

November 2004



**Friends of
the Earth**

Briefing

Why nuclear power is not an achievable and safe answer to climate change

Climate change threatens global security and the stability of the environment. Friends of the Earth Trust carries out independent and authoritative research on the causes and impacts of climate change and measures to adapt to or prevent it, and provides information to the public on the basis of that research.

Friends of the Earth inspires solutions to environmental problems, which make life better for people.

Friends of the Earth is:

- the UK's most influential national environmental campaigning organisation
- the most extensive environmental network in the world, with almost one million supporters across five continents and over 60 national organisations worldwide
- a unique network of campaigning local groups, working in over 200 communities throughout England, Wales and Northern Ireland
- dependent on individuals for over 90 per cent of its income.

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Friends of the Earth Limited company number 1012357

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Why nuclear power is not an achievable and safe answer to climate change

Friends of the Earth has researched realistic solutions to reduce UK greenhouse gas emissions and has openly considered the view that nuclear power could tackle climate change. Friends of the Earth has modelled how the Government could meet its climate targets for 2010, in respect of electricity, and at how electricity generation could change up to 2020ⁱ. Friends of the Earth has concluded that, based on current scientific information, investment in a programme to construct new nuclear power plants is not justified and that nuclear power has several drawbacks that prevent it from being an achievable and safe answer to climate change. In summary these are:

- Doubling nuclear power in the UK would reduce greenhouse gas emissions by no more than 8%.
- Research, in a UK context, suggests nuclear power would produce about 50 per cent more global warming emissions than wind powerⁱⁱ.
- Nuclear power does not hold any financial benefits compared with the development of renewable energy
- The technology of nuclear power is intimately connected with the technology used to make nuclear weapons
- Nuclear facilities are uniquely vulnerable to terrorist attack
- Nuclear power produces waste which remains dangerous for tens of thousands of years
- Nuclear power leads to radioactive discharges into the seas and atmosphere

In 2000, the Royal Commission on Environmental Pollution showed that the UK could cut its carbon dioxide emissions by 60 per cent by 2050 without recourse to nuclear powerⁱⁱⁱ.

Doubling nuclear power in the UK would reduce greenhouse gas emissions by no more than 8% at most

Nuclear power currently generates about a quarter of our electricity. Yet electricity generation is responsible for less than a third of the UK's emissions of carbon dioxide, the principal greenhouse gas. Carbon dioxide is responsible for about five-sixths of the UK's greenhouse gas emissions.

Friends of the Earth has calculated that, if the use of nuclear power in the UK was doubled, emissions of greenhouse gases could fall by about 8 per cent.

This calculation assumes that nuclear power produces no carbon dioxide emissions. However the mining and transport of uranium, the making of nuclear fuel rods, the building of nuclear power plants and the storage and processing of nuclear waste all lead to carbon dioxide emissions.

Assessments therefore need to be based on the whole impact of nuclear power on greenhouse gas emissions. These vary depending on where the assessment is made and on what nuclear power is compared against^{iv}. In general nuclear power comes out favourably against coal, oil and gas and worse than combined heat and power using biofuels^v. The most authoritative study for the UK suggests it would produce about 50 per cent more global warming emissions than wind power^{vi}.

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Nuclear power does not hold any financial benefits compared with the development of renewable energy

In 2002 the Cabinet Office Performance and Innovation Unit (PIU) Energy Review predicts the cost of energy in 2020 as:

Estimated cost of UK electricity in 2020 pence/kWh

On Land wind	1.5 - 2.5
Offshore wind	2 - 3
Energy crops	2.5- 4
Wave and tidal power	3 - 6
PV Solar	10 - 16
Gas CCGT	2 - 2.3
Large CHP/cogeneration	> 2
Micro CHP	2.3 - 3.5
Coal (IGCC)	3 – 3.5
Nuclear	3 - 4

Source: Performance & Innovation Unit, 'The Energy Review', Cabinet Office, Feb. 2002.

Nuclear power uses technology that is intimately connected with nuclear weapons

Uranium enrichment technology that is essential for nuclear power can also be used to make weapons-grade uranium. A number of countries have already used nuclear power as a spring board to make nuclear weapons^{vii}. In the last year, Iran and North Korea have been investigated by international agencies over their alleged misuse of civil nuclear technology.

Climate change is a global problem and global agreements will be needed to prevent it. Energy generation is a major cause of greenhouse gas emissions and energy use is closely related to international competitiveness. It is difficult to see how a global agreement to cut emissions can be achieved if one country has access to a technology that is denied to another.

If Britain were to use nuclear power to cut its emissions, it would find it difficult to argue that other countries shouldn't. Yet this would greatly increase the risk of nuclear proliferation.

