

March 2006



**Friends of
the Earth**

Briefing

The Energy Review

A short guide

Introduction

In January 2006, the Government published a new consultation, 'The Energy Review'ⁱ, inviting comments on how the UK should meet its future energy needs. The review considers a number of key issues of concern: how to get the UK on track to meet its climate targets; the importance of ensuring secure energy supplies for the UK; and how to replace our ageing coal fired and nuclear power stations. Significantly, the review pays particular attention to proposals for a new nuclear power programme. This consultation is an important opportunity to call on the Government for a greater emphasis on clean, sustainable energy sources, and is open to all stakeholders - NGOs, industry, and the public, to submit their views.

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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We encourage you to respond, either using our online letterⁱⁱ, or write your own submission. This briefing is intended to give additional information to inform your response. You can find more info in our report '*A Bright Future*', and once published, in our full submission responseⁱⁱⁱ.

Background

In 2003 the Government published an Energy White Paper^{iv} which identified as energy strategy priorities reducing emissions that cause climate change and ensuring energy security. The report concluded there was no need for a new nuclear programme and suggested a major role for renewable and decentralised energy. Just 3 years later the UK looks off-track to meeting its target of a 20 per cent cut in CO₂ emissions by 2010, and is again considering the nuclear option.

The 2006 Energy Review currently underway (until April 14th 2006) focuses primarily on electricity generation. The UK's fleet of coal fired power stations have traditionally been the backbone of electricity supply, but are now more than 30 years old and reaching the end of their design lifetime. During the nineties the 'dash for gas' saw a switch to gas-fired electricity generation and construction of a large number of gas fired power stations, which had significant benefits in terms of UK CO₂ emissions, as modern gas plant produces around half the CO₂ of our ageing coal plant. However, due to rising gas prices (in part linked to the price of oil) recent years have witnessed a switch back to coal and a consequent rise in emissions from the sector. The situation is further complicated as diminishing gas reserves in the North Sea mean the UK is becoming a net gas importer, in an increasingly globalised gas market, prompting fears for the security of future supplies.

Against this background, nuclear power is hailed by some as a magic bullet which will solve all our energy ills. Our existing nuclear power stations are also reaching the end of their lifetime and being decommissioned, and proponents argue these should be replaced with a nuclear programme, hailing them as an emissions-free solution to our energy needs, despite technological and nuclear proliferation concerns.

However, Friends of the Earth believes the most sensible, sustainable answer to the twin aims of emissions reductions and energy security can be better achieved by a programme of support for clean renewable energy technologies, demand reduction, and maximizing the efficiency with which we use coal and gas.

A sustainable energy future?

Friends of the Earth has assessed a number of potential scenarios for future UK electricity generation, and these are detailed in our recently published report, '*A Bright Future*'^v.

This shows that:

1. **The UK can meet demand for electricity *and* make massive cuts in CO₂ emissions from this sector by 2020 – without the need for a new nuclear programme.**
2. **Natural gas consumption in the power sector can be stabilised or even lowered considerably - addressing the growing concern over gas imports.**

'A Bright Future' considers a number of electricity scenarios for 2020-2030. The scenarios are based on realistic industry estimates of the UK potential for a range of renewable technologies, highly efficient combined heat and power stations, combined with a stabilisation or modest reduction in electricity demand. In the scenarios remaining demand was met by conventional generation (fossil fuels) alongside a continued phase-out of nuclear power.

The scenarios also considered the thorny question of gas versus coal: while a switch in conventional generation from coal to gas continues to offer significant savings in emissions, the potential high cost of gas and concerns over energy security may influence the UK's future generation mix, resulting in continued operation of some coal plant. These, however, would have to be fitted with state-of-the-art technologies to reduce their emissions.

All our scenarios demonstrate that by promotion of renewable energy, demand reduction, and more efficient use of fossil fuels, we can meet electricity demand AND reduce the carbon dioxide emissions associated with electricity generation by 48-71 per cent by 2020, with further reductions by 2030.

