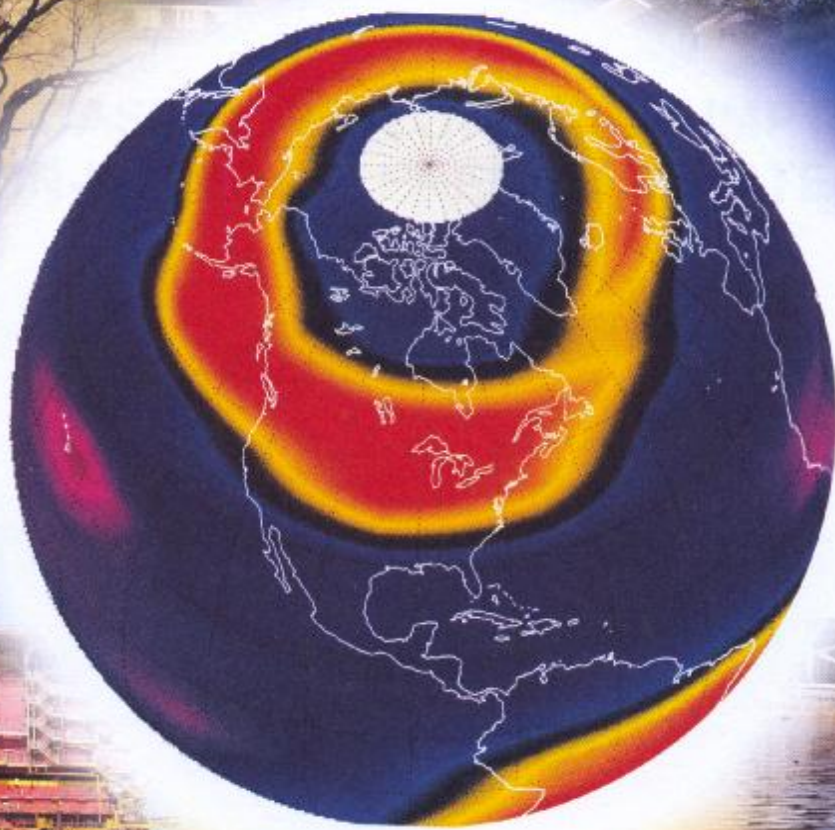


FAITH AND POWER

The Case for a Low Consumption,
Non-Nuclear, Energy Strategy



CHRISTIAN ECOLOGY LINK

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**THE CASE FOR A LOW CONSUMPTION,
NON-NUCLEAR, ENERGY STRATEGY**



CHRISTIAN ECOLOGY LINK

March 2006

Summary

Christian Ecology Link proposes in this paper the adoption of an energy strategy based on a significant reduction in energy demand and investment in renewable energy rather than nuclear power. We have sought a strategy that reflects love of the Creator, expresses care for the whole creation, and is informed by Christian principles of wise stewardship, peacemaking, justice, loving our neighbours and moderation in consumption.

Climate change and the impending closure of ageing nuclear reactors have raised the prospect of a new nuclear reactor construction programme. It is possible to tackle climate change without such an approach. Links between nuclear power and nuclear weapons, concerns relating to nuclear waste and radioactive emissions, excessive costs, and the implications for economic direction and political structures lead us to conclude that the nuclear programme should not be revived at the present time. We favour instead an energy strategy based on efficiency, conservation and restraint, with increased use of renewable sources and decentralised supply.

We conclude that substantially enhanced Government support for efficient, less profligate energy consumption and investment in renewable sources of energy supply rather than nuclear power is a moral imperative.

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For further information or to become a member, contact:

Christian Ecology Link (This address was updated in 2013, though the report was first written in 2006)

10, Beech Hall Road, London E4 9NX

Tel: 0845 4598 460

Email: info@christian-ecology.org.uk

URL: www.greenchristian.org.uk

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1. Introduction

In 2004 the UK Government invited greater dialogue with representatives of faith communities in order to improve consultation on public policy.¹ Its Sustainable Development Commission has similarly encouraged engagement from faith groups.² Christian Ecology Link welcomes these invitations and offers this report as a contribution to the important public debate on energy strategy. Christian Ecology Link (CEL) is a UK-based charity with members from a wide range of Christian denominations which aims to increase environmental awareness and action in order to take proper care of God's creation.³

Many of people's hopes and fears for the future will be captured by the forthcoming public debate on energy strategy. It is especially important, therefore, that the debate addresses ethical issues explicitly, is characterised by honesty and transparency, and is set within a global context. We hope that the outcome directs the nation towards a distinctive vision that Christians may associate with the purposes of God in creation. Thus **we seek an energy strategy that reflects love of the Creator, expresses care for the whole creation, and is informed by Christian principles of wise stewardship, peacemaking, justice, loving our neighbours and moderation in consumption.**

Our aim in this paper is to offer a contribution to policy discussion and to inform Christians about energy use and promote further reflection within the church. We are particularly concerned about the need to abate harm from climate change, the threat from which is most intense for the poor.⁴

The paper initially sets the context and highlights recent discussion on future energy scenarios. It then proposes some theological principles and ethical values to underlie energy strategy before addressing a key aspect of the debate, the nuclear power option and alternatives, and drawing conclusions.

