Nuclear Power and Climate Change

A risky and dangerous diversion from solutions

Jan Haverkamp

October 2015

The nuclear industry is in decline. It currently produces less than 11% of global electricity, the lowest since 1984. In the last 15 years, it's been out-stripped 17-fold by the expansion of wind power, with its potential to generate the output of 120 nuclear reactors.

Yet the nuclear industry is trying to pretend it can be part of the solution to global warming. It claims that only nuclear power can deliver low-carbon base-load electricity, and that it has avoided large amounts of CO2 emissions.

This claim that nuclear is part of the solution has to be rejected. The imperative of phasing out fossil fuels must not lead to a renaissance of nuclear power.

The risks of nuclear energy are growing

The nuclear industry's public relations machine is in over-drive in the run-up to the Paris climate conference. But the PR conveniently avoids some uncomfortable facts.

- The average age of the global nuclear fleet is growing and with that the risk for technical problems because of mechanical ageing, loss of human skills and increased terrorist and other security threats. Added to that are obsolete security systems in and around ageing nuclear power plants. Constant upgrades have removed only some of the risks known from actual accidents and incidents, but the ageing of irreplaceable parts and concepts means the overall risk is growing. Most of the really important upgrades after nuclear catastrophes like Chernobyl and Fukushima have not been implemented yet or have got lost in studies, but not in actual adaptations.[1]
- The list is growing of those countries who could use nuclear technology for hostile purposes. Several states have succeeded in getting their hands on nuclear weapons technology using civil nuclear experience (India, Pakistan, Israel, North Korea and possibly Iran), and security incidents involving state and non-state actors at existing nuclear power stations have become more sophisticated. In 2014, there was an unsolved sabotage incident at a nuclear reactor in Belgium and dozens of unsolved coordinated drone over- and through-flights in nuclear power stations in France.[2] Any spread of nuclear power over the globe will increase the risk of proliferation.
- The amount of high-level radioactive waste on the planet is growing – and we still have no idea what to do with it. There is now around 300.000 tons of high-level waste spread over the globe. In the meantime, the US disposal programme has been

[1] Becker, Oda and Patricia Lorenz, *Critical Review of the Updated National Action Plans (NAcP) of the EU Stress Tests on Nuclear Power Plants*, Brussels (2015) Greenpeace e.V

[2] Power Engineering International, 15/08/2014: *Electrabel confirms Doel 4 nuclear power plant sabotage*

GREENPEACE

International

abandoned, technical problems are slowing down developments of such programmes in Finland, Sweden, France, Belgium and Switzerland and the only functioning (military!) disposal place in New Mexico in the US has been (temporarily?) halted after an accident. Many countries produce radioactive waste programmes on paper, but don't build them. In spite of no disposal being operational, the mountain of this highly toxic waste continues to grow – and with it the risk that something will go wrong.

Nuclear power doesn't solve the problem of climate change

The accident in three nuclear reactors in Fukushima Daiichi in 2011 was a clear reminder of the danger of a severe accident, and the long-term damage of a substantial leak of radioactive substances.

This could have been an opportunity to re-think Japan's disastrous nuclear strategy. And, initially, prime minister Naoto Kan's response was to promote renewable energy to fill the gap caused by the shut-down of its nuclear reactors, giving lucrative feed-in tariffs to stimulate the installation of solar, wind and other forms of renewable. But this far-sighted initiative was squandered by the government of Prime Minister Shinzo Abe which, in a knee-jerk response, fell back on fossil fuels[3]– aggravating the very problem that the nuclear industry says it wishes to help solve.

In the meantime, a decade-long debate about extravagantly expensive nuclear projects in the UK and Finland has delayed the development of clean renewable sources in those countries.

Nuclear has run out of time to "help" solve climate change

The nuclear industry would have to expand hugely to play any realistic role in keeping down greenhouse gas emissions. But it is not easy to build a lot of nuclear power stations. The Nuclear Energy Agency of the OECD had to admit that its original hopes for a fourfold growth of nuclear capacity in 2050 were wildly exaggerated. Its current proposal[4] is to double the nuclear fleet by that time, which would require 26 new reactors per year, for the next 35 years. In the last decade, on average fewer than five new reactors a year came on line.

