management and some back-up equipment to meet the new standards for emergency preparedness. The estimates for earthquake intensity and tsunami height in each locale have been revised upward, but not to the point where they would necessitate fundamental design changes.

"The second basic problem is that the new standards do not cover all the levels of "defense in depth" advocated by the International Atomic Energy Agency in its seven-stage International Nuclear Events Scale. They extend only as far as Level 4 ("control of severe conditions including prevention of accident progression and mitigation of the consequences of a severe accident"), stopping short of Level 5 requirements for responding to accidents that threaten the surrounding area through significant release of radioactive materials."

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A detailed briefing on the reactor cable separation problem is posted at: www.greenpeace.org/japan/Global/japan/pdf/20160126_ENG_Cabling%20brief.pdf

FAIREWINDS and NIRS speaking tour of Japan

Arnie Gundersen of Fairewinds Energy Education and Mary Olson of Nuclear Information and Resource Service (NIRS) will tour Japan from February 11 to March 15, beginning and ending in the Fukushima Prefecture.

Invited by a consortium of organizations and NGO leaders, Olson and Gundersen will be speaking to the general public and various educational institutions. Both have decades of experience working on atomic issues, Olson as an educator and advocate, Gundersen as a nuclear engineer and technical expert witness. Olson's speaking focus will be on the impact of radiation to human health with an emphasis on the higher radiation exposure hazard for women and young girls compared to men and boys. Gundersen will present a review of the meltdown at Fukushima Daiichi, and address safety concerns, including the serious issue of reactor aging.

In addition to public engagement and education of the ongoing impact of TEPCO's Fukushima atomic disaster, both delegates from the US will engage in original work, collecting data to support future analysis. Olson will be blogging during her trip, and entries will be posted on the GreenWorld blog site http://safeenergy.org. Fairewinds Energy Education will conduct podcasts and host updates provided by their Chief Engineer Arnie Gundersen during his travels.

The full itinerary is posted at: http://fairewindsenergy.nationbuilder.com/japan_speaking_tour

New York's nuclear fork in the road: subsidizing old reactors is a dead end

Authors: *Tim Judson and Michael Mariotte – Nuclear Information & Resource Service*

NM818.4536 Thirty years ago, New York Governor Mario Cuomo was asked about the future of nuclear power. The future of nuclear power, he replied, "is Chernobyl." He prevented the Shoreham reactor on Long Island, for which construction was basically completed and it had even been tested at very low power, from ever operating.

But while Cuomo stopped Shoreham, he didn't go after the Indian Point nuclear plant – close to New York City – in the same way. And he said virtually nothing about New York's upstate nuclear reactors, even though, if the future of nuclear power was Chernobyl, that would seem to apply everywhere, not just on Long Island.

A generation later, Mario Cuomo's son Andrew is now Governor Cuomo. Andrew wants to end the use of coal in the state, and he is insisting on a clean energy plan that New York attain 30% of its electricity from renewables by 2020, less than five years from now, and 50% renewables by 2030. For a large, industrial state, that is by any measure an aggressive plan.

And the current Gov. Cuomo has made clear he wants Indian Point closed and he is doing just about everything a Governor can do to close those reactors.

So far so good, but where Gov. Mario Cuomo essentially ignored New York's upstate reactors, Gov. Andrew Cuomo has embarked on a new crusade – not to close them, but to ensure they continue operating at any cost. And that cost, which is part of a new "Clean Energy Standard" proposal released by the staff of New York's Public Service Commission, could become very high.

The state's utility regulators propose that New York will establish a renewable energy standard to reach 50% renewable energy by 2030, but it's packaged with a massive subsidy to nuclear power plants to try to prevent four of the state's six reactors from closing during that time.

Two upstate reactors, Ginna and Fitzpatrick, announced last year that they will be closing within the next year or two because they are no longer economically competitive in New York's marketplace. Gov. Cuomo seems determined to try to reverse those decisions, and to provide extra protection – in the form of subsidies from already burdened New York ratepayers – to nuclear power. Even though he still wants to close Indian Point.

If the proposal ends up being implemented as the state's Public Service Department is proposing, the nuclear subsidies could end up costing New Yorkers US$2–6 billion (€1.8– 5.4b) by 2030. And that is just the extra cost of subsidies, above and beyond the market price of electricity. Between buying the reactors' electricity and paying subsidies, New Yorkers would spend a total of at least $18 billion (€16.1b) on the four reactors, rather than on renewables and efficiency. And that is assuming the reactors' operating costs don't rise, and that the state wouldn't need to guarantee them a profit margin to continue operating.