There will doubtless remain differences of opinion among individuals within the church concerning appropriate levels of energy consumption and energy supply options. Nonetheless it is our judgement that the proposed theological principles and ethical values point towards a low consumption, non-nuclear, energy strategy and a bold switch from the use of fossil fuels (i.e. coal, gas and oil) to renewable sources of energy.⁵

2. Energy production and use

Energy consumption in the United Kingdom continues to grow even though we are increasingly dependent on external sources for fossil fuels. Electricity is an important component of energy consumption but only around 3.6% of our electricity is currently generated using renewable sources, although the amount is

¹ Home Office (2004) *Working Together: Co-operation between Government and Faith Communities*, Home Office Faith Communities Unit.

² Sustainable Development Commission and WWF-UK (2005) *Sustainable Development and UK Faith Groups: two sides of the same coin?*, October.

³ Christian Ecology Link. URL: <http://www.christian-ecology.org.uk/>

⁴ Christian Ecology Link seeks to promote awareness of climate change within the church through Operation Noah, a collaborative project with Churches Together in Britain and Ireland.

⁵ The term 'low consumption' is, of course, relative. We interpret it as low by the standards of a modern industrialised nation and in line with the principle of convergence towards global equity in energy use.

increasing.⁶ Even so, other European countries (e.g. Denmark, Germany, Austria) have significantly larger proportions of new renewables⁷, suggesting that the UK has been relatively slow in harnessing its large potential supply.

An overview of the current energy situation is provided by statistics from the Government which reveal that in 2004:

- UK production of oil and natural gas decreased.
- Primary demand for oil rose by 3% in the UK and deliveries of aviation fuel rose by over 9% compared with the previous year.
- The UK remained a net exporter of oil and oil products, but net exports halved.
- The UK was a net importer of gas for the first time since 1996.
- Imports of coal, which account for the majority of coal used in the UK, rose to a record high.
- UK emissions of CO₂ increased by 1.5%, although they were 4% less than in 1990.⁸

Energy consumption per head in the United Kingdom is far above the global average and through our reliance on fossil fuels we contribute disproportionately to adverse effects on the 'global commons', such as climate change. Such impacts, arising from our over-consumption, are liable to cause greatest harm to the world's most poor and vulnerable people.

3. The historical context

Industrialisation, by raising the consumption of goods and services above basic subsistence levels, has improved the quality of life for many people. Industrial societies require considerable inputs of energy, however, and in Britain these have largely comprised fossil fuels which are in finite supply and emit greenhouse gases and other forms of pollution.

Affluence has increased for most people in Britain in recent decades, but there is growing evidence that, overall, the quality of life has not improved.⁹ Assumptions that high levels of energy demand are inevitable or desirable must be considered in the context of an emerging debate about appropriate consumption patterns. It is important, therefore, to consider consumer demand alongside supply in the energy debate.

Decisions concerning energy supply in Britain have historically been influenced by our reserves of coal, gas and oil and a desire to avoid dependence upon one type of fuel. Nuclear power has contributed to electricity supply since 1956, when the first reactor was commissioned. In 1979 a decision was taken to construct 10 new reactors starting with Sizewell 'B', which took 15 years to build and cost more than twice the original budget. In the aftermath of the Chernobyl accident in 1986, Britain's nuclear programme was effectively abandoned.

⁶ Department of Trade and Industry data for 2004. URL: <http://www.dti.gov.uk/renewables/>

⁷ cf. hydroelectric power.

⁸ Department of Trade and Industry (2005) *Energy Trends*, March.

⁹ Jackson, T. and Marks, N. (1994) *Measuring Sustainable Economic Welfare*. Stockholm Environment Institute/New Economics Foundation; Prime Minister's Strategy Unit (2002) *Life Satisfaction*. December.

Environmental campaigners have for decades warned that oil and gas reserves are finite and, critical of nuclear power, have urged the development of renewable sources of energy. Such warnings have largely been ignored by successive governments. Thus, for example, the Royal Commission on Environmental Pollution (RCEP) concluded that wave power and undersea turbines have received little government support despite their great potential.¹⁰ Public funding of research and development and market incentives for renewable energy appear to have been squeezed by the demands of the nuclear sector. Nuclear power has, in addition, required huge financial commitments for waste treatment and plant decommissioning.

Government priorities are exposed in recent figures for public expenditure: announcements of £42m for investment in wave and tidal research, £1m for solar installations, £3m for a tidal-stream energy prototype and £30m for small-scale renewable energy are dwarfed by the £2,200m annual clean-up budget of the Nuclear Decommissioning Authority.¹¹ Nonetheless, renewable sources of energy have in recent years emerged to play an increased role in energy supply.

4. Reassessing energy strategy

The need to review Britain's energy strategy has been prompted by the demise of coal mining, depleting supplies of oil and gas in the North Sea, and growing concern about climate change. The Government is committed under the Kyoto process to reduce emissions of greenhouse gases by 12.5% by the period 2008-12 (as compared with 1990) and has, in addition, pledged to achieve a 20% reduction in emissions of CO₂ by 2010 compared with the same benchmark year. It should just meet the Kyoto commitment but appears unlikely to meet the second target.

