Getting Serious about Nuclear Power

Too little, too late, too expensive – and too dangerous

Nuclear Power contradicts Clean Development

The nuclear industry is using the issue of climate change and energy supply as a vehicle to win political and financial support for its dirty and dying sector. Even a massive, four-fold expansion of nuclear power by 2050 would provide only marginal reductions (4%) in greenhouse gas emissions, when we need global emissions to peak at 2015 and 50 - 80% cuts by 2050.

Nuclear energy's 'contribution' to fighting climate change would come too late (long after 2020), with huge costs (US$ 10 trillion) and would create a myriad of other serious hazards related to accidents, waste and proliferation. These large costs and negative impacts make nuclear energy an obstacle to the necessary development of effective, clean and affordable energy sources – both in developing and industrialised countries.

Activities related to nuclear power must not be allowed to become eligible for the Kyoto Protocol's flexible mechanisms in order to avoid:

- Undermining climate protection by wasting time and taking resources away from more effective and clean solutions;
- Dumping this expensive and unsafe technology on developing countries who would be landed with the associated economic and environmental impacts (accumulation of massive financial debts, increased dependency on foreign fuel and technologies, increased risk from reactor accidents and contamination); and
- Decreasing global security as volumes of nuclear waste with no safe methods of disposal increase massively and both nuclear materials and technologies are spread.

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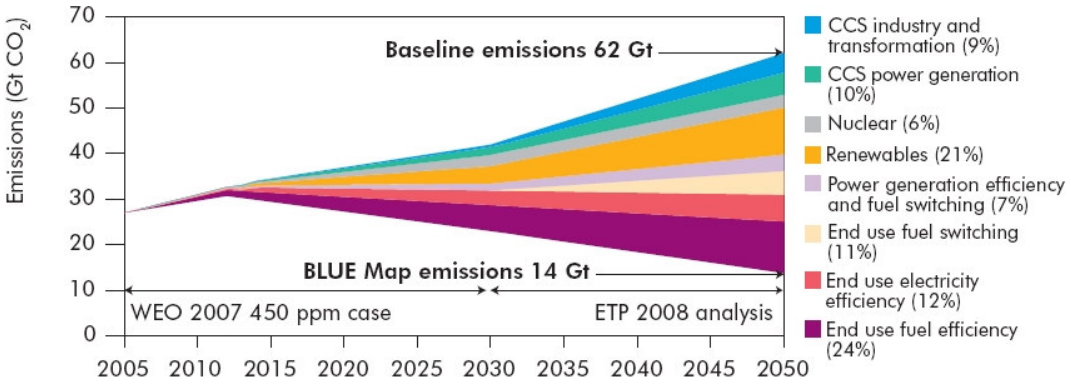
Nuclear power can provide only expensive, late and marginal contribution to carbon mitigation

The OECD International Energy Agency's (IEA) *Energy Technology Perspectives 2008* Blue Map scenario[1] assesses what energy mix could achieve a 50% reduction in carbon emission by 2050. The agency assumes a four-fold increase of nuclear power generation, from today's 2,600 TWh/year to 9,900 TWh/year in 2050. But this would only reduce CO_2 emissions from the energy sector by 6% (around 4 % of overall greenhouse gases).

Figure ES.2 ▶ Comparison of the *World Energy Outlook 2007* 450 ppm case and the BLUE Map scenario, 2005-2050



Even getting to this 6% would require unprecedented rates of growth, sustained over four decades. The nuclear industry would have to build an average of 32 large (1,000 MWe) nuclear reactors every year from now until 2050.

Compare this with the last decade's average where the nuclear industry added 3000MW of new capacity a year. In the 1980's, the decade of the industry's fastest growth, it built an average of 17,000 MW a year[2] – still only half the rate needed to realise the IEA's Blue Map scenario. But the IEA believes we can build 32,000MW capacity every year from now to 2050.

Then there's the cost. Moody's[3] currently estimates the investment cost for new reactors at USD 7,500 USD/kW. Assuming this, the required 1,400 large new reactors would cost around USD 10,500 billion – and this is only the upfront investment.

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

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

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 both the French EPR units in Finland and France experienced years of delays and billions in cost overruns already.[4]
- **Capacity to produce** reactor components is limited to only several pieces a year and by 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 tonnes uranium in 2007, compared to an annual production of just 41,300 tonnes 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 its demand for huge volumes of steel and concrete.
- **Negative health effects of ionising radiation.** Recently published peer reviewed research found statistically high incidence of childhood leukaemia in close vicinity of nuclear power plants in Germany[8] and the 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, Africa, India and Australia, *inter alia*) 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 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 USD 40 billion in United States[10] and by GBP 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 kgs 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 references 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 Journal 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 .

Nuclear power is a hazardous obstacle to clean solutions

Expensive, dirty and hazardous nuclear power stands in the way of clean and sustainable solutions. It could take USD10 trillion or more to build enough reactors to produce 9,900 TWh of nuclear electricity as projected under the IEA's 2008 Blue Map scenario. Building enough wind farms to produce the same amount of electricity, for example, would cost USD 6 trillion at current prices, with these costs decreasing over time.

Wind has no associated fuel costs and does not require expensive dismantling of the plant at the end of its life and long term disposal of radioactive waste. Other calculations show that, compared to nuclear, *wind power at today's costs replaces twice as much carbon per invested dollar and energy efficiency measures three to six times more.*[12]

Even the IEA's 2008 Blue Map scenario itself shows that, while massive nuclear expansion reduces carbon emissions from the energy sector by 6%, the potential of renewable energy sources is around four times bigger, and the potential of energy efficiency six times bigger. It is clear which technology needs to get priority.

Lastly is the issue of time. Energy efficiency measures can be implemented in months. A wind farm can be planned and built in one year. Nuclear reactors take one to two decades to prepare and build. 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.

Nuclear power not suitable

Renewable energy sources can easily provide power to remote areas with underdeveloped infrastructure and can be implemented fast and support local jobs.

In contrast, large nuclear power plants are often not compatible with grids and infrastructure in developing countries. Various institutions have recently warned developing countries against unrealistic expectations from nuclear energy plans.

Ferran Tarradellas Espuny, a spokesman for the EU Energy Commissioner, said about renewable energy projects in South East Asia:

"You should go for it. It is cheaper than investing in nuclear development." [13]

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12 Amory Lovins, The Nuclear Illusion, May 2008.
13 http://www.bangkokpost.com/121008_News/12Oct2008_news08.php