The wide range of our estimate is because the cost of the subsidies would depend on two factors:

- The cost of operating the reactors, which is rising. That is the main reason the industry is pushing so hard for subsidies.
- The market price of electricity.

The gap between nuclear costs and energy prices could very well get wider by 2030. On the one hand, reactors are getting more expensive to run as they get older, and New York has some of the oldest and most uneconomical reactors in the world. Nuclear operating costs have been going up by about 5% per year on average, for over a decade now. On the other hand, energy prices have been trending lower in New York and around the country for nearly a decade, even with occasional spikes. If nuclear costs and energy prices continue going in opposite directions, $6 billion could be an underestimate.

Here's how the regulators are proposing it would work:

- Each year the reactors' owners would tell the Public Service Commission what each reactor's "going forward costs" are projected to be, and how much money they could expect to make selling the power each reactor generates.
- The reactors' owners would be paid the difference between the "going forward costs" and the projected sales revenue, by selling "zero emissions credits," or ZECs, to utilities and electricity retailers in the state.
- The utilities and other retailers would be required to buy credits according to their proportion of the state's total electricity consumption. That is, if a utility's customers represent 10% of total electricity consumption in New York, then the utility would have to buy 10% of the total number of ZECs.

Keep in mind, New York still wants to close the two reactors Indian Point. The subsidy would, ostensibly, only apply to the four reactors in Central and Western New York, on the shore of Lake Ontario: FitzPatrick, owned by Entergy, the same company as Indian Point; and Ginna, Nine Mile Point 1 and Nine Mile Point 2, owned 50-50 by Exelon and Électricité de France (EdF), the American and French nuclear giants. (Well, technically, Nine Mile 2 is still 18%-owned by the Long Island Power Authority, but Exelon and EdF control the other 82%.)

Entergy says the subsidy is too little too late to keep FitzPatrick from closing at the end of the year, and is promising to fight to have Indian Point included in the subsidy scheme. If the company wins, it could be a lose-lose-lose for the state: New Yorkers get socked with higher electric bills to subsidize old, dangerous, and dirty reactors; the state loses its fight to close Indian Point by subsidizing all of the equipment upgrades the reactors need to maintain their water permits; and there would be less money and market share to invest in long-term emissions reductions by expanding renewable energy and efficiency.

The New York subsidy would be essentially a blank check: the only cost control would be the Public Service Commission's review of the reactors' projected operating costs each year. Even if Exelon and Entergy didn't fudge the numbers, if the costs of the reactors continue to go up more than energy prices do, so would the subsidies.

At the same time, there is nothing to prevent reactors from closing if their owners decide they just aren›t making enough money. And in that case, the subsidies would have been a huge waste of ratepayer dollars: a corporate giveaway for however long Exelon and Entergy were willing to take it, while generating more nuclear waste, risking nuclear accidents, and diverting ratepayer dollars from efficiency, renewables and long-term investments in emissions reductions. In addition, Exelon has already indicated it believes the state will have to provide an additional incentive to continue running uneconomical reactors: a guaranteed profit margin, over and above the operating costs. Read, even greater subsidies.

Whether now or later, New York is going to need to ramp up efficiency and renewables enough to take nuclear's place. Since Ginna and FitzPatrick are already poised to close because they are no longer economical or competitive, why not just let them shut down and invest the resources in cheaper renewables and efficiency that will be needed to reduce emissions in the long run, anyway?

As we showed in a report we published last fall (see Nuclear Monitor #813), renewables and efficiency are so much cheaper than nuclear that New Yorkers could do more than replace FitzPatrick and Ginna: for the same cost as the reactors, New York could develop even more renewables and efficiency, close additional fossil fuel power plants, reduce total carbon emissions, keep nuclear workers employed, and provide a just transition for the reactor communities. That's the path Gov. Cuomo should choose. To pave the way to a real clean energy future, one in which we have good jobs, live in healthy communities, and our children are safe.

NUCLEAR NEWS

French government report questions passive safety systems

The French *Institut de Radioprotection et de Sûreté Nucléaire* (IRSN) has released a report questioning claims made about so-called passive nuclear reactor safety systems. The report outlines the main characteristics of passive safety systems and the main difficulties associated with assessing their performance and reliability, as well as priority research areas to be developed in order to overcome these difficulties.

