Nuclear power: dirty, dangerous and expensive

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The Fukushima disaster in March 2011, and the Chernobyl disaster in 1986 proved that nuclear reactors are inherently unsafe. Both disasters exposed the fundamental flaws of reactors and highlighted the serious institutional failures in the oversight of nuclear safety. Some of these failures are replicated worldwide by the nuclear industry and regulatory systems that should protect the public from accidents. As a result, millions of people who live near reactors are at risk.

In Japan, the failures of the human institutions that oversee reactor safety led to the Fukushima disaster. The reactor operator, Tokyo Electric Power Company (TEPCO), and the Japanese government were well aware of the risks of earthquakes and tsunamis years before the disaster. Yet, they ignored these risks. Both the Chernobyl and the Fukushima disasters released massive amounts of radioactive materials into the atmosphere. Hundreds of thousands of people were affected. People who had to evacuate from the 30km exclusion zone around Chernobyl still cannot return, and that area remains a no-go zone.

In Japan, 160,000 were ordered to leave contaminated areas around the plant, and tens of thousands more fled voluntarily. Experts expect the 20km evacuation zone around the plant will be uninhabitable for decades. High levels of contamination and worry about being unemployed are keeping people from returning to some of the other contaminated areas.

Nuclear reactors will always be vulnerable to the deadly combination of human errors, design failures, terrorist attacks and natural disasters. One lesson to be learned again and again from nuclear accidents is that the nuclear industry's risk assessments fail to take human and institutional failures into account, while human and institutional behaviour are the principal contributors to reactor accidents.

A series of these institutional failures set the stage for the Fukushima Daiichi disaster, including a system of industry-led self-regulation, industry overconfidence and inherently dismissive attitude towards nuclear risks, as well as its neglect of scientific evidence. Self-regulation by the nuclear industry can be found in many places globally.

Nuclear accidents and "near misses", in which the fuel rods at the core of a reactor come close to melting down, continue to occur in nuclear plants around the world. Since Chernobyl, the US alone has faced nearly 200 "near misses" according to the US Nuclear Regulatory Commission.[1] In 2003, the French nuclear safety agency activated its emergency response centre after flooding threatened two reactors at a plant in the southwest. In 2007, an earthquake in Japan caused a fire that shut down seven reactors at a nuclear plant on the country's west coast. It took more than two years for the first reactor to come back online, and some of them have not restarted yet.

The nuclear industry benefits; people suffer

The public pays the price for a nuclear disaster in three ways. First, their lives and health are put at risk from massive releases of radioactive materials. Second, their lives are disrupted. They have to leave their homes, set up temporary housing without proper compensation and live without jobs. Families can be split up. Parents live with the ongoing worry that the health of their children may suffer. Third, the people who suffer the misery and disruption of a nuclear disaster end up paying the clean-up costs, the decommissioning of destroyed reactors and the compensation through their taxes.

[1] An American Chernobyl: Nuclear near misses at US reactors since 1986

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In general, governments and nuclear regulators put the nuclear industry ahead of protecting people. The operators of nuclear plants are almost universally protected from paying the full costs of disasters caused by their plants. The companies that supply the nuclear industry, from reactors, to cement, to piping, to computers, pay nothing in the event of an accident. Nuclear operators are not required to have insurance that would cover the full cost of a disaster, in part because such insurance would make nuclear power too expensive. The amount of liability they have to pay is almost universally capped at a level far below the real costs of a disaster.

The expense of nuclear reactors

Nuclear reactors are expensive to build. From initial planning to first operation can take at least a decade. Cost overruns and delays are the norm for reactor construction. For example, the French nuclear company Areva is building new reactors in Finland and in France. The costs of both projects have increased to more than three times in Finland and 2.5 in France than the original price and the reactors are nowhere near completion. This problem is repeated with almost every reactor project in the world.

Radioactive waste: the long-term problem

In addition to the risks of operating reactors, there are also significant risks associated with spent nuclear fuel and other radioactive wastes. Even after 60 years of nuclear power, there is no solution that provides safe, long-term storage of radioactive waste anywhere in the world. At present, radioactive waste around the world is stored in temporary facilities while discussions continue about long-term storage.

The International Atomic Energy Agency estimates that the nuclear industry produces about one million barrels of “Low and Intermediate-Level Waste” and about 50,000 barrels of the even more dangerous “High-Level Waste” every year. On top of that reactors produce spent nuclear fuel, yet another high-level waste. The most hazardous waste needs to be stored securely for hundreds of thousands of years before it is considered safe.

The nuclear industry’s proposed solution, backed by many governments, is to bury radioactive waste in deep geological repositories. Even though the industry has been examining this idea for decades, not one single repository has been built.

Some spent nuclear fuel is reprocessed, which means that plutonium and unused uranium are separated out from other waste with the intention of reusing them in nuclear power plants. In reality, the term “reprocessing” or “recycling” is misleading, since a lot of the recovered materials are not reused. Reprocessing does not get rid of any of the radioactivity in the spent fuel, but the process does spread it about through discharges to the environment and through creating a larger volume of different waste flows.

Nuclear reactors and climate change

The nuclear industry often claims that nuclear energy is needed to combat climate change. However, nuclear power is in fact an expensive and dangerous distraction from the real solutions to climate change. The operation of nuclear plants prevents the large-scale integration of renewable energy into the electricity grid. Greenhouse gas reduction targets can only be met through using renewable energy technologies and energy efficiency. Every dollar spent on nuclear power is a dollar stolen from the real solutions to climate change.

Nuclear is not the way to fight climate change – it simply delivers too little, too late, and it is too expensive. Nuclear power could at best make only a negligible contribution to emission reductions: Even if the entire global fleet of reactors was quadrupled, a completely far-fetched scenario, this would lead to at most a 6% reduction in global CO_2 emissions, which would come too late due to long construction times, well beyond the deadline that climate scientists have set for avoiding catastrophic climate change.

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