The electricity sector demands particular attention because a significant number of Britain's nuclear reactors will come to an end of their lives by 2010 and the EU's Large Combustion Plant Directive will require significant reductions in electricity supplied from coal-fired power stations. Electricity generation from either nuclear power or renewable energy has a reduced impact on climate change as compared with fossil fuels. It must be emphasised that electricity accounts for less than one fifth of energy use, however, and transport and non-electric heating account for a major share of fossil fuel consumption.

Nonetheless, a key decision in the Government's energy review¹² will be whether to favour a new nuclear reactor construction programme or prioritise renewable sources of energy. The Government's last Energy White Paper, in 2003, did not rule out the option of building new nuclear reactors but noted that "its current economics make it an unattractive option for new carbon-free (*sic*) generating capacity."¹³ The omission of clear policies on nuclear power in both Labour and Conservative manifestos for the 2005 General Election represented a serious democratic failing as the electorate was left uninformed about a key policy.

¹⁰ Royal Commission on Environmental Pollution (2000), *Energy – The Changing Climate*, 22nd Report, Cm 4749.

¹¹ Nuclear Decommissioning Authority. URL: http://www.nda.gov.uk/documents/annual_plan_0506.pdf

¹² Department of Trade and Industry (2006) *Our Energy Challenge*, Consultation Document, January.

¹³ Department of Trade and Industry (2003) *Our Energy Future*, Cm 5761. No energy source is entirely carbon free, as fossil fuels will be used in resource extraction, construction of plant, transportation, etc.

Growing concern about climate change is playing an important role in the nuclear power debate and public opinion appears divided on its future role.¹⁴

An alternative is to expand the use of electricity from renewable sources of supply such as hydro, wind, biomass, wave, tidal and solar energy which, although increasing, accounted for only 3.6% of electricity generated in 2004. The Government already has a target of raising the proportion of electricity generated from such sources to 10% by 2010 and an 'aspiration' to increase this to 20% by 2020. It must judge whether progress needs to be accelerated and consider whether to firm up its aspiration.

Another means of cutting greenhouse gas emissions would be to address demand and take far bolder action than in the past to reverse the growth in energy use. Reduced total electricity consumption is of course one way to increase the share of renewable energy and meet the above targets. More generally, increased energy efficiency in buildings, vehicles and appliances reduces demand in ways that are often highly effective both in economic and environmental terms. According to one expert, "investment in energy efficiency typically displaces five to seven times the amount of carbon dioxide as investment in nuclear power."¹⁵

The energy debate should also address the social implications of energy provision and use, such as the ability of citizens to identify and control the sources from which their electricity is supplied and to acknowledge their responsibilities as consumers. The debate may focus on economic and environmental issues but it should also embrace issues relating to democratic accountability and structures of power.

5. Energy scenarios

Energy choices need to be informed by an understanding of the range of options concerning levels of demand and sources of supply. Several studies have been undertaken in recent years offering different scenarios for reducing carbon dioxide (CO₂) emissions.¹⁶ We summarise below scenarios created by the Royal Commission on Environmental Pollution (RCEP) in order to highlight some of the issues raised in considering the need for a new nuclear reactor construction programme.

The RCEP considered four possible energy scenarios in which CO₂ emissions were reduced by around 60% between 1998 and 2050. Each revealed that dramatic changes would be required in energy use in order to meet the climate change target. A key finding concerned the need for nuclear power: "Nuclear power could continue to play an important role in reducing UK greenhouse gas emissions. We do not, however, accept the arguments of those who hold that it is indispensable."¹⁷

¹⁴ Poortinga, W., Pidgeon, N. and Lorenzoni, I. (2006) *Public Perceptions of Nuclear Power, Climate Change and Energy Options in Britain*, University of East Anglia Understanding Risk Working Paper 06-02.

¹⁵ Tom Burke, visiting professor at Imperial and University Colleges, London, in *The Guardian*, 2nd March 2005.

¹⁶ These have been summarised in Paper 2 of the evidence base for the report of the Sustainable Development Commission (2006) *The Role of Nuclear Power in a Low Carbon Economy*, March. Friends of the Earth have since produced another scenario-building report, *A Bright Future* (March 2006), which concludes that a 48-71% reduction in CO₂ emissions is feasible without replacing decommissioned nuclear reactors.

¹⁷ Royal Commission on Environmental Pollution (2000) *op. cit.*

One scenario allowed for an expansion in nuclear power and assumed that the historic long-term increase in energy demand was curtailed but not reversed (i.e. demand was stable). In this scenario, the reduction in CO₂ emissions required 46 new nuclear power stations and 53GW of renewable energy capacity. The latter would necessitate hundreds (possibly thousands) of small CHP plants (fuelled by energy crops, covering 15% of agricultural land, and by municipal solid waste), almost 200 offshore wind farms (each with 100 turbines), 7,500 small wave power devices, a score of tidal-stream farms, photovoltaic panels on many roofs, onshore wind farms on 2,000km² of land (slightly under 1% of the UK land area), plus other renewable sources such as small hydro power schemes involving several thousand turbines on rivers and streams.