Even if the nuclear fleet was doubled, it would result in a reduction of greenhouse gas emissions of about 4% compared to business as usual, at a time when global emissions need to be down by 50% to prevent catastrophic climate change.

The costs of such an operation are mammoth: at least 5 Trillion USD (based on 5000 USD/kWe - which is less than current estimates for nuclear construction in France, Finland, the UK, Hungary and the US), delivering electricity prices which are about double what they are today. In the meantime, renewable construction costs are continuing to go down and on-shore wind and photovoltaic energy are already cost-competitive.

The OECD's Nuclear Energy Agency recently admitted that nuclear projects may be able to compete only when construction times go down, prices are kept low, and costs are spread over 60 years against unrealistic low discount rates of 5%.[5] This goes against the trend of construction time increases, cost increases and financing problems we have seen for nuclear power worldwide.

---

[3] The Guardian, 17/04/2014. *Can Japan's climate policy get back on track after Fukushima?*

[4] IEA / NEA, *Technology Roadmap - Nuclear Energy - 2015 edition*, Paris (2015)

[5] IEA / NEA, *Projected Costs of Generating Electricity - 2015 Edition*, Paris (2015)

Nuclear power stations take a long time to build. From the moment of a decision, it takes over a decade before a reactor is linked to the grid in countries with nuclear experience. New entrants take even more time, unless they cut corners in necessary safety features or nuclear oversight.

Whatever nuclear power could theoretically deliver, it does so too little, too late and against too high costs.

The battle of the grids

The nuclear industry argues we need to use renewable energy sources, but also nuclear energy because the latter delivers stable output 24/7. And that is exactly where the problem is.

Although many renewable energy sources can be used on demand (biomass, biogas, larger hydro, geothermal, concentrated solar heat power, wave- and tidal energy) the two cheapest forms, wind and PV, are variable. This means that any high-renewable structure will need to be able to work with many, decentralised variable sources. An expensive invariable source like nuclear power then gets in the way. It is possible to reduce the capacity from nuclear power stations, of course, but this has a negative impact on its life-time (less time to earn back the high investment) and cost-recovery (less income when the capacity is reduced). It's another factor that prices nuclear out of the future.

Energy efficiency and many renewable energy forms are the way to go

- Greenhouse gas emissions in the energy sector need to be brought to zero by 2050. For that, a real revolution is needed in energy policy that is realistic and will deliver the necessary reductions as soon as possible.

- The Greenpeace Energy [R]evolution Scenario 2015[6] shows that it is possible to decarbonise the energy sector by mid-century without the need for nuclear power. In fact, the introduction of more nuclear energy into that mix would complicate the developments to an extent that it would be difficult or extremely expensive to deliver the emission reductions needed.

- Nuclear power complicates grid development, it adds to cost, it slows down renewable energy implementation, it delays emission reductions and on top of that we still face the problems of the risk of accidents, proliferation and radioactive waste.

For more information, contact:

Martin Kaiser, Head of International Climate Politics, martin.kaiser@greenpeace.de
Jan.Haverkamp, Greenpeace nuclear energy and energy policy consultant, jan.haverkamp@greenpeace.org
(V.i.S.d.P./Person responsible according to the German Press Law)
Tina Loeffelbein, Head of Political Communications Climate, tina.loeffelbein@greenpeace.org
Mobile: +49 151 167 209 15

Greenpeace Germany e.V.
Hongkongstr 10
20457 Hamburg Germany
Tel: +49 40 30618 – 340
presse@greenpeace.de

[6] Teske, Sven, Steve Sawyer and Oliver Schäfer, *Energy [R]evolution - a sustainable world energy outlook 2015 - 100% renewable energy for all*, Amsterdam (2015) Greenpeace International