WASTING OUR TIME WITH NUCLEAR

April 2010

Would you drive a car if it had no brakes? Probably not. Yet nuclear power has been driven for the last 50 years by the nuclear industry and some European governments with no concern for the safety of its deadly by-product: nuclear waste.

The European Commission is currently preparing a directive on nuclear waste that could make European countries think twice before they add to the problem by building new nuclear power plants. However, the legislation could also be exploited by the nuclear industry to attempt to overcome the stumbling block of public opposition and give politicians a false sense of security that could open the door to new projects. This briefing illustrates why for now – and for the next hundreds of thousands of years – the nuclear waste problem is here to stay and why we should stop wasting our time with nuclear power.

Timeline

April-May: public consultation on the nuclear waste directive:
http://ec.europa.eu/energy/nuclear/consultations/2010_05_31_fuel_waste_en.htm

July: Commission publishes draft proposal

Summer: first reading by the European Parliament

Autumn: Council debate

End of 2010 / early 2011: adoption of the directive

EU adviser on nuclear policy Jan Haverkamp said: *"The only way to address the problem of nuclear waste is to not produce it in the first place. Despite the decline of nuclear power over the last decade, the industry still creates more radioactive waste than it can deal with. It has tried dumping it in the sea, attempted storage in geological formations, and in copper and clay containers, but nothing has worked. It's time to put an end to this madness."*

For over 50 years the nuclear industry has produced large volumes of hazardous radioactive waste, not just from the operation and decommissioning of nuclear power plants, but also from uranium mining and enrichment. Today, nuclear energy is being sold to politicians and consumers as one of the solutions to climate change that will also deliver energy security for Europe. However, nuclear energy is a dangerous obstacle on the road to a clean energy future.[1] On top of other substantial problems related to safety and costs, nuclear waste remains a major flaw of nuclear energy.

The International Atomic Energy Agency (IAEA) estimates that the industry annually produces one million barrels (200 000 m3) of what it considers 'low and intermediate-level waste' and about 50 000 barrels (10 000 m3) of the even more dangerous 'high-level waste'.[2] These numbers do not include spent nuclear fuel, which is also high-level waste.

It takes 240 000 years for radioactive plutonium to decay to a level that is safe for human exposure, which is longer than modern humans have been on the Earth (200 000 years). There is no way to guarantee to keep these substances safe for this long. It does not make sense to allow the nuclear industry to continue producing more nuclear waste.

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1 In its 'Energy [R]evolution' scenario, Greenpeace shows that renewables (like wind, solar, biomass, geo-thermal, tidal and wave energy) and energy efficiency deliver faster, cheaper and cleaner solutions. Sven Teske, e.a., Energy [R]evolution – A Sustainable Global Energy Outlook, Amsterdam (2008), Greenpeace/EREC, www.greenpeace.org/international/press/reports/energyrevolutionreport

2 IAEA Factsheet: Managing Radioactive Waste, 1998, www.iaea.org/Publications/Factsheets/English/manradwa.html

FAILED SOLUTIONS

Billions of euros have been spent over the past half-century on finding a solution to the nuclear waste problem. Without success.

Russia, USA, France, UK, Netherlands, Japan and others – waste dumping at sea banned

For years, low level radioactive waste was dumped at sea, 'out of sight and out of mind'. Disintegrating barrels brought the waste back into the environment, and dangerous substances accumulated in the bodies of animals. After 15 years of campaigning by Greenpeace, in 1993 an international treaty was signed banning all dumping of radioactive waste at sea.

USA – seismic fault line compromises bedrock storage

Construction of the Yucca Mountain nuclear waste site in Nevada, USA, began in 1982. The US Geological Survey has found a seismic fault line under the site and there are serious doubts about the long-term movements of underground water that can transport deadly contamination into the environment. As a result of these problems, the US government stopped funding the project in early 2010.

Germany – Water floods salt layers solution

In Asse, Germany, an experimental radioactive waste dump was set up in the 1960s in salt formations deep underground. It started leaking water in 1988 and is currently flooding with 12 000 litres of water per day. As a result, all 126 000 barrels of waste already placed in the dump now need to be cleared out. Asse was meant as a pilot project for a final storage solution in the salt layers under Gorleben, but there is now serious doubt in Germany about the viability of salt layers as storage for nuclear waste.

France – Waste inventory unknown

One of the largest nuclear dumps in the world, the Centre de Stockage de La Manche (CSM) in northern France, was opened in 1969 to store low level waste. It was closed in 1994. It currently stores 520 000 m^3 of radioactive materials from waste reprocessing (see below) and French nuclear reactors. A 1996 commission set up by the French government concluded that the site also contained long-living waste and higher level waste, and that the true inventory was effectively unknown. In 2006 it was found that contaminated water from the site had been leaking into an underground aquifer, threatening contamination of the surrounding agricultural land.

NEW RESEARCH BRINGS NEW CHALLENGES

Forsmark, Sweden – Olkiluoto, Finland: copper corrosion

Sweden is developing a system that places nuclear waste in a copper container surrounded by clay. Water is expected to help the copper container harden when it is stored in rock like granite, deep underground. Finland adopted the same system and Switzerland and the UK are considering this option. But problems have already begun to appear. The copper canisters were expected to survive corrosion for 3 000 years, but recent research shows that they might fail in 300 years.[3] There are furthermore concerns about the build-up of hydrogen produced as a result. High temperatures from the canisters could also affect the clay covering, while groundwater flows could bring contaminants from any compromised containers into the Baltic Sea. Furthermore, studies predict that Nordic countries are likely to face at least one ice age in the coming 100 000 years,[4] which could change the pattern of the underground and ground water streams.