A second scenario did not allow for a revival in nuclear power or the burning of municipal solid waste. Meeting the 60% target in such circumstances would require a 'very large' (47%) reduction in energy demand and 20GW of renewable energy capacity. The latter could be achieved through an onshore and offshore wind power programme one half of the scale described above in the stable demand scenario, together with more modest contributions from other renewable sources.

The RCEP also considered two scenarios with a less challenging (36%) reduction in energy demand. A non-nuclear scenario required 43GW of renewable capacity, enabling a 50% reduction in onshore wind farms compared with the stable demand scenario. Alternatively, 19 nuclear power stations could be built and onshore wind farms would remain a 'fairly rare sight' as only 25GW of renewable capacity would be required in this scenario.

6. Christian principles to underpin energy strategy

Christian Ecology Link believes that faith should permeate the whole of life. Environmental degradation, climate change, widespread poverty and profligate life-styles in the industrial West are important concerns. Love of the Creator should lead us to express care for the whole creation.

Christians will approach the energy debate from different backgrounds, experiences, traditions and professions and hold diverse opinions. Whatever these differences, however, our contribution to the energy debate should be well-informed, honest and based upon principles derived from our faith. We suggest that the following principles be used to underpin a Christian approach to energy strategy:

- Energy should be supplied and used in a manner consistent with the Biblical principle of taking care of God's creation.
- The technology adopted in supplying energy should not involve excessive risk, including threats of pollution or warfare.
- Energy consumption should reflect a just use of the Earth's resources, demonstrating love of neighbours, such that there is an end to fuel poverty and the energy needs of the world's poor are met.
- Finite energy reserves should be consumed in moderation, sufficient only to meet genuine need and with due account of future generations.

In the current political context these should be supplemented by general principles of honesty and transparency:

- The general public should not be misinformed or told partial truths and the decision making process should be open to public scrutiny.
- Any market incentives or subsidies to encourage particular forms of energy supply should be transparent and energy prices should take account of negative impacts on third parties (i.e. externality effects), insurance against accidents, and long-term impacts.

7. Why Christian opinions may differ

Christian Ecology Link is in favour of a low consumption, non-nuclear, energy strategy for reasons that follow. We accept that there will be differences of opinion within the church in the detail of public policy.¹⁸ In order to understand how underlying beliefs may shape such opinion, therefore, we explore below some reasons why Christian opinions may differ concerning energy.

Understandings of progress

Christians differ in their beliefs about the material world and societal development. Some respond positively to people's material aspirations and see affluence as a sign of God's blessing. Others emphasise the many Biblical warnings about materialism and, aware that affluent Western lifestyles already result in an excessive 'ecological footprint',¹⁹ regard substantially reduced energy consumption as imperative. Members of Christian Ecology Link have sensed a calling from God to promote this latter understanding.

World views

Christians view the world differently as a result of factors such as their background, theological beliefs and experience of the natural world. Nature is envisaged by some as a benevolent mother-provider, by others as chaotic and pitiless and in need of being ordered and brought under control. Some regard uranium as a resource given by God that humans should utilise and argue that renewable energy is only of marginal value because of a natural law that the 'God-given nature' of renewable sources is 'dilute' whereas that of uranium and fossil fuels is 'concentrated'. Others believe that if we are to care for God's creation as well as work it²⁰, we should exercise restraint in our utilisation of the Earth's resources. A world view informed by ecological principles leads Christian Ecology Link to favour energy supplied through natural, renewable processes and to attribute value to the environment not merely for its usefulness to humankind but as God's creation.

Faith in science

Christians' beliefs concerning the supremacy of scientifically based argument will affect their attitudes to technology and risk. Some are inclined always to accept conclusions derived from use of the 'scientific method' and are confident of people's ability to manage technology carefully. Others are more critical of

¹⁸ Early Christian studies include Francis, J. and Abrecht, P. (1976) *Facing up to Nuclear Power*, Saint Andrew Press and a short pro-nuclear booklet, Hodgson, P. (1985) *Nuclear Power*, Oxford University Press Studies in Christianity and Science. The Science Religion and Technology Project of the Church of Scotland produced a report in favour of nuclear power, *What Future for Nuclear Power?*, in 1996. A pro-nuclear booklet provocatively entitled *When the Lights Go Out* (ed. F Knaggs, self published) was circulated at an environmental debate at the Church of England's General Synod in 2005. A recent speech in the House of Lords by the Bishop of Southwell and Nottingham avoided explicitly taking sides, although media reports noted that he did not rule out nuclear energy (*Hansard*, 16th February 2006, *Church of England Newspaper*, 24th February 2006).

¹⁹ i.e. the amount of land and water area a population needs to support itself and absorb its wastes.

²⁰ Genesis 2:15.

positivism as a philosophy, wary of placing complete trust in the scientific community and averse to taking technological risks. It is not 'anti-science' to propose that its application, in the form of technology, should be assessed with reference to ethical values and social context. Wisdom has been defined as 'the art of steering'²¹ and, while recognising the value of scientific advance, Christian Ecology Link believes that managing God-given resources requires this art in selecting and utilising the best and most appropriate technology.

Political beliefs

Christians hold diverse political beliefs. Some favour strong leadership, criticise planning enquiries for delaying progress and believe that the free market invariably leads to an efficient and healthy economy. Others are critical of the power of political and industrial elites to determine technological priorities and believe that government intervention is needed when the market is unresponsive to long-term trends that threaten environmental degradation such as resource depletion. Christian Ecology Link favours a decentralised model of political power that empowers ordinary citizens and supports market intervention when necessary in order to prevent environmental degradation.