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Nuclear power plants are vulnerable to terrorist attack

Following 9/11, David Kyd of the International Atomic Energy Agency told the Times that “reactors are built to withstand impacts but not that of a wide-bodied passenger jet full of fuel. A deliberate hit of that sort is something that was never in any scenario at the design stage. These are vulnerable targets and the consequences of a direct hit could be catastrophic.”^{viii} A report commissioned by the European Parliament concluded that a plane crashing on Sellafield would be forty times more dangerous than Chernobyl^{ix}. Mohamed El Baradei, IAEA Director General, says: “there is no sanctuary anymore, no safety zone”^x.

In his January 2002 State of the Union speech, President Bush said that U.S. forces “found diagrams of American nuclear power plants” in al-Qaeda materials in Afghanistan. An al-Qaeda training manual lists nuclear plants as among the best targets for spreading fear in the United States^{xi}.

Nuclear power produces waste which remains dangerous for tens of thousands of years.

There is no agreed solution for the safe storage of this waste. An inventory in 2001 recorded 1.75 million cubic metres of nuclear waste in the UK, most of which has arisen from civil nuclear power and reprocessing. Most of this waste will require treatment before it can be stored safely, yet 85 per cent is currently stored in a raw or partly treated state^{xii}.

In 1997, the Government rejected proposals to build a Rock Characterisation Facility, a precursor to an underground store for these radioactive wastes, at Sellafield. The decision letter said the Secretary of State “remains concerned about the scientific uncertainties and technical deficiencies in the proposals presented by Nirex [the nuclear industry waste management body], which would also justify refusal of this appeal”^{xiii}.

Nuclear power leads to radioactive discharges into the seas and atmosphere.

Reprocessing of spent fuel from nuclear reactors, at Sellafield, leads to emissions of radioactive forms of hydrogen, sulphur and krypton being released into the air. It causes releases of the radioactive element technetium to the sea^{xiv}.

Discharges to the atmosphere have fallen in recent years^{xv} and discharges to the sea are expected to fall, following construction of an effluent treatment plant^{xvi}. However, radioactive contamination from Sellafield can still be found throughout the Irish Sea and beyond.

Only this week, a Government committee has reported that the health impacts from radioactive particles taken into the body may be ten times greater than previously thought^{xvii}.

Background facts

- Nuclear power stations currently produce about a quarter of Britain's electricity.
- Many are now too old to continue to operate efficiently and safely and are being closed down.
- By 2023 only 4% of Britain's electricity will come from nuclear power.
- In terms of climate change nuclear power generally comes out favourably against coal, oil and gas and worse than combined heat and power using biofuels.
- The most authoritative study for the UK suggests nuclear would produce about 50 per cent more global warming emissions than wind power^{xviii}.

ⁱ http://www.foe.co.uk/resource/reports/climate_chnge_without_nuke.pdf

ⁱⁱ <http://externe.jrc.es/uk.pdf>

ⁱⁱⁱ Royal Commission on Environmental Pollution (2000) "Energy – our changing climate" 22nd Report Chapter 9

^{iv} See http://www.oeko.de/service/gemis/files/info/nuke_co2_en.pdf, or <http://www.nei.org/index.asp?catnum=2&catid=260> for a selection of different studies.

^v This is because the combined heat and power using biofuels would also cut fossil fuel use for heating. As a result, the CO₂ emissions for the electricity generating part of the process are effectively negative. – see http://www.oeko.de/service/gemis/files/info/nuke_co2_en.pdf

^{vi} <http://externe.jrc.es/uk.pdf>

^{vii} See http://en.wikipedia.org/wiki/Nuclear_proliferation

^{viii} Henderson M "Nuclear reactors vulnerable to attack" The Times 27 September 2001

^{ix} WISE (Paris) (2001) "Possible toxic effects from nuclear reprocessing plants at Sellafield (UK) and Cap de la Hague (France)" STOA p. 38

^x International Atomic Energy Authority "Calculating the new global nuclear terrorism threat" Press Release 1 November 2001

^{xi} <http://www.cfrterrorism.org/security/nuclearfacilities.html>

^{xii} DEFRA/NIREX (2002) "Radioactive Wastes in the UK: a summary of the 2001 inventory"

http://www.defra.gov.uk/environment/radioactivity/research/complete/pdf/defra_ras-02-003.pdf

^{xiii} Secretary of State for the Environment (17 March 1997) "Appeal by United Kingdom Nirex Ltd into the proposed Rock Characterisation Facility on land at and adjoining Longlands Farm, Gosforth, Cumbria" Government Office for the North West para 9

^{xiv} http://www.environment-agency.gov.uk/yourenv/eff/business_industry/213963/513813/514241/?lang=e

^{xv} http://www.environment-agency.gov.uk/yourenv/eff/business_industry/213963/513813/514241/?lang=e

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<http://www.environ.ie/DOEI/doi/pub.nsf/0/78DC86336A0857C580256E7E002B46CD?OpenDocument&Lang=en>

^{xvii} Committee Examining Radiation Risks of Internal Emitters (CERRIE) "Report calls for precautionary approach to internal radiation" 20th October 2004 http://www.cerrie.org/pdfs/cerrie_press_release_final.doc

^{xviii} <http://externe.jrc.es/uk.pdf>