Friends of the Earth's demands to the Energy Review

Friends of the Earth is calling on the Government to take action to combat carbon dioxide emissions from the electricity sector by:

1. Friends of the Earth's climate campaign - The Big Ask, is calling for the introduction of a new climate change law which would force the government to cut emissions of carbon dioxide, the main greenhouse gas, by three per cent every year^{vi}. This new law will also greatly help to provide the long-term certainty needed for investment in clean technologies.
2. Ensuring fossil fuels are used in the most efficient way possible through the promotion of combined heat and power schemes, decentralised energy systems, and technologies to clean up coal-fired power stations.
3. Doing more to promote renewable sources of electricity: the Government has set targets for renewable energy growth. However without more ambitious policies which promote a wide range of renewable electricity sources the Government is unlikely to achieve these targets, or even begin to tap the enormous potential of renewable energy sources.
4. Reducing demand for electricity through new energy efficiency measures. The government must do far more to promote energy-efficiency policy for industry, the commercial and retail sector and households. If nothing is done, demand will continue to grow.
5. In addition, the Energy Review must identify new policies to reduce emissions in the transport and heating sector, which currently appear to be neglected.

Further information

Solutions and technologies

Below we outline some of the solutions and technologies we believe the Government should be promoting instead of nuclear power ^{vii}. (More detailed information, including estimates of the potential of each technology, can be found in the '*A Bright Future*' report):

Energy efficiency

A Government study^{viii} in 2002 concluded that the country could cost-effectively reduce energy consumption by up to 30 per cent through the adoption of current energy efficiency technologies. There are many ways to achieve energy savings in the home and in the workplace. New more efficient technologies, from domestic appliances to office cooling systems and industrial motors are appearing on the market making it easier to reduce consumption and energy bills. For example a programme to replace ordinary light bulbs with energy efficient light bulbs could reduce national electricity consumption by at least two per cent by no later than 2020 - the equivalent to one nuclear power station. The potential is much higher if we implement a programme to replace all inefficient street lighting and lighting in the commercial sector in the same time period.

Micro-generation

Micro-generation refers to a number of different renewable or highly efficient fossil fuel technologies that can generate heat and/or electricity in people's homes and workplaces. Most are designed to meet domestic needs but more powerful devices are being developed which would have the potential to export excess electricity back to the grid. For example micro combined heat and power domestic central heating boilers that also generate electricity, small wind turbines for the roof or garden, and solar panels.

Decentralised power

Decentralised power is generally defined as electricity that is produced close to the point of use instead of being generated in a remote power station and transmitted along great distances on the transmission and distribution system, with losses along the way. Micro-generation and combined heat and power schemes of all scales fall into this category.

Combined heat and power

Combined heat and power devices and schemes generate electricity locally and so can use the heat which would otherwise be wasted during generation for heating and hot water needs in buildings, offices or industrial processes. Combined heat and power schemes are the most efficient way of generating useful energy from fossil or hydrogen fuel and can generate up to 40 per cent more useful energy per unit of fuel than large power stations or conventional devices. In a traditional power-plant delivering electricity to consumers, as little as a third of the heat content of the primary energy source (coal, gas, or oil) is used by the consumer. A combined heat and power system converts at least two-thirds and often as much as 90 per cent of the heat from the primary energy source to useful purposes.

Renewables

There is huge potential for electricity and heat production from a range of renewable energy technologies fuelled by biomass (plant material), wind, wave, tidal, solar, wind and geo-thermal sources. For example wave power generates electricity from movements of the sea surface, whereas tidal stream installations sit on the sea floor and use the regular ebb and flow of tides. The Carbon Trust estimates that the potential for wave and tidal technologies is to supply up to 20 per cent of UK electricity.

Biomass

Biomass is material of recent biological origin that can be used as a source of energy. It includes trees, crops, algae and other plants, as well as agricultural and forest residues. 'Bio-energy' often refers to biomass energy systems that produce heat and/or electricity, while 'bio-fuel' refers to liquid fuels for transportation. Bio-energy can also be used for cooling using absorption chillers that work on the same principle as your refrigerator.

Cleaner coal and gas

There is huge potential to use fossil fuels efficiently, and reduce the associated carbon dioxide emissions, through the introduction of best available technology:

- Combined cycle gas turbine technology is the latest, most efficient way of using gas to produce electricity. Existing gas plant emits around 410g CO₂ for every kWh generated – less than half the emissions of our existing coal plant.
- Existing coal fired power stations emit around 940g CO₂ for every kWh electricity they generate, but new technology exists to refurbish our coal plant with significant efficiency improvements. Known as 'advanced super critical steam cycle' this raises the temperature and pressure of the steam, and reduces emissions by around 20 per cent. The latest boilers also allow biomass to be added to the fuel mix, known as 'co-firing'.
- Biomass co-firing: plant material such as sugar beet, willow coppice, or other energy crops can be burnt alongside coal in coal-fired power stations. Using biomass for fuel does not increase the level of carbon dioxide in the atmosphere as long as the harvested plants are replaced, removing the carbon dioxide from the atmosphere. In modified coal power stations as much as 20 per cent of the electricity produced could come from co-burning biomass. Biomass can also be burnt in other types of power stations.
- A new generation of power stations is being developed, known as 'integrated gasification combined cycle' technology where coal or biomass is turned to hydrogen before it is burnt to produce electricity. This technology, which is still under development, can reduce the cost of subsequent carbon capture and storage significantly.

Carbon capture and storage

Carbon capture is a process where the carbon dioxide is captured instead of being released into the air and then buried in disused oil or gas fields or other underground deposits. As an example, a consortium led by BP wants to build a pilot electricity

plant in Peterhead, near Aberdeen. The carbon dioxide produced and captured would be pumped into the nearby Miller Field in the North Sea. The gas would force out the field's remaining reserves of oil and would then remain stored underground. Large scale development of this technology was not considered in our '*A Bright Future*' report. Friends of the Earth believes there should be more research into this technology as a possible future option for carbon abatement, if some outstanding issues are resolved and if it does not undermine investment in renewables and energy efficiency

The nuclear option – the argument against

The Government seems minded to propose a new programme of nuclear power stations. Friends of the Earth is convinced that nuclear power is not the solution: nuclear power currently provides a mere 3.6 per cent of UK energy supply (19 per cent of electricity and no contribution to heat or transport); it's uneconomic and it leaves a legacy of radioactive waste which must be stored for tens of thousands of years.

A government advisory body, the Commission on Sustainable Development has recently drawn together the most comprehensive evidence available^{ix}, to find that there is no justification for bringing forward a new nuclear power programme. The report, based on eight new research papers, finds that the problems with nuclear power outweigh the advantages.

To justify this conclusion, the Commission on Sustainable Development states that even if the nuclear capacity of the UK was doubled, this would only achieve an 8 per cent reduction in CO₂ emissions by 2035, and no emission reductions before 2010. This is a small amount, set against the country's commitment to reduce CO₂ emissions by 60 per cent by 2050, and would not happen fast enough to contribute in any way to current Kyoto targets. This, the Commission says, must be set against five 'major disadvantages'.

1. No long term solutions for disposal of radioactive waste are yet available, let alone acceptable to the general public; it is impossible to guarantee safety of the long-term disposal of waste.
2. The economics of a new nuclear programme are highly uncertain. There is little justification for public subsidy. If estimated costs escalate, though, the taxpayer will be have to pick up the tab.
3. Nuclear would lock the UK into a centralised distribution system, at exactly the time when opportunities for micro-generation and local distribution network are stronger than ever.
4. A new nuclear programme would give out the wrong signal to consumers and businesses, implying that a major technological fix is all that's required, weakening the urgent action needed on energy efficiency.
5. If we build new nuclear power stations, we cannot deny other countries the same technology as part of international climate change negotiations. With lower safety standards, plant in such countries may run higher risks of accidents, radiation exposure, proliferation and terrorist attacks

Notes

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- i Department of Trade and Industry, '**Our Energy Future**' Jan 2006
<http://www.dti.gov.uk/energy/review>
- ii http://www.foe.co.uk/campaigns/climate/press_for_change/energy_review/index.html
- iii '**A Bright Future**' and in due course our submission response, will be posted here:
<http://www.foe.co.uk/campaigns/climate/resource/experts.html>
- iv Performance and Innovation Unit, '**Energy Review**' February 2002
- v Friends of the Earth, '**A Bright Future**' March 2006.
Main Report: http://www.foe.co.uk/resource/reports/bright_future.pdf
Data: http://www.foe.co.uk/resource/evidence/bright_future_data.pdf
- vi For more information on The Big Ask climate campaign, see <http://www.thebigask.com>
- vii You can find further information on Friends of the Earth's view on nuclear power in '**Nuclear Power and the Energy Review**' November 2005.
http://www.foe.co.uk/resource/media_briefing/nuclear_power_energy_review.pdf
- viii Commission on Sustainable Development, '**Nuclear power in a low-carbon economy**', March 2006. <http://www.sd-commission.org.uk/pages/060306.html>
- ix Ibid