A step into the future, or one foot in the past?

The choice between renewable energy or nuclear power

Submission to the Government Energy Review

GREENPEACE

September 2001

Contents *Page*

1. Introduction

Greenpeace welcomes the fact that the Government is reviewing energy policy. Current energy trends are unsustainable: greenhouse gas emissions and radioactive waste are leaving enormous burdens for future generations to deal with. The fifty year time-scale identified by the Government makes possible a visionary and bold approach which no previous energy review in the UK has achieved.

The Royal Commission on Environmental Pollution (RCEP) has said that the UK should reduce its carbon dioxide (CO2) emissions by 60% by 2050. This sounds an ambitious target, but is in fact the bare minimum the UK needs to do to contribute to the global fight against climate change. The RCEP proposal is predicated on the need to stabilise atmospheric concentrations at 550 ppmv carbon dioxide equivalent, which would eventually produce a temperature increase of at least 3 degrees C. Greenpeace has published research suggesting the need to stabilise CO2 concentrations at 350 ppmv in order to limit global average temperature increases to 1 degree C[1]. The EU has proposed that temperature increases should not be allowed to exceed 2 degrees C and concluded that CO2 concentrations should be kept *below* 550 ppmv. It is clear from both the wording of the decision and from the science that this is an extreme upper boundary[2].

The new energy policy must therefore be framed to ensure that concentrations can be kept well below 550 ppmv. This will almost certainly require CO2 cuts of *greater* than 60% by 2050. Anything else would be morally indefensible. Runaway climate change will condemn millions of people to the effects of floods, drought, increased storm levels and the spread of tropical disease. Though no part of the world will be immune, the most severe effects will be felt in developing countries like Bangladesh, which lack the resources to protect their citizens. Arguments from the fossil fuel industry and major energy users who are opposing radical change need to be seen in this context.

---

[1] Hare,B et al (1997)*Fossil fuels and climate protection - the carbon logic*:, Greenpeace International

[2] European Community 1996 Climate Change - Council Conclusions 8518/96

In the time available it has not been possible for Greenpeace to draw up a response to all the questions raised by the PIU. This submission covers four key issues: the enormous scope for energy productivity gains; the need for ambition in developing renewable energy; the unacceptability of nuclear power and particularly any new nuclear subsidies; and the unreliability of carbon sequestration as a way to combat climate change.

2. Energy productivity

It makes both economic and environmental sense to make the task of phasing out nuclear power and fossil fuels easier - and to reduce the UK's need to import energy - by reducing the total amount of energy we need. The UK's system is dominated by wasteful and polluting technologies, and continues to be poor at providing the energy services that people want. The main fossil fuel technologies in our economy, like the Combined Cycle Gas Turbine and the Internal Combustion Engine, have conversion efficiencies of 50% or less. Much of the electric power supplied in the UK is lost from inefficient appliances and leaky buildings.

An Environment Agency discussion paper has recently suggested that it would be possible to reduce the UK's primary energy input by 50% by 2050[3]. Although predictions for fifty years ahead are inevitably highly uncertain, Greenpeace believes that this scale of reduction is plausible, given the wasteful way in which energy is currently used and the range of existing and developing approaches and technologies which could be used to boost energy productivity. **We suggest that the Government should use a 50% reduction in primary energy use as an aspirational target for UK energy policy to 2050.**

A wide range of policies will be needed to increase energy efficiency in all sectors. Below we suggest a number:

- There should be an expanded obligation on suppliers to deliver energy savings, based on the existing Standards of Performance but much more ambitious in scope.

[3] Archard, D. (June 2001) A Sustainable Energy Vision for the UK – A document to stimulate discussion about the compostion of a future low carbon sustainable energy system, The Environment Agency.

- Landlords, including commercial landlords, local authorities and social landlords, should be obliged to make their own stock energy efficient.

- The Government should move quickly to upgrade the Building Regulations to bring them into line with international best practice; there is no reason why construction companies in the UK should be allowed to build to lower standards than those in Denmark and Sweden.

- Mandatory minimum efficiency standards for products are needed, including standards on standby power.

- To encourage increased energy productivity in the industrial and commercial sectors, the Climate Change Levy should be increased gradually year on year, and this escalator should be pre-announced so that companies can build the increase in the unit cost of energy into their investment decisions.

