Nuclear Power: A hazardous obstacle to clean solutions

While nuclear power presents itself as the largest low carbon source, its potential role in carbon mitigation is very limited and is not worth taking, given all its risks and costs.

The International Energy Agency published in 2008 an analysis, *Energy Technology Perspectives 2008*, which illustrates this point very well.[1] This scenario assesses what energy mix could achieve a 50% reduction in carbon emission by 2050. The Agency assumes a fourfold increase of nuclear power generation, from today's 2,600 TWh a year to 9,900 TWh a year in 2050, which would contribute only 6% of the required carbon reductions from the energy sector (and roughly 4% of overall greenhouse gases).

In contrast, the mitigation potential of renewable energy sources is 21% and the potential of efficiency is 36%. It is clear from this which technology needs to get priority.

Time matters. Energy efficiency measures can be implemented in months. A wind farm can be planned and erected in one year. Nuclear reactors take one to two decades to prepare and build.

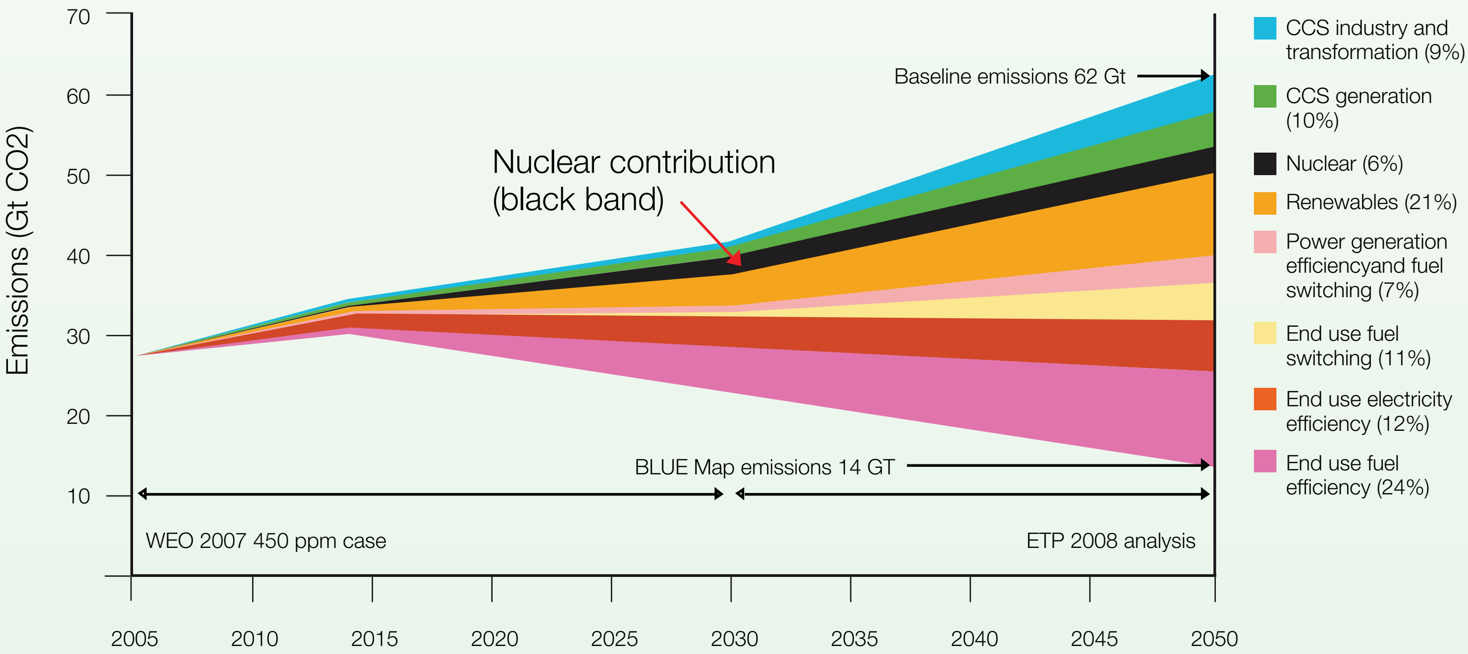
1 International Energy Agency, Energy Technology Perspectives 2008 (Paris: IEA, 2008)
2 International Atomic Energy Agency's PRIS database, http://www.iaea.org/programmes/a2/index.html
3 New Nuclear Generating Capacity - Potential Credit Implications for U.S. Investor Owned Utilities, Moody's Corporate Finance, May 2008

Yet, an unprecedented rate of growth would need to be achieved and sustained for four decades to make even this small contribution. On average, 32 large (1,000 MW) nuclear reactors would need to be built every year from now until 2050 – compared to an average of only 3 equivalent reactors a year in the past decade. To put this into perspective, in the 1980s - the decade of the nuclear industry's fastest growth - the industry built an equivalent of 17 large reactors a year,[2] growing at half the rate needed to realise the aforementioned IEA scenario.

