

11. The Medical and Ecological Consequences of Nuclear Power

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The official task of the IAEA since 1957, enshrined in article IV of the NPT promotes the peaceful uses of nuclear energy and the "transfer" of nuclear technology. Superimposed upon this official policy is a huge propaganda push by the nuclear industry promoting nuclear power as a panacea for the reduction of global-warming gases.

There are presently 442 nuclear reactors in operation globally. If, as the nuclear industry suggests, nuclear power were to replace fossil fuels on a large scale, it would be necessary to build 2000 large 1000-megawatt reactors. Furthermore, to replace all fossil-fuel-generated electricity today with nuclear power, there is only enough economically viable uranium to fuel the reactors for three to four years.

Belgium, Germany, Spain and Sweden have decided to phase out their operating nuclear reactors, while Britain plans 10 new reactors and China plans 27 by 2020. The US administration has called for construction of more than 50 new reactors.

The true economies of the nuclear industry are never fully analysed - including costs of uranium enrichment, the massive liability involved in a nuclear accident, decommissioning all existing and new nuclear reactors and the enormous expense in the transportation and storage of radioactive waste for a quarter of a million years.

The prevailing ethic says that nuclear power is emission-free. The truth is very different.

In the US for instance, where much of the world's uranium is enriched, the enrichment facility at Paducah, Kentucky, requires the electrical output of two 1000-megawatt coal-fired plants, which release large quantities of carbon dioxide, the gas responsible for 50% of global warming.

Also, this enrichment facility and another at Portsmouth, Ohio, leak from rusty pipes 93% of the chlorofluorocarbon gas emitted yearly in the US. The production and release of CFC gas is now banned internationally by the Montreal Protocol because it is mainly responsible for stratospheric ozone depletion. But CFC is also a global warmer, 10,000 to 20,000 times more potent than carbon dioxide.

The nuclear fuel cycle in all countries uses large quantities of fossil fuel at all stages - the mining and milling of uranium, the construction of the nuclear reactor and cooling towers, robotic decommissioning of the intensely radioactive reactor at the end of its 20

to 40-year operating lifetime, and transportation and long-term storage of massive quantities of radioactive waste.

Contrary to the current propaganda line, nuclear power is not green and it is certainly not clean. Nuclear reactors consistently release millions of curies of radioactive isotopes into the air and water each year. These unregulated sanctioned releases occur because the industry considers certain radioactive elements to be biologically inconsequential. This is not so.

These unregulated releases include the noble gases krypton, xenon and argon, which are fat-soluble and if inhaled by persons living near a nuclear reactor, are absorbed through the lungs, migrating to the fatty tissues of the body, including the abdominal fat pad and upper thighs, near the reproductive organs. These radioactive elements, which emit high-energy gamma radiation, can mutate the genes in the eggs and sperm inducing genetic disease.

Tritium, a radioactive isotope of hydrogen, is another biologically significant gas, routinely emitted from nuclear reactors. Tritium combines with oxygen creating "tritiated" water. Tritium which is a soft energy beta emitter, more mutagenic than gamma radiation incorporates directly into the DNA molecule of the gene and it passes readily through the skin, lungs and digestive system where it is distributed throughout the body. The half life of tritium is 12.3 years, giving it a biologically active life of 246 years.

The dire subject of massive quantities of radioactive waste accruing at the 442 nuclear reactors across the world is also rarely, if ever, addressed by the nuclear industry. Each typical 1000-megawatt nuclear reactor manufactures 33 tonnes of thermally hot, intensely radioactive waste per year.

More than 80,000 tonnes of highly radioactive waste sits in cooling pools next to the 103 US nuclear power plants, awaiting transportation to a storage facility yet to be found. Much more accrues at reactor sites in France, Japan Russia and elsewhere. This dangerous material is an attractive target for terrorist sabotage as it traverses roads, railway and shipping lines of many nations.

The long-term storage of radioactive waste is an immense insoluble problem. No country, including the US has a plan for preventing this toxic carcinogenic material escaping into the biosphere and contaminating the food chain for the rest of time.

Furthermore, a study released recently by the US National Academy of Sciences shows that the cooling pools at nuclear reactors, which store 10 to 30 times more radioactive material than that contained in the reactor core, are subject to catastrophic attacks by international terrorists, which could unleash an inferno and release massive quantities of deadly radiation -- significantly worse than the radiation released by Chernobyl.

This vulnerable high-level nuclear waste stored in the cooling pools at the 442 global nuclear power plants includes hundreds of radioactive elements that have different biological impacts in the human body, the most important being cancer and genetic diseases.

The incubation time for cancer is five to 50 years following exposure to radiation. Children, old people and immuno-compromised individuals are many times more sensitive to the malignant effects of radiation than other people.

Following are four of the most dangerous elements made in nuclear power plants.

Iodine 131, which was released at nuclear accidents at Sellafield in Britain, Chernobyl in Ukraine and Three Mile Island in the US, is radioactive for twenty three weeks and it bio-concentrates in leafy vegetables and milk. When it enters the human body via the gut and the lung, it migrates to the thyroid gland in the neck, where it can later induce thyroid cancer. In Belarus more than 2000 children have had their thyroids removed for thyroid cancer, a situation never before recorded in pediatric literature.

Strontium 90 lasts for 600 years. As a calcium analogue, it concentrates in cow and goat milk. It accumulates in the human breast during lactation, and in bone, where it can later induce breast cancer, bone cancer and leukemia.

Cesium 137, which also lasts for 600 years, concentrates in the food chain, particularly meat. On entering the human body, it locates in muscle, where it can induce a malignant muscle cancer called a sarcoma.

Plutonium 239, one of the most dangerous elements known to humans, is so toxic that one-millionth of a gram is carcinogenic. More than 200kg is made annually in each 1000-megawatt nuclear power plant. Plutonium is handled like iron in the body, and is therefore stored in the liver, where it causes liver cancer, and in the bone, where it can induce bone cancer and blood malignancies. On inhalation it causes lung cancer. It also crosses the placenta, where, like the drug thalidomide, it can cause severe congenital deformities. Plutonium has a predisposition for the testicle, where it can cause testicular cancer and induce genetic diseases in future generations. Plutonium lasts for 500,000 years, living on to induce cancer and genetic diseases in future generations of plants, animals and humans.

Plutonium is also the fuel for nuclear weapons -- only 5kg is necessary to make a bomb and each reactor makes more than 200kg per year. Therefore any country with a nuclear power plant can theoretically manufacture 40 bombs a year.

Nuclear power produces a carcinogenic legacy for all future generations, it produces global warming gases, and it is far more expensive than any other form of electricity generation, while it triggers the proliferation of nuclear weapons.

A supplementary protocol to the NPT is needed, which would permit the signatory States to fulfil their obligations stated in Article IV of the NPT by supplying technical aid in form of Renewable Energy Technologies. The supplementary protocol should be the basis for an International Renewable Energy Agency that can act as a counterbalance to the institutionalized advocates for nuclear energy. The main provision of the supplementary protocol to Art IV should be: "The present Treaty permits the parties to the Nuclear Non Proliferation Treaty to replace the assistance in the peaceful use of nuclear energy provided for in article IV with assistance in promoting the use of clean, sustainable, renewable energy."