Passive safety systems aim to bring the reactor to a safe shutdown state and maintain this state for a long period of time without need for human intervention and with limited reliance on support functions. They are mainly characterized by reduced reliance on active components for proper actuation; reliance on natural phenomena (gravity, differential pressure, etc.) for proper operation; not requiring support functions for proper operation; and not requiring human intervention for actuation and operation.

IRSN identifies a number of intrinsic difficulties, particularly concerning the following:

1. Performance assessment: assessing the performance of passive safety systems requires a very good understanding of the physical phenomena underlying their operation, as well as the necessary simulation capabilities for such phenomena;
2. Reliability assessment: specific development approaches appear to be necessary in order to properly evaluate the reliability of passive safety systems, with particular emphasis on assessing the failure probabilities of thermal-hydraulic mechanisms used by these systems.

The report notes that the demonstration of passive safety systems in reduced-scale tests raises the issue of their representativity and transposition to full-scale operating reactors.

The effective operation of passive safety systems may depend on ambient conditions (e.g. containment temperature increase caused by initiating event) or external hazards (climatic, seismic, etc.).

The report questions the passivity of some 'passive' safety systems:

"However, caution should be exercised as to the truly passive nature of safety systems which, according to their designers, rely solely on natural phenomena. Indeed, most of these systems rely on changes in mechanical equipment status (e.g. valve open), actuation signals and battery power.

"Furthermore, a passive safety system may not be capable of performing its assigned function, even in the absence of mechanical or electrical failure. Indeed ... a passive safety system may rely on low-intensity phenomena (e.g. natural convection) which, under certain conditions, may be insufficient to perform its function. Such failure may occur when the phenomena at play are sensitive to system geometry (e.g. head loss sensitivity), ambient parameters and mismatches between design expectations and actual conditions.

"This type of failure, referred to as a functional failure, may lead to non-actuation or shutdown of a passive safety system, or unexpected operating conditions. If the same phenomenon is used to ensure proper operation of various passive safety system components, a functional failure could affect all components. This is referred to as a common mode failure."

The report states that further research is required in order to properly assess the performance and reliability of passive safety systems to be implemented in new reactor designs.

IRSN, January 2016, 'Considerations on the performance and reliability of passive safety systems for nuclear reactors', www.irsn.fr/EN/newsroom/News/Documents/IRSN_Passive-safety-systems-for-nuclear-reactors_01-2016.pdf

PGE EJ1 cancels plans to build a nuclear power plant in the Lubiatowo Dunes

According to information received by Greenpeace, the Polish utility PGE EJ1 has removed the location 'Choczewo' from the list of potential sites for the construction of the first Polish nuclear power plant and has no plans to conduct further preparatory work on the site. According to Greenpeace, this is a good step toward ditching the costly and inefficient nuclear program.

The Lubiatowo Dunes, where PGE EJ1 planned the construction of a nuclear power plant, is one of the most beautiful dune areas in the country, and falls under protection of the European Habitat and Bird directives.

One of the sites still under consideration for a nuclear plant is just 4 kms to the west, and also threatens dunes and a vital corridor for animals and birds. Another site being considered is the site of the old and never finished Zarnowiec nuclear power plant – with too little cooling water available and currently hosting a breeding colony of different coastal and sea birds.

Jan Haverkamp, Greenpeace Central and Eastern Europe expert in the field of nuclear energy and energy policy, said: "The decision to abandon the idea for a nuclear power plant in the Lubiatowo Dunes was taken shortly before the fifth anniversary of the Fukushima disaster, and is an important step towards the withdrawal of PGE EJ1 from its costly nuclear fantasies. Nuclear power is not necessary for the phase-out of Poland's unhealthy addiction to coal. It is a risky technology and too costly for the Polish consumer. A realistic scenario for Poland is to increase energy efficiency and develop the production of affordable energy from wind, solar and sustainable biomass."

The results of expert analysis clearly indicate that nuclear power is the most expensive and inefficient way of producing energy for Poland. Iwo Los, Greenpeace expert on energy security in Poland, said the entire

Anti nuclear action camp in Lubiatowo, July 2012.
Greenpeace / Jan Haverkamp.

nuclear program, already delayed for several years, could cost up to €160 billion. Poland has no power reactors but six are planned.