Considering the current investment costs for new reactors (the French EPR is currently over $ 4,750 (US dollars) per kW), and the cost estimates ($ 7,500 per kW according to Moody's May 2008 report[3]) of getting required 1,400 large new reactors are 6,000 to 10,500 billion US dollars – and this only considers the upfront investment.

"Every dollar invested in nuclear power means a dollar less invested in energy efficiency and renewable energy sources that can replace several times more carbon for the same cost, and can do that much faster than nuclear power."

IEA/OECD's blueprint for carbon mitigation from the energy sector* shows that the potential of nuclear is very limited, even if expanded fourfold. In contrast, the mitigation potential of renewable energy and efficiency combined is 10 times bigger.



* IEA/OECD, 2008

image A US soldier checks a yellow cake mixer returned by Greenpeace to the Tuwaitha nuclear facility. The device was found in an open public place in front of a bus stop. The Tuwaitha facility was left unsecured by occupying powers after the fall of Saddam Hussein's regime.

Nuclear energy in trouble on all sides

Even today, running at one-tenth of the hypothetically required construction speed, the nuclear industry is struggling with serious problems and has hit many bottlenecks:

- **Massive technical problems and ever-rising costs** have affected attempts to build new reactor units - for example, the French EPR units in Finland and France have already experienced years of delays and billions in cost overruns.[4]
- **Capacity to produce** reactor components is limited to only several pieces a year, and then by only half a dozen corporations in a handful of countries.[5]
- **Shortages in uranium supplies** to fuel the existing fleet of reactors, where the annual consumption reached 69,000 tons of uranium in 2007, compared to annual production of just 41,300 tons in 2007.[6] The world's proven and reasonably assured uranium resources would only be able to cover current consumption for a few decades and, as they deplete, carbon emissions from the nuclear fuel chain would rise significantly.[7]
- **Raw material crunch**, because of the huge volumes of steel and concrete needed to construct reactors.
- **Negative health effects of ionising radiation.** Recently published peer-reviewed research found a statistically high incidence of childhood leukaemia in close vicinity of nuclear power plants in Germany[8] and US[9].
- **Dangerous impacts of uranium mining and milling** threatens the lands, communities and health of indigenous peoples, many of whom (in Canada, the US, India and Australia, for example) continue to protest the extraction of uranium on or near their homelands and territories
- **Lack of qualified engineers, inspectors and personnel** to safely manage and oversee operations at the current scale.
- **Long lead-times for projects.** It takes 10 to 15 years, even in countries with the developed related infrastructure, to plan, approve, build and start a new reactor. It would take even longer in countries that are just starting their nuclear programmes.
- **No safe disposal method for radioactive wastes** that reactors have already produced, despite decades of research and money spent. In the past five years, the estimated costs of radioactive waste disposal grew by $ 40 billion in the United States[10] and by £ 27 billion in the United Kingdom,[11] with no guarantees to deliver safe storage at the end.
- **Growing proliferation problems:** As stockpiles of separated plutonium increase, nuclear technologies and materials spread to new countries. International safeguards are under-resourced and structurally weak. It is only a question of time before they become accessible to terrorist groups. One large reactor can produce 200 kilograms of plutonium every year - enough for two dozen nuclear weapons.

All these factors raise additional scepticism about the potential of nuclear power to really mitigate greenhouse gases on any useful scale and timeframe.

4 Nucleonics Week, Platts, 4 September 2008; Detailed briefings and refererences at http://www.greenpeace.org

5 Platts Nucleonics Week publications; Nuclear Engineering International; http://www.areva.com .

6 See World Nuclear Association, online: http://www.world-nuclear.org/info/inf23.html .

7 Benjamin Sovacool, "Valuing the greenhouse gas emissions from nuclear power" (2008) 36 Energy Policy 2940.

8 Spix C et al, Case-control study on childhood cancer in the vicinity of nuclear power plants in Germany 1980- 2003, European Jouran of Cancer (December 2007)

9 Joseph Mangano, Janette D. Sherman: Childhood Leukaemia Near Nuclear Installations, European Journal of Cancer Care No 4 Vol 17, July 2008

10 Platts, Nuclear Fuel, 11 August 2008.

11 Guardian Online: http://www.guardian.co.uk/environment/2008/jul/18/nuclearpower.energy .