3. Renewable energy

Though energy efficiency can dramatically reduce our need for energy, it obviously cannot eliminate it. In order to cut greenhouse gas emissions by the necessary scale, we need not only to increase energy productivity, but also to phase out the use of fossil fuels and rely instead on renewable energy sources[4].

a. Targets for renewable output

[4] Greenpeace does not consider incineration of municipal solid waste with energy recovery to be a renewable form of energy. This is partly because of the substantial carbon dioxide emissions which result, and partly because even the most modern incinerators emit dangerous levels of heavy metals, dioxins and acid gases. The Government should amend its definition of renewable energy to exclude incineration. It should make electricity from incineration subject to the Climate Change Levy, and rescind all outstanding contracts under NFFO for incinerators.

There is no shortage of energy to be had from renewable sources - they could theoretically supply our existing energy needs many times over[5]. Various studies have estimated the scale of the renewable energy resource available to the UK. One of the most comprehensive - and in our view fairly conservative - is the ETSU analysis published as supporting evidence to the DTI's 1998 Renewables Review. This study has been used by the PIU to derive an estimate of the scale of the renewable resource[6].

The PIU note confirms that the technical potential for renewables is enormous: for offshore wind alone the potential is equal to *ten times* current electricity use, and wave power could provide almost double current demand.

The 'practicable potential' in 2025, taking account of cost, planning constraints, build rate and network constraints, is 228 TWh/y, equivalent to two thirds of existing electricity demand. Most of this is from offshore wind (100 TWh/y) and wave power (50 TWh/y). The prediction for solar in this scenario is very modest, since it appears to assume no change in the regulatory environment.

Despite this clear indication of the scale of the practicable resource, the PIU note goes on to say that the PIU is considering setting a target for 2020 of either 20% or 30%. **Greenpeace welcomes the proposal to set a 2020 target. It is essential to ensure that the value of credits under the Renewables Obligation holds up. The proposed PIU target of 30% is too low and is less than half the practicable and economic potential**.

ETSU assessment of *practicable* resource in 2025	228 TWh/y
ETSU assessment of *economic* resource in 2025 *(at 4 p/kWh or less)*	224 TWh/y
PIU proposed targets: 30% by 2020	c 100 TWh/y
20% by 2020	c 66 TWh/y

[5] See for example Garrard Hassan and Partners' 1998 study *Offshore Wind Energy in the European Community*, for the European Commission.
[6] Table 1 in the PIU scoping note on "Renewable Energy.

We are assuming that if a percentage target is set it will refer to a percentage of a baseline, not a percentage of whatever electricity demand is in 2020. Otherwise it is a moving target, and the more successful the UK is at increasing energy productivity, the less ambitious the renewables target becomes. For this reason it would be simpler to express future targets in absolute terms, TWh/y or GW , rather than percentages.

The nature of the threat to the climate, the need to phase out fossil fuels as quickly as possible, and the need to replace nuclear power with carbon-free alternatives, make it essential to develop renewable energy as fast as possible in the UK.

Since the ETSU assessment indicates that it is practicable and economic to get over 200 TWh/y from renewable sources by 2025, the Government should set a 2020 target of 175 TWh/y, or 50% of current annual electricity demand.

This target is ambitious but achievable given sufficient political will. It is well within the scope of engineering capabilities. To get 100 TWh/y from offshore wind turbines, for example, would require just under 11,000 turbines (assuming each turbine is 3MW and operates at an average 35% capacity). The total area of sea needed for these turbines (at 600 metre spacing) would be equivalent to a box roughly forty miles by forty miles.

Germany, which has an offshore wind resource one quarter the size of the UK[7] has already announced its intention to generate 75 –80 TWh from wind farms at sea, as part of its plan to close all 19 of its nuclear power stations[8]. A detailed description of the status and opportunities for offshore wind in Northern Europe can be found in a recent report for Greenpeace by the German Wind Energy Institute (DEWI) – see Appendix I.

What is needed from the UK Government is a step change in its renewables ambitions. The current offshore wind programme, welcome though it is, will provide a maximum of 4.5 TWh/y. The UK's tiny wave power programme hardly registers at all in output terms despite the huge potential. The 2010 target for all renewables equates to aproximately 35 TWh/y.

[7] Matthies, H.G. et al (1995) Study of Offshore Wind Energy in the EC. Final Report of Joule contract JOUR-0072 , Verlag Naturliche Energien, Brekendorf, Germany.
[8] *Germany Substitutes Wind for Nuclear Power* – ENS June 11, 2001

Aiming for a target of over 175 TWh/y requires, as much as anything, a different mindset within Government and policy making circles.

b. Can the grid cope with this level of renewable power?

The PIU note reports that "most analysts state that the current UK grid system could accommodate around 20% of electricity from intermittent sources such as wind and wave energy, before technical and managerial changes are required".