More information:

http://aarhus-konvention-initiative.de/2016/02/erfolg-fuer-polinische-bevoelkerung-fuer-gp-polen-und-fuer-die-natur-lubiatowo-wurde-von-der-liste-der-potentiellen-akw-standorte-entfernt/

www.facebook.com/jan.haverkamp/posts/10154034439446162

Europe's challenging nuclear future

In a leaked draft document obtained by Energy Post, the European Commission (EC) outlines the bleak future facing the nuclear power industry in EU.[1]

The "Communication for a Nuclear Illustrative Programme" or PINC is a report produced periodically by the Commission. The draft report states that 27% of electricity in the EU is currently produced from nuclear energy and 27% from renewables. It estimates that nuclear electricity generation capacity will decline by 20% by 2025; and that nuclear capacity in 2050 will be 95–105 GWe, well short of

the current figure of 121 GWe. Nuclear's share of electricity generation is expected to fall from 27% now to 17– 21% in 2050. (A 2013 EC report estimates that nuclear capacity in 2050 would be considerably higher, 122 GWe.[2] French legislation to reduce nuclear's share from 75% to 50% of electricity generation is the main reason for the lower expectations in the latest EC report.)

The EC report notes that there is a "historical trend of cost escalation" for nuclear power. Even in France, construction costs per MWe in 1974 were three times lower than those of units connected to the grid after 1990. Building ever-bigger reactors means longer construction times with major impacts on cost. Moreover the EC believes that the investment cost (per KW) of small modular reactors is likely to be higher than for large plants.

The average age of the nuclear fleet in Europe is 29 years, and by 2030 most of the fleet will be operating beyond its original design life. More than 50 of the EU's 131 reactors are likely to be shut down by 2025, the EC report says.

The projected costs of long-term geological storage depositories for nuclear waste run from less than half a billion in Slovenia and Croatia to over €20 billion in France, the report says. Total waste management costs (for spent fuel and other nuclear waste streams) will add up to an estimated €142 billion by 2050. That equates to €3.23 per MWh, and the EC report notes that that figure is more than double the estimate of other recent studies.

France will be the only country to operate reprocessing facilities after 2018 (when those in the UK are shut down). The report states that the future of recycled nuclear fuel is limited by the lack of fast-breeder reactors, more safety requirements, a higher risk of proliferation, lower competitiveness, and the fact that it still requires a final waste depository.

The report states that given "the ageing status of the European reactors, the capability of the industry and regulators to develop safe and cost effective decommissioning programs will determine to a great extent the future of nuclear commercial power in Europe". The EC comes up with a total cost of €126 billion for decommissioning out to 2050.

Estimates of decommissioning costs per unit also vary "significantly" between Member States – €0.20 billion in Finland, €0.32 billion in France, €0.85 billion in the UK, €1.06 billion in Germany, and €1.33 billion in Lithuania.

Decommissioning experience is scarce: although 89 reactors had been permanently closed in Europe as of October 2015, only three had been fully decommissioned (all of them in Germany).

Of the €268 billion needed for waste management and decommissioning in the EU by 2050, €150 billion is in the bank.

Energy Post notes some gaps in the draft EC report: "There are a few other things the draft PINC does not (yet) do. It does not advise on the involvement of foreign firms in supposedly strategic energy projects (e.g. China in Hinkley Point C). It does not draw lessons from recent upheavals in the nuclear industry (e.g. Areva's bankruptcy). It does not tackle liability, although a former PINC suggested setting up a harmonised system of liability and financial mechanisms in case of an accident. And finally, it does not discuss harmonising strategies for decommissioning funds – also suggested in the former PINC – beyond proposing a European Centre of Excellence."

1. Sonja van Renssen, 2 Feb 2016, 'Exclusive: EU paints challenging picture of Europe's nuclear future', www.energypost.eu/exclusive-eu-paints-challenging-picture-europes-nuclear-future/
2. WNN, 9 Jan 2014, 'Policies hold European nuclear steady', www.world-nuclear-news.org/EE-Politics-hold-European-nuclear-steady-0901144.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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Contact us via:

WISE International
PO Box 59636, 1040 LC Amsterdam, The Netherlands

Web: www.wiseinternational.org

Email: info@wiseinternational.org

Phone: +31 20 6126368

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