Bure, France – Dessel, Belgium: uncertainties of clay as a natural barrier

Unlike Sweden and Finland, that rely on man-made barriers to prevent leakage, France and Belgium are exploring clay as a natural barrier. The waste is to be contained in simple stainless steel canisters, which can corrode even more easily than the Swedish copper ones, and rely on the natural clay formation to keep in radioactivity. The crucial question is whether it can be guaranteed – for hundreds of thousands of years – that no cracks or channels will form in the clay layers, which would cause water to leak in and out and poison nearby aquifers.

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3 Hultquist, G. et al. (2009). Water Corrodes Copper. Catalysis Letters, Volume 132, Numbers 3-4. http://dx.doi.org/10.1007/s10562-009-0113-x

4 Matti Saarnisto, Evaluation report on the Posiva report 2006-5 (2008), STUK (Finland's nuclear regulating agency). Available on demand.

THE HUMAN RISK OF STORAGE

Human interference

Once placed into final storage, nuclear waste needs to be monitored and not only secured from natural events, but also from human interference. Stored civilian and military nuclear waste, such as plutonium or uranium, are the most accessible sources of radioactive material that can be used for the production of nuclear bombs. A few kilograms of these substances would be sufficient to make bombs similar to the ones used on Japan by the US military during World War II. Even a very modest amount of radioactive material from these sites (around 20 grams) would be sufficient to make a 'dirty bomb', which could contaminate several square kilometers. To deal with the problem, the nuclear industry proposes to guard storage sites for 300 years. But there is no proposal to ensure security for the other 239,700 years.

Interim storage: leakage and terrorist risk

Some countries, like the Netherlands, have set up interim storage for 100 years, effectively shifting the problem of final storage to our grandchildren and great-grandchildren. In the meantime, leakages and accidents need to be prevented. An additional risk is terrorism: an attack on an interim nuclear waste storage site would be a relatively soft target for terrorists.

Reprocessing – the myths of the 'nuclear cycle'

The nuclear industry talks about the 'nuclear fuel cycle' and claims that after use, nuclear fuel is recycled. In reality, with reprocessing, as this process is called, only a very small part of the spent nuclear fuel is actually re-used: 99% of the radioactivity and 90% of the waste volume are left at the end of the process. The process also produces large volumes of different types of radioactive waste that are difficult to store. Liquid waste pumped into the sea from reprocessing plants in Sellafield, in the United Kingdom, and la Hague, in France, can be traced as far as the Arctic.[5] And numerous cases of nuclear poisoning have been detected in areas surrounding the reprocessing plant in Mayak, Russia.

Transport of nuclear waste

Nuclear waste, such as spent nuclear fuel, plutonium and other highly radioactive material, is transported all over the planet, often passing through large inhabited areas. These deadly convoys pose a serious risk to populations and ecosystems along the routes. If an accident were to occur, radioactivity could contaminate several square kilometres or more. The convoys are also at risk of terrorist attack. The annual transport of nuclear waste from France to Gorleben in Germany therefore draws tens of thousands of demonstrators. Tons of plutonium resulting from reprocessing are also regularly shipped from France and the UK to Japan,[6] crossing the territorial waters of many countries on the way, as well as important marine ecosystems. Depleted uranium from France is transported to Russia, where thousands of barrels are dumped in large open-air storage sites in the Urals.

The cost of nuclear waste

Because it is as yet unclear how nuclear waste can safely be stored for the amount of time necessary, it is very difficult to make a full projection of costs. Nuclear energy companies in the EU are required to reserve money for waste processing and storage in the future. But in several countries these waste funds appear to be far too small and have in the past been used for new risky investment. When the UK privatised nuclear utility British Energy, the State had to spend £5.3 billion (€6.6 billion) of taxpayers' money to fill a hole in the company's reserves for decommissioning and waste. But British Energy's fund would only cover a fraction of the total cost for decommissioning and waste for all 45 existing British nuclear reactors, so far estimated to be around £70 billion (€88 billion), the equivalent of almost €2 billion per reactor.

5 See among others: AMAP, 2002. Arctic Pollution 2002: Persistent Organic Polluatants, Heavy Metals, Radioactivity, Human Health, Changing Pathways. Arctic monitoring and Assessment Programme (AMAP), Oslo, Norway. xii+112 pp.

6 The most recent plutonium shipment from France to Japan took place in February 2009 and contained 1,800 kg of plutonium. Over 20 000 kg are still stored in France and the UK awaiting shipment to Japan.

GREENPEACE DEMANDS

A nuclear phase-out – In order to manage the existing nuclear waste crisis we should first of all stop producing more waste and develop clean energy production and energy efficiency. There should be **a ban on all new nuclear power reactors** and an **immediate end to all reprocessing**.

Storage for existing radioactive waste must use the best available technology to prevent radioactivity from leaking into the environment and to protect human health. Storage should be managed, monitored and retrievable for an indefinite time period into the future.

No export of nuclear waste – Countries should be responsible for the safe management of the nuclear waste that they have created and **transport of nuclear materials** (including spent nuclear fuel) **should be avoided**.

Full transparency – Some countries have chosen nuclear waste sites without consulting the local population and without exploring alternatives. All information relevant to decisions on the management of nuclear waste should be fully transparent and made available for public consultation.

Radioactive material from decommissioned nuclear weapons should be treated in order to minimise the possibility of it being used to make a 'dirty' or a nuclear bomb.

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