Currently electricity distributors have a largely passive role in the demand and supply of electricity in their region. If they had incentives to manage their networks more actively, and if the benefits of demand management and local supply were recognised, it would be possible to get to much higher penetration of micro generation and renewable energy in the system without new storage systems. Whilst technologies such as wind power are intermittent in their supply new forecasting models allow for a high degree of predictability. The firm nature of biomass power allows dynamic management of the network to allow it to act as ' balancing' power source with source such as wind, wave and solar power.

This means that there need be no immediate concern about grid capacity. As the UK begins to exceed 50% reliance on renewable sources for electricity generation, there will of course be a need to store renewable power for periods of high demand. All the indications at present are that hydrogen will be the key to solving these issues. Renewable energy can be used to electrolyse hydrogen from water,or hydrogen can be 'produced' directly from biomass. Hydrogen can then be used in a fuel cell to produce power when and where it is needed. Other energy storage systems will also be developed. We cannot and do not need to predict what exact storage/carrier technologies will be available fifty or even twenty five years from now. What we can say with confidence is that, given the right regulatory environment, the rate of technological advance and the level of private sector investment will be such that these or other solutions to the problem of intermittence *will* be available to a renewable energy economy.

c. Solar power

UK policy towards solar power has in the past been a victim of short termism. Successive governments have concluded that solar power is not close to market competitiveness and therefore not worth supporting. This

then becomes a self-fulfilling prophecy. The PIU's fifty year timeframe offers a chance to break the impasse on solar photovoltaics.

Analysis for ETSU suggests that the technical potential for building-integrated PV panels is 266 TWh/y. However, solar's 2025 contribution in the ETSU calculation is limited by assumptions about cost and rate of penetration into new buildings. The Government needs to address both these constraints.

A report by a group of industry experts chaired by BP Solar concluded in 1996 that what was needed to bring PV prices down to levels comparable with fossil fuel generation was one major PV factory (of 500MW capacity) which would achieve economies of scale. Since 1996 there has been some progress on PV, but nothing approaching the economies of scale that would enable the market to take off. There are three things the government could do to change this:

- The Government should announce a vastly more ambitious programme to install solar panels in the UK, with a target of 100,000 roofs[9].

- To encourage individuals and companies to invest in PV, all supply companies should be required to offer net metering deals[10].

- The Government should also ensure good penetration of PV into new buildings by amending the building regulations to require that new buildings and refurbishments are able to generate a proportion of their own electricity**.** This could be through the use of solar photovoltaic panels, small wind turbines, micro CHP, or fuel cells. This would represent a challenge to British architects to use their ingenuity to help solve energy and environmental problems.

d. The Industrial policy case for UK renewables

[9] This was first proposed by an alliance of seven environmental groups in a challenge to all political parties in the run up to the last election.
[10] TXU do already offer net metering to UK solar pioneers on a voluntary basis via their 'Solarnet' offer.

As well as the obvious environmental benefits, there are very strong industrial and social policy reasons to invest heavily in renewables. A report by Border Wind suggests that development of the UK's offshore wind resource to supply 10% of total electricity demand, would create over 36,000 jobs[11].

The UK has a long and proud history of maritime engineering, from centuries of ship-building to offshore oil and gas engineering. But the decline in activity and investment in the North Sea over recent years means that facilities and skills are being lost. Marine renewable energy sources require the same engineering skills that the UK possesses.

There are also major export opportunities. Wind power around the world is already a $2.5 billion industry, which every year for the past 5 years has grown by 40%, a growth rate set to continue. But unless it moves fast the UK will miss out. Denmark has captured the largest share of the world onshore wind market, and is now pushing offshore with new wind and wave technology.

Other renewables will help provide jobs in areas where they are badly needed. Decentralised biomass generation will provide employment in rural communities aswell as a new source of income for farmers. Wave power offers strong potential for the Scottish Highlands and Islands.

e. Diversity and security of supply

The use of the term 'renewables' is misleading when considering diversity of supply. **The different forms of renewable power - solar, wind, wave, biomass, hydro, tidal and so on - should be listed separately, just as different fossil fuels are.** A 100% renewable energy system would involve a wide range of different technologies, safeguarding against freak weather conditions which might make any particular one source difficult to use at particular times.