Christian Ecology Link has welcomed discussion with Christian advocates of nuclear expansion.²² While sharing belief in the most profound truths about the source and purpose of life, we recognise that there may be differences in the outworking of faith within the church. Our visions of the kingdom 'on earth' may not exactly coincide. There is genuine uncertainty about the resilience or fragility of the Earth. Consequently Christians may disagree about energy policy. Christian Ecology Link will continue to listen with particular care to all independent and informed contributors to the debate.

8. Assessing the nuclear option

As noted above, a key decision for Government is whether to initiate a new nuclear reactor construction programme. Four themes provide a structure for our analysis of the case for and against nuclear expansion: the link between nuclear power and nuclear weapons, environmental and health issues, economic aspects, and social and political perspectives.²³

Nuclear power and nuclear weapons

As nuclear reactors offer access to material required to make nuclear weapons, the technology raises concerns for Christians who oppose Britain's independent nuclear deterrent on ethical grounds (e.g. through 'just war' principles). The links between nuclear power and nuclear weapons are now widely accepted, having long been denied by governments, senior civil servants and industry representatives.

Christians must carefully question the wisdom of reviving a potentially dangerous technology in the light of human fallibility and sinful intent. Such worries deepen in an era of international tension. Many people fear a proliferation of nations armed with nuclear weapons. Thus in the 1980s the Israeli air force bombed a

²¹ Granberg-Michaelson, W. (ed.) (1987) *Tending the Garden*. Grand Rapids: Eerdmans.

²² e.g. *Green Christian*, Issue 59.

²³ These are taken from a well-balanced report: American Baptist Churches, *American Baptist Resolution on Nuclear Power: Seeking Rational Solutions*, December 1982, updated September 1997. URL: <http://www.abc-usa.org/resources/resol/nukepowr.htm>

nuclear reactor in Iraq to prevent it from acquiring the capacity to build nuclear weapons, while most recently a nuclear reactor in Iran has proved politically sensitive. If the British Government commences a new nuclear reactor construction programme it will become harder for diplomats to argue that other countries should not do likewise. Increasing the prospect of nuclear proliferation might be judged to conflict with our calling to be peacemakers (Matt 5:9).

A further concern is that nuclear reactors are vulnerable to the threat of a terrorist attack, as appears to have been planned last year in Australia. An expansion in the nuclear sector is liable to increase terrorists' access to material required to make 'dirty' nuclear weapons. Recent reports indicate that plutonium in the former communist economies has gone missing and has not always been fully accounted for even in Britain, where security at nuclear sites has recently been criticised by a BNFL (British Nuclear Fuels) security working group as chronically inadequate.²⁴

Environmental and health issues

As Christians we are expected to take care of God's creation. Although interpretations of the practical implications of this vary, the principle of wise stewardship leads most to conclude that we should limit the risk of environmental damage through human activity. We must therefore exercise a degree of restraint, not least because "the earth is the Lord's" (Ps 24:1).

The environmental risks involved in nuclear power include the threat of nuclear accidents, the legacy of toxic radioactive waste, and the effects of unintended radiation. Christians should be particularly mindful of human fallibility and, consequently, the potential for accidents. The risk may not be high, but if an accident were to occur the effects are potentially very severe.

The worst nuclear accident to date, at Chernobyl in 1986, resulted in 31 people dying immediately but will ultimately cost 8,000 lives from cancer and other radiation-related illnesses according to the Ukrainian Government.²⁵ There has been a dramatic increase in thyroid cancers and evidence of serious psycho-social problems.²⁶ Radioactive pollution from the accident affected several continents and over 100,000 people had to be evacuated from the immediate area. The movement of sheep on several farms in Scotland and Wales is still restricted, 20 years later.

There are safety concerns about nuclear facilities even in Britain. Many minor accidents have been reported, most recently at the Thorp reprocessing plant.²⁷ A former employee at the Dounreay nuclear research station has described management in the industry as 'reckless'²⁸ and, using the Freedom of Information Act, *New Scientist* journalists discovered that Government nuclear inspectors have found many gas-cooled nuclear power plants to be in danger from cracks in their graphite cores which could force them to close down earlier than expected.²⁹

²⁴ *The Times*, 18th February 2005.

²⁵ *BBC News*, 29th March 2000. URL: <http://news.bbc.co.uk>

²⁶ Schneider, M. and Froggatt, A. (2004) *The World Nuclear Industry Status Report 2004*, The Greens/EFA Group in the European Parliament.

²⁷ *The Guardian*, 9th May 2005.

²⁸ *Sunday Times*, 6th March 2005

²⁹ Core racks may force shutdown of UK reactors, *New Scientist*, 26th March 2005.

A major problem is the legacy of radioactive waste, some of which is highly toxic and lasts for many thousands of years. Waste depositories must remain isolated from entry of ground water for thousands of years. It is estimated that there is currently around 82,500 cubic metres of intermediate level waste and 1,890 cubic metres of high level waste. By around 2050 the amount of intermediate level waste is expected to have increased to three times this amount.³⁰ The RCEP concluded that no nuclear power stations should be built until waste issues have been resolved to the satisfaction of the scientific community and general public.

