

Nuclear Energy:

The answer to Climate Change or a recipe for weapons proliferation?

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Dr Herman Scheer

The birth of the Atomic Age in 1945 introduced a new and frightening reality – that humans had developed the potential to not only kill each other in large numbers, but also to threaten civilization and the entire ecosystem. The nuclear threat has not disappeared, but has been joined by another human-made threat to civilization – climate change emissions.

In January 2007 the Bulletin of Atomic Scientists, in an indication of the increasing global risks arising from climate change and nuclear weapons, moved the hands of their Doomsday Clock to five minutes to midnight. The Clock indicates, in the view of eminent scientists, how close we are to a catastrophe that could destroy civilization. It now stands at five minutes to midnight.

Mathematician Stephen Hawking, at the press conference announcing the Doomsday Clock change, noted; "As scientists, we understand the dangers of nuclear weapons and their devastating effect, and we are learning how human activities and technologies are affecting climate systems in ways that may forever change life on Earth. As citizens of the world, we have a duty to alert the public to the unnecessary risks that we live with every day, and to the perils we foresee if governments and societies do not take action now to render nuclear weapons obsolete and to prevent further climate change."

The challenge to meet increasing national and global energy needs, while at the same time reducing climate change emissions, has led a number of governments to turn to nuclear energy as a potential saviour. At a recent meeting of the Asia-Pacific Economic Cooperation Summit, US President George W Bush, for example, insisted that "If you truly care about greenhouse gases, then you'll support nuclear power. If you believe that greenhouse gases are a priority, like a lot of us, if you take the issue seriously, like I do, then you should be supportive of nuclear power. After all, nuclear power enables you to generate electricity without any greenhouse gases."

The US is thus considering resuming construction of nuclear power plants after a 30 year hiatus. Other countries are also looking at either beginning, resuming or increasing construction of nuclear power plants.



The International Atomic Energy released this new international symbol for radiation in 2007, indicating 'Danger – Keep Away'.

See:

www.iaea.org/NewsCenter/News/2007/radiationsymbol.ht

A 2003 study from the Massachusetts Institute of Technology¹ envisaged the possibility of 1000 new nuclear reactors being built over the next 45 years in order to meet energy needs without increasing climate change emissions.

However, a number of other studies conclude that nuclear power cannot meet energy needs, is excessively expensive, is not carbon neutral, and creates additional environmental and security risks. Most importantly, new evidence indicates that environmentally safe and sustainable energy technologies can be developed to meet growing energy needs.

Nuclear power cannot meet energy needs

The Institute for Energy and Environmental Research² notes that the possibility of 1000 new nuclear reactors being built by 2050, as explored by MIT, is optimistic given current and projected technical capacity. Even if this were possible, it would only increase the proportion of global energy produced by nuclear power by about 4%. IEER reports that this compares unfavourably with the energy returns that would be possible investing the same resources in alternative sustainable energy development.

Nuclear energy is excessively expensive

In 1954 Lewis Strauss, Head of the US Atomic Energy Commission, promised the world that “it is not too much to expect that our children will enjoy in their homes electrical energy too cheap to meter.” The reality has in fact been the reverse – nuclear energy is one of the most expensive forms of energy. The true cost has been hidden by extensive government subsidies, limits on liability for accidents, and the costs for waste storage and nuclear power plant decommissioning not being added to pricing structures. Even without these costs included, the price of nuclear energy per kilowatt hour is approximately twice that of natural gas and is unlikely to decrease. The costs of wind and solar, on the other hand, are now comparable with nuclear energy and rapidly falling as energy efficiency improves and economies of scale kick in (As more wind turbines are produced, for example, the unit cost is reduced).

Nuclear energy is not carbon neutral

It is true that the fission of enriched uranium in a nuclear reactor to generate energy produces no carbon emissions. However, every other step required to produce nuclear energy releases carbon into the atmosphere. These include yellow-cake mining, ore transport, ore crushing, uranium extraction, uranium enrichment, uranium oxide furnacing, uranium casing (with zirconium) and nuclear power plant construction. In the paper "*Nuclear Power : the energy balance*" J.W. Storm and P. Smith calculate that with high quality ores, the CO₂ produced by the full nuclear life cycle is about one half to one third of an equivalent sized gas-fired power station. For low quality ores (less than 0.02% of U₃O₈ per tonne of ore), the CO₂ produced by the full nuclear life cycle is equal to that produced by the equivalent gas-fired power station.



*North Hoyle (UK) offshore windmills
Photo: Anthony Upton*

¹ *The Future of Nuclear Power*, MIT Study Group chaired by Professors John Deutch and Ernest Moniz, 2003

² **Insurmountable Risks**, The Dangers of Using Nuclear Power to Combat Global Climate Change, Brice Smith, IEER, Takoma Park USA (2006)

Nuclear power creates environmental and security risks

Nuclear reactors contain an incredibly dangerous level of radiation – up to hundreds of times more than was released by the nuclear bombs dropped on Hiroshima and Nagasaki. In addition the nuclear reaction occurs at incredibly high pressures and temperatures – all to turn water into steam to turn turbines. Physicist Michio Kaku has compared this to using a chainsaw to slice butter.

It is true that nuclear reactors have tight safety measures. Despite this, accidents can happen and have happened. The Chernobyl accident released millions of curies of radiation into the atmosphere making whole regions inhabitable and causing thousands of deaths. Other accidents releasing smaller amounts of radiation include Sellafield (1957) and Three Mile Island (1979). Even with improved safety procedures, the risk of another major nuclear accident is high. Henrik Paulitz, using official German risk figures, sets the probability of a severe nuclear accident in Europe as 1:6 over the next 40 years, i.e. the probability of throwing a six on a dice.

Just as important is the vulnerability of nuclear power plants to a terrorist attack. If the World Trade Center terrorists had instead flown their planes into the Indian Point nuclear reactor just north of Manhattan, the city would have been rendered uninhabitable for hundreds of years.

Nuclear energy fuels the bomb



*Nuclear energy is a dead end
Photo Greenpeace*

In 1946 a report to the US Secretary of State's Committee on Atomic Energy concluded that *"The development of atomic energy for peaceful purposes and the development of atomic energy for bombs are much of their course interchangeable and interdependent."* The committee further concluded that *"...there is no prospect of security against atomic warfare"* in an international system where nations are *"free to develop atomic energy but only pledged not to use it for bombs."*

Subsequent events have given proof to this statement. The development of nuclear weapons by France emerged from a nuclear program which many scientists believed was only for civilian purposes. India's explosion of a nuclear device in 1974 developed from a civilian nuclear program.

Frank von Hippel, former science adviser to the US government, has noted that *"Civilian nuclear energy programs provide a convenient cover, as well as the training, technology and nuclear material necessary for the construction of nuclear weapons."*

The recently expressed desire by energy rich Arab countries to develop nuclear energy leads to questions about the real intentions of these governments, and gives further cause for concern about nuclear weapons proliferation accompanying any proliferation of nuclear energy.

Many countries use the Non-Proliferation Treaty to justify their 'right' to develop nuclear energy and to receive assistance from other States and the International Atomic Energy Agency to do so. This could be changed by adding a protocol to the NPT which would replace the current obligation to assist nuclear energy development by an obligation to assist instead with the development of renewable energies.

World's energy needs can be met by alternatives

Wind, solar, biomass, water, and other environmentally safe energy sources currently provide a small fraction of global energy sources. However they potentially could provide a substantial portion of global energy needs. Henrik Paulitz estimates that sun, wind, water, biomass and other renewable energies could provide a primary energy supply of 580 exajoules by the year 2050. This is 30% more than the current world energy usage. Such production would however require research and development support from governments, such as is currently invested in nuclear energy, in order to improve technologies and make them cost-competitive.



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Some countries are developing renewable energy sources sufficiently to both reduce fossil fuel consumption and phase out nuclear energy. In Germany this process has been very successful, as indicated in the recent book *Energy Autonomy* by Dr Herman Scheer. Since the Renewable Energy Sources Act was adopted in 2004, the percentage of Germany's entire electricity supply derived from renewable energy has increased to 12 percent – the target figure for 2010. 8.5 per cent – or approximately 25,000 megawatts - has come from 'new' forms of renewable energy, meaning without water power from dams. Wind power has comprised the largest share. Assuming that Germany experiences the same annual growth of renewables over the next few decades, capacity would increase to 48,000 megawatts in 2015, 78,000 in 2025, 108,000 in 2035, and 178,000 in 2054 – far exceeding the capacity envisaged in the Renewable Energy Sources Act. In addition, renewable energy's still youthful technologies will continuously increase their level of efficiency

thus creating a situation in Germany in which nuclear and fossil energy could be completely replaced by renewable energy within 40 to 50 years from now.

Role of parliamentarians

Parliamentarians can help promote renewable energy technologies, prevent the development of nuclear energy and thus prevent nuclear proliferation through:

- Encouraging their governments to forgo nuclear energy and instead develop environmentally safe renewable energy
- Supporting the establishment of an International Renewable Energy Agency which would assist countries in developing renewable energy
- Supporting the adoption of an additional protocol to the Nuclear Non-Proliferation Treaty on assisting member States with the development of renewable energy
- Joining the World Parliamentary Network for Renewable Energy (contact hermann.scheer@bundestag.de)

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