Given the scale of the UK renewable resource, developing these technologies will also enable the UK to become self-sufficient in energy terms, and eventually to become a major exporter of energy (possibly in the

[11] Boder Wind (1998) Offshore Wind energy- Building a New Industry for Britain, Greenpeace UK.

form of hydrogen) as well as an exporter of the technologies for harnessing renewable power.

f. Policies to promote renewable energy

Targets are only as good as the policies that support them. The Renewables Obligation should increase year by year after 2010.Vulnerable customers should be protected from the impacts of the Obligation through programmes to tackle fuel poverty.

However, given the environmental and industrial policy importance of renewable energy, it would be wrong to load all the cost of transition onto consumers. The Government needs also to accept its responsibility to invest significantly to speed up the transformation to a renewable energy system.

As the Prime Minister pointed out in his speech to Chatham House in March, the money allocated so far is no more than a "downpayment". **The Treasury must use the next spending review to invest ambitiously in renewable energy systems.** Greenpeace, along with Friends of the Earth, WWF, RSPB, CPRE, the Wildlife Trusts and the Green Alliance, challenged all political parties before the last election to pledge at least £100 million a year in support of offshore wind.

Government support is also needed to ensure that the grid is extended and where necessary strengthened and upgraded to cope with different patterns of generation. It is essential for the public sector to pay for grid extension to create a level playing field**.** The existing electricity network was largely built at public expense whilst the industry was in the public sector. Building power stations on land on or near existing sites does not incur significant new cabling costs; this is in effect a subsidy arising from past public investment. New technologies, particularly marine ones, face cabling costs which can make them seem 'uneconomic' when compared to the cost of fossil fuel generation. This is a real barrier to the rapid growth of a large offshore wind and wave industry in the UK. **The Government should therefore subsidise the building of a new offshore cabling network.**

The Government also needs to ensure that the overall market conditions are favourable to renewables. The New Electricity Trading Arrangements (NETA) are geared towards large-scale, mainly fossil fuelled generation; they

penalise small generators and intermittent generation, while not reflecting the value of embedded generation offered by renewable installations.

Since NETA's introduction, wind exports to the grid have fallen by 13% and other renewables by 7%. Renewables prices have fallen by around 26%. The problems will not be rectified by Ofgem tinkering. Fundamental reform is necessary to avoid long term damage to renewables generation, and the Government must recognise that renewable development will be inhibited by the market conditions being imposed by Ofgem. **NETA must be restructured to ensure that it recognises the benefits of embedded generation.**

4. Nuclear power

It has been widely reported that the Government sees a revival of nuclear power as part of the answer to climate change. This would be economically irrational: both energy efficiency and renewable energy generation provide more cost-effective ways of reducing carbon emissions. However, this is not the main reason why Greenpeace opposes nuclear power. Nuclear generation inevitably involves routine and accidental release of radioactivity into the environment, and the generation of radioactive waste. This is true even of the most modern reactor design. Radioactivity is a 'no threshold pollutant' - according to the International Commission on Radiological Protection there is no level for exposure below which it can be said that there will be no adverse effects on human health.

The effects of radioactivity on human health and the environment are poorly understood, being based on models and data derived from the bombing of Hiroshima and Nagasaki. There are statistically-significant increases in childhood cancer rates around some nuclear facilities. It is known that radiation causes cancers and other illnesses, and despite the lack of conclusive direct causal evidence, the Government should adopt a precautionary approach and stop the radioactive discharges.

The UK, in common with all other countries with a nuclear power industry, has no solution to the problem of nuclear waste. The industry's preferred option is so-called 'deep disposal' in a specially constructed underground dump. Deep disposal would inevitably result in radioactivity leaking from

the site and returning to the surface. This 'solution' therefore amounts to dumping the waste out of site and out of mind, but in the knowledge that it will return as a liability for future generations.

There is in fact no solution to the problem of radioactive waste. It will remain dangerous for generations to come, so creating it is clearly incompatible with any notion of sustainable development. The least-bad option is to store it on site, where it can be monitored and managed. It is irresponsible to produce nuclear waste that cannot be safely dealt with, regardless of the quantity. The Royal Commission on Environmental Pollution stated this clearly 25 years ago:

> *"there should be no commitment to a large programme of nuclear fission power until it has been demonstrated beyond reasonable doubt that a method exists to ensure the safe containment of long-lived highly radioactive waste for the indefinite future."*[12]

Since then, no progress has been made and the RCEP reiterated its demand in its report last year:

> *"New nuclear power stations should not be built until the problem of managing nuclear waste has been solved to the satisfaction both of the scientific community and the general public."*[13]

It is a tragedy that the RCEP's advice was not heeded 25 years ago, and that the UK now has a legacy of nuclear waste which will need to be stored and monitored for tens of thousands of years. