Fact Sheet 6: Safe Energy

Uranium Mining: Health Risks and Environmental Consequences

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Nuclear energy has never been "safe" or "clean"

Whoever praises nuclear energy as "clean" energy is ignoring the complete path of the nuclear fuel chain from uranium mining to nuclear waste disposal. In particular, the production process of uranium generates massive problems to human health and the environment. Between the mining of uranium and its use in a nuclear power plant, many steps are necessary including mining, milling, enrichment, production of fuel rods, and transportation, all of which could lead to severe environmental destruction and damaged health for the people affected.

Uranium mining

Uranium is located in the earth's crust. However, it is not evenly spread, so it is only mined in the most profitable mineral deposits. Vast amounts have to be mined, since most rock contains very little uranium ore (below 0.5%). Radon gas and contaminated water leak from giant waste dumps and threaten the health of human and surrounding ecosystems. Large amounts of contaminated water can seep into the ground water and further contaminate rivers. Underground and surface workers are exposed to radioactive substances and suffer the risks of lung and other cancers.

The processing of uranium ore

Usually taking place close to the mines, the processing of the uranium ore is known as "milling". The ore is chopped, the uranium extracted and finally ground to yellow powder, which is called "Yellow Cake". The "tailings", remain of the milling process, consist of mud which settles in a sedimentation tank and remains there. It still contains 85% of the original radioactivity with long living isotopes as Thorium-230 or Radium-226, heavy metals, harmful substances like arsenic and other additives from the processing. Due to the escape of radon gas and the eolian erosion of toxic dusts the contamination is being spread over large distances. Another problem is the seeping water, as it is a hazard for the ground and surface water supplies.

The enrichment of uranium

To enrich uranium, the "Yellow Cake" has to be transformed into uranium hexafluoride (UF6), a very toxic, chemically aggressive substance. The enrichment is necessary, because natural uranium mainly consists of not fissionable Uranium-238 and only for about 0.7% of fissionable U-235. However, most nuclear power plants need fuel, which contains 3-5% of fissionable material. (For the production of atomic bombs an enrichment level of about 90% is necessary.) The process of enriching the uranium also produces more radioactive waste material. One such waste product is depleted uranium, which, for example, is used to coat ammunition to give it "armor piercing" abilities.

Such depleted uranium weapons were used in the Kosovo and first Gulf Wars.

Uranium stockpiles

Uranium is a limited resource, just like fossil fuels, and is going to run short sooner rather than later. The status report of the Federal Republic of Germany for the Energy Summit 2006 (1) states that the uranium resources will last for about 70 years globally, at constant demand. The German Bundesanstalt für Geowissenschaften und Rohstoffe (BGR) describes the uranium resources in their energy study 2005 (2) as sufficient for "the next decades". Including the resources that are not accessible right now, but geologically listed, at today's demand, uranium could be available for 150 to 200 years at most. Developing new uranium mines would not only be a major investment, but also take a lot of time. Furthermore, only a little part of all uranium resources lie in so called "rich-ore reserves". This is why mining would have to shift production more and more to "smaller ore deposits" - with less then 0.1% of uranium present. That would lead to even more environmental destruction.

Production capacities

As of today, the global mining companies already cannot meet the need for the global consumption of uranium. The output of mined uranium per year is about 32 000 to 42 000 tons, by a yearly consumption of about 60 000 tons (2). The production gap is being met partly by prior developed civil holdings, increasingly also by military

holdings, due to the nuclear disarmament of Russia and the USA. The uranium reserves are not evenly spread around the globe. The majority of uranium production is centred in Australia and Canada, followed by Kazakhstan, Russia, Nigeria, Namibia and Uzbekistan (3). The principal customers are the USA, France, Japan and Russia. Additionally, there are now new demands from countries like China and India, who want to develop nuclear energy, but do not hold significant natural uranium reserves themselves. The bulk consumers USA, France, Japan, Great Britain and Germany only have limited national production and are increasingly dependent on imports to meet their needs The dependence on imports in Germany, for example, is 100%.

As always, there is radioactive waste. The uranium production, on its own, proves that nuclear energy is not a "clean" and everlasting energy source. The only thing "everlasting" about nuclear power is the radioactive waste products that are harmful to human and planetary health.

Furthermore, the safe closing of exploited uranium mines – if carried out at all – costs billions of dollars, which mostly has to be paid by the taxpayer. The shutdown of the Wismut-Mines in the former German Democratic Republic is a good example:
After the USA dropped the nuclear bombs on Hiroshima and Nagasaki in August 1945, the Soviet Union made an extreme effort to keep up with the USA in the nuclear arms race. In an area of 40 square kilometres in the former German Democratic Republic, between the provinces of East Thuringia and West Saxony, the third biggest uranium mine in the world was built to provide raw material for the Soviet Union's nuclear weapons.

The uranium production did not cease until 1990 after the reunification of East and West Germany. The succeeding company, the Wismut GmbH, was now assigned to rehabilitate a large contaminated area and to dispose of 5 million tons of radioactive waste. By 2010 the clean up operations, with a budget of 6 billion Euros of German government funds, are supposed to be finished. Today the ones who suffer, the former workers fight for the acceptance of their illnesses as industrial diseases. Only patients with lung or bronchial cancer have a chance of acceptance so far. Also, the local residents were constantly exposed to radioactive hazards from escaping radon gas. In bedrooms and living rooms a radon level of up to 1000 times higher than the usual numbers of that region have been measured.

If even in a highly developed and financially secure industrial country like Germany it is that difficult to deal properly with the clean up and reclamation of uranium production facilities and surrounding areas it is hard to imagine how a production shutdown in poor, socially weaker regions would be dealt with. Probably not at all.

Environmental injustice

Nuclear power carries an inherent injustice to the land-based indigenous peoples of the world on whose territories the uranium is mined and the nuclear wastes are most often stored. Often, economic incentives are provided to poor communities to encourage them to take the nuclear risk. This is not only unethical, but also unnecessary as there are better alternatives available than nuclear power to solve our climate crisis.

As we have shown by all the reasons stated above, the health environmental risks of mining, milling and production, and the limited, at best, amount of uranium reserves that are available on the planet, it is clearly best to leave the uranium right where it is: under the earth.

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Sources:

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