Advocates of nuclear power argue that it offers the best solution to the greatest environmental challenge, climate change. However, while nuclear energy provides just under 20% of electricity consumption, this translates into less than 4% of final energy consumption.³¹ Its potential role is therefore relatively small. Moreover, the idea that it offers 'carbon free' electricity is a myth. Certainly it offers the benefit of a reduction in greenhouse gas emissions; estimates suggest that the full life cycle of nuclear fuels, reactors and wastes produce 20-40% of the CO₂ of a typical gas fired power plant per kilowatt hour.³² Electricity generated from renewable sources, however, offers far greater benefit. Wind turbines, for example, generate as much energy as is used in their construction within 3-5 months³³, and for the remainder of their 20 year design life are virtually free of embodied energy input.

Economic aspects

Energy policy should be considered within the broader context of economic development, which then raises questions about the nature of progress and our relationship with the material world. In industrialised countries such as Britain, the link between affluence and quality of life is tenuous, as noted above. Proponents of nuclear power nonetheless argue that "the people of the world will be unwilling to face a future which diminishes lifestyles or expectations much below those enjoyed at present in the West."³⁴

Christians might take a more critical stance, believing that modern society is too acquisitive and materialistic and questioning contemporary interpretations of 'need'. Many would argue that income and wealth should be distributed more fairly but that it is not imperative - or even desirable - to increase the overall level of consumption in Britain. In the words of one Church of England Bishop: "Nuclear allows us to be profligate. Reduced energy sources or renewable energy sources, which demand us to live more simply, place constraints on human greed."³⁵

Acknowledging Christ's warnings about the futility of materialism (e.g. Matt 6:19), most Christians will believe that economic growth should not be sought at the expense of environmental and social goals. The Government aims to 'decouple' energy consumption from economic growth by increased energy efficiency without seeking to limit 'delivered demand'. There is considerable potential for more

³⁰ Nuclear waste watchdog tells of Britain's disgrace, *The Times online*, 19th January 2006. URL: <http://www.timesonline.co.uk>

³¹ Department of Trade and Industry (personal communication). In 2004 electricity accounted for 18.1% of energy consumption. Nuclear energy accounted for 7.8% of primary fuel consumption and 3.6% of total final consumption (i.e. excluding energy which is used for transformation into other forms of energy).

³² Jan Willem Storm van Leeuwen and Philip Smith, *Nuclear Power: the Energy Balance*. URL: <http://www.stormsmith.nl/>

³³ Department of Trade and Industry (2006) *Renewables Explained*. URL: <http://www.dti.gov.uk/renewables>

³⁴ Holliday, F. (1999) Editorial, *Nuclear Europe Worldscan*, Issue 5-6.

³⁵ Rt Rev George Cassidy, Bishop of Southwell and Nottingham, *Hansard*, 16th February 2006.

efficient vehicles, appliances and lighting and for better-insulated buildings. Efficiency alone, however, will not suffice to meet long-term climate change targets and conserve finite energy reserves. Lifestyle changes will be required, such as reversing the growth in air travel.³⁶ Courageous political action will be needed to achieve this. This may include higher energy prices which until recently had been falling in real terms, implying plentiful supply and providing no incentive for careful use. Energy demand is influenced by prices which ought to 'tell the ecological truth' by including hidden negative costs (e.g. the cost to the health service of polluted air, insurance costs relating to climate change).³⁷

Investment in nuclear power has represented poor stewardship of financial resources. Cost over-runs have been common: Sizewell 'B', the last reactor built in Britain, was twice as expensive as planned. The cost of cleaning up disused nuclear plants is estimated by the Nuclear Decommissioning Agency at a minimum of £56,000m, equivalent to every household paying around £100 annually for the next 20 years.³⁸ In 2003, the company that purchased most of the newer nuclear reactors from the Government, British Energy, had to be rescued out of taxpayers' funds after building up a massive debt. A report by independent consultants Oxera concluded that private companies would not be willing to invest in nuclear power plants without very substantial capital grants (£1.6bn) or debt guarantees (£3bn) from government.³⁹ In short, nuclear power has proven uneconomic as a private business.

Once said to promise electricity 'too cheap to meter', nuclear power has proven costly relative to the alternatives. Proponents of nuclear power such as the Royal Academy of Engineering insist that electricity from a new generation of nuclear reactors would be relatively cheap. However, Government-funded studies by the Performance and Innovation Unit and Interdepartmental Analysts' Group compared the cost per kWh of onshore wind, offshore wind, nuclear and gas and concluded that nuclear was the most expensive option.⁴⁰

An energy strategy based on efficiency, conservation and restraint with increased use of renewable sources and decentralised supply will be relatively labour intensive and improve the health of the economy, whereas nuclear power implies dependence on foreign designs and skills, with fewer benefits for the domestic economy.

Social and political perspectives

Britain's energy strategy will have important social and political implications. Nuclear power implies highly concentrated economic and political power, which leads to a centralised, less participatory society.

