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Nuclear energy as a miracle solution for the energy transition and the climate crisis? *This is and remains an illusion*

1) Despite relatively low CO₂ emissions during operation, nuclear energy is by no means environmentally friendly:

- Measuring the ‘environmental friendliness’ of nuclear energy solely on the basis of CO₂ emissions is too narrow a view: uranium mining causes massive environmental pollution and has negative social impacts on the local population. Uranium must be transported over long distances from its countries of origin.
- The search for suitable solutions for radioactive waste (during mining and after the removal of fuel elements) has not yet yielded convincing results.
- In the scientific literature, estimates of CO₂ emissions from nuclear energy vary widely. Very low figures should be viewed with scepticism, as they are often disseminated by pro-nuclear stakeholders. More realistic estimates tend to range from 78–178 grams¹ of CO₂ equivalent per kWh. In even when operating at full capacity, a nuclear power plant emits at least 4.4 grams. Overall, therefore, the carbon footprint of nuclear energy is significantly worse than that of renewable energies² :
 - Offshore wind power: 10–26 grams of CO₂ equivalent per kWh
 - Onshore wind power: 7–56 grams of CO₂ equivalent per kWh
 - Photovoltaics: 18–180 grams of CO₂ equivalent per kWh (here, the production location plays a significant role, as transport is included)

¹ Mark Z. Jacobsen, Stanford University, 2024

² IPCC

* Mouvement Ecologique, Greenpeace, OGBL, LSAP, déi gréng, Forum, déi jonk gréng, DP, FGFC, LCGB, Luxembourg Guides and Scouts, Fairtrade Luxembourg asbl, déi Lénk, Justice et Paix, Climate Alliance Luxembourg, Eurosolar, Syprolux, natur&ëmwelt, Ligue CTF, Pirates, JSL, déi jonk Lénk.



2) In the long term, new nuclear technologies and reactor types are not yet fully developed, are extremely expensive, and their development prevents a more sensible use of these investments in renewable energy

- Technologies such as nuclear fusion are, according to all forecasts, not expected to be operational before the end of the 21st century. However, the period from 2025 to 2035 is crucial for achieving massive reductions in CO₂ emissions.
- Research into nuclear technologies and new reactor types consumes billions of euros, funds that are lacking elsewhere.
- Despite these massive investments, many ‘miracle solutions’, such as SMRs (Small Modular Reactors), are still immature, as evidenced by very low operating figures³. These reactors remain far from being economically and exacerbate the problem of the proliferation of weapons-grade material.
- The construction of the EPR (European Pressurised Reactor) is facing significant delays, resulting in very high additional costs – Hinkley Point C is now expected to cost over 30 billion pounds⁴.
- New investments in nuclear energy, the construction of new power stations and the ramp-up of existing reactors are currently uneconomical, even for large corporations.

3) Globally, more energy is generated from renewables than from nuclear power⁵

- New renewable energy capacity: +460 GW from wind and solar
- New nuclear energy capacity: –1 GW (net of reactor closures and openings)
- Production: In 2021, production from renewables exceeded that from nuclear energy for the first time; by 2023, it will be 50% higher. The 2,300 TWh generated by solar energy alone is almost on a par with the 2,600 TWh generated by nuclear energy

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³ As of 2024: two of these reactors are producing energy that is fed into the grid, in Russia and India.

⁴ Source: EDF, prices adjusted for inflation; including inflation, the figure stood at over 40 billion pounds in 2024

⁵ Source: World Nuclear Industry Status Report 2024

4) Climate change also has an impact on the operation of nuclear power stations and reduces their economic viability

- The increasing warming of surface waters, along with the hydrological changes associated with longer periods of drought, are leading to further shutdowns of power stations. As a result, these stations are producing less energy and are becoming even less cost-effective.

5) Nuclear energy creates new dependencies

- Dependence on uranium imports, some of which come from crisis regions and countries subject to sanctions, is not a secure or sovereign solution.
- Furthermore, significant dependencies arise in the areas of technical expertise, maintenance and the final disposal of waste products.

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