Jacques Ellul, writing from a Christian perspective, warned that technology has a dynamic of its own and feared that it was out of human control.⁴¹ Nuclear technology has led to a scientific 'elite' described in one Christian critique as a

³⁶ At the same time, poorer sections of society may need to increase their energy consumption for adequate warmth and mobility.

³⁷ This phrase originates from Ernst von Weizsäcker.

³⁸ *ENDS Report*, 367, August 2005. Other estimates are as high as £92,000m

³⁹ *Sunday Times*, 26th June 2005.

⁴⁰ Department of Trade and Industry, *Our Energy Challenge*, Energy Review Consultation Document, January 2006.

⁴¹ Ellul, J. (1964) *The Technological Society*, New York: Vintage.

'nuclear priesthood'.⁴² By contrast, energy from renewable sources is more likely to be decentralised and involve a large and dispersed range of stakeholders, particularly if through micro-generation. This would be empowering to ordinary people, offering them more choice about their source of electricity.

The planning system is intended to protect residents from 'bad neighbours' in the form of unwanted developments. Some advocates of nuclear power have argued the Government should overrule public enquiries so that reactors might be constructed in just four years, in contrast with the ten years hitherto considered a more realistic minimum for planning and construction. This raises serious concerns about democracy and, in a Christian context, a questionable interpretation of loving our neighbours (Mark 12:31).

It is also argued that energy supply shortages will arise if nuclear power is phased out, causing energy price rises with serious social and political consequences. As poor people spend a greater proportion of their income on energy, higher prices could indeed be problematic. Injustice could be prevented, however, through a more progressive tax system and schemes to increase energy efficiency in households faced with fuel poverty.

Supporters of nuclear power point to its reliability and contrast this with the threat of intermittency from renewable sources which, they warn, may lead to disruptions in electricity supply. Some propose that renewable energy be capped at 10% of total provision. Such fears appear unwarranted, however, since modern types of generator and control systems allow integration of renewable supplies to 100% of supply capacity, as evidenced in western Denmark. Any threat of disruption must be prevented, but to set a cap when the technology is still evolving rapidly would be premature. Other non-nuclear energy sources will in any case remain available. A Government report concluded that even though up to 80% of gas may have to be imported by 2020 "there appear to be no pressing problems concerned with increased dependence on gas."⁴³

9. The case for reduced consumption and increased use of renewable energy

Christian Ecology Link favours a low consumption, non-nuclear, energy strategy based on a significant reduction in energy demand and investment in renewable sources of energy rather than nuclear power. The high consumption, nuclear path may appear easier for government to pursue in the short term, but we believe that there is a moral duty to follow this more challenging and more sustainable option.

As Christians we are expected to use God's gift of creation wisely. Christian Ecology Link believes that measures to reduce energy demand should take precedence over increases in supply capacity. All human activity has environmental impacts and even renewable sources of energy should not be viewed uncritically, although impacts of a chemical nature, as from fossil fuel and nuclear emissions, may be considered more significant than aesthetic and noise concerns about wind farms. There will also be economic and environmental trade-

⁴² Evangelical Lutheran Church in America (1980) Nuclear energy – problems and promises, *Journal of Lutheran Ethics*. URL: http://www.ecla.org/jle/alc/alc.nuclear_energy.html

⁴³ Performance and Innovation Unit (2002) *The Energy Review*, February.

offs to consider (for example, offshore wind energy may have less of an impact than onshore wind energy but is more expensive).

In this context it is highly regrettable that so much energy is wasted. In the case of most UK thermally generated electricity, 50% to 70% of primary energy input is lost at the generation stage and a further 13% of the primary energy is wasted through inefficient use in housing, offices and factories.⁴⁴ Many houses, for example, use excessive energy in space heating due to poor insulation. Private transport likewise uses much more energy than would an effective public transport system.

The RCEP concluded that without further investment in nuclear power a 47% reduction in energy demand is required to meet the climate change target for 2050. This is feasible⁴⁵, but we do not underestimate the magnitude of the task. Much can be achieved through energy efficiency and careful use, but we recognise that reduced consumption may also require a degree of sacrifice, foregoing lifestyle options in order to prioritise the needs and freedom of others.

Churches could have an important role in supporting Government in a partnership to overcome some of the driving forces behind profligacy and over-consumption.⁴⁶ The Bible contains many warnings of the dangers posed by materialism and the early Christians advocated a lifestyle characterised by sharing and moderation (Acts 2:44; 1 Tim 6:8). The Government, for its part, should implement a bold range of measures such as stricter energy efficiency requirements for new buildings, vehicles and appliances, curbs to the growth in aviation, phasing out the sale of conventional light bulbs, incentives for home insulation and the use of public transport, a carbon tax applicable when fossil fuels are first purchased (with measures to ensure that poor households are not treated unfairly), and inducements to encourage supply companies to provide energy services.⁴⁷

Such policies should form part of a wider programme to move towards a more sustainable, decentralised, low carbon economy. Reducing consumption through energy efficiency and consumer restraint would conserve finite reserves of fossil fuels and improve the long-term health of the economy. The Government should stop using economic growth as its primary indicator of the nation's progress. Economic growth is used politically in an appeal to people's consumerist aspirations and, while it has technical uses for economists, the more accurate indicators of quality of life now being developed should take precedence in public debate.⁴⁸

The availability of renewable sources of energy, as part of a sustainable ecological system structured into God's creation, is a gift from God. One benefit of using wind energy, for example, is that it is generally most available when demands for electricity from the national grid are greatest.⁴⁹ Renewable sources of energy are

⁴⁴ i.e. 26% to 60% of end-use energy. Source: Prof. John Twidell (personal communication). For instance, correctly used compact fluorescent lamps are 500% more efficient than traditional incandescent lamps. See reports of the International Association for Energy-Efficient Lighting (URL: <http://www.iaeel.org>).

⁴⁵ Tyndall Centre (2005) *Decarbonising the UK: Energy for a Climate Conscious Future*, Technical Report No.33.

⁴⁶ Christian Ecology Link produces many materials to this end, including a briefing paper *Energy Use in Church Buildings*.

⁴⁷ An 'energy services' approach is when a supplier offers to meet a customer's requirements (e.g. a warm house) rather than simply to sell energy. This provides an incentive to energy efficiency.

⁴⁸ URL: <http://www.sustainable-development.gov.uk/progress/>

⁴⁹ *The Independent*, 14th November, 2005.

the most 'chemically benign' of the supply alternatives. The fact that they provide for diversification and are within UK jurisdiction weakens any threat of political disruption to the nation's energy supply. They can also be developed faster than nuclear power, enabling reductions in CO₂ emissions to be realised more quickly.

It was a Christian thinker, E.F. Schumacher, who argued for appropriate forms of technology and popularised the phrase 'small is beautiful'.⁵⁰ One attraction of renewable sources of energy is their potential to be used on a humane, decentralised scale, allowing for greater control by people over their lives. An area of considerable medium term promise is micro-generation, small-scale electricity generation units located in buildings, including solar panels, domestic micro-turbines and small-scale CHP/cogeneration systems.⁵¹

In Britain, as elsewhere, there has been a rapid increase in the manufacturing and installation of the main renewable energy technologies in recent years. Globally, installed energy generation capacities from wind, solar and biomass are each increasing at 20% to 35% annually, evidence of the growing stature and reliability of mainstream renewable energy products. Wave and tidal power hold much promise and could supply up to a fifth of our electricity requirements.⁵²

We believe, therefore, that the Government should take advantage of the opportunities provided by renewable sources of energy and that it would be foolish to revive nuclear power, an outmoded technology that should be phased out as existing reactors become obsolete. The church must play its part, too, by actively promoting the use of renewable energy.⁵³ Renewable sources of energy should not be adopted uncritically, however, and electricity generation from a dispersed range of renewable sources will be preferable to large onshore wind farms located in sensitive rural areas.

10. Conclusion

We have sought an energy strategy that reflects love of the Creator, expresses care for the whole creation, and is informed by Christian principles of wise stewardship, peacemaking, justice, loving our neighbours and moderation in consumption.

Climate change and the impending closure of ageing nuclear reactors have raised the prospect of a new nuclear reactor construction programme, although independent research demonstrates that it is possible to tackle climate change without such an approach. Links between nuclear power and nuclear weapons, concerns relating to nuclear waste and radioactive emissions, excessive costs, and the implications for economic direction and political structures lead us to conclude that the nuclear programme should not be revived at the present time.

We propose instead a low consumption, non-nuclear, energy strategy. This would require much greater attention to promoting energy efficiency and restraining

⁵⁰ Schumacher, E.F. (1973) *Small is Beautiful*, Blond and Briggs.

⁵¹ A report by the Energy Saving Trust estimated that such technologies could provide up to 40% of electricity demand by 2050. Energy Saving Trust (2005) *Potential for Microgeneration: study and analysis*. Cogeneration is another term for CHP (combined heat and power). See also Greenpeace (2005) *Decentralising Power*.

⁵² Carbon Trust (2006) *Future Marine Energy*.

⁵³ The church-led campaign Operation Noah encourages its supporters to switch to green electricity tariffs.

consumer demand, a bold switch from using fossil fuels to renewable sources of energy and the phasing out of nuclear reactors in electricity generation.

Our reasoning is rooted in Christian ethics and motivated by a determination to reduce the nation's environmental impact, particularly the effects on global climate of excessive fossil fuel use. Christians will disagree on the detail of public policy, but we believe that such a strategy is the most appropriate in order to take proper care of God's creation.

A key determinant of a nation's energy requirement is the nature and direction of its economy. Faster progress is needed towards sustainable development, requiring changes to Britain's economic, social and political systems that will have profound implications for lifestyle patterns and technological choices. An energy strategy based on efficiency, conservation and restraint, with decentralised supply and increased use of renewable sources, would be relatively labour intensive and improve the health of the economy.

Decisions on whether or not to implement measures to minimise resource depletion, limit climate change, inhibit nuclear weapons proliferation, minimise the threat of radioactive pollution (whether by accident or intent) and prevent the further accumulation of nuclear waste have an ethical dimension. The high consumption, nuclear path may appear easier for government to pursue in the short term, but we believe that there is a moral duty to follow a more challenging and more sustainable option.

We conclude that substantially enhanced Government support for efficient, less profligate energy consumption and investment in renewable sources of energy supply rather than nuclear power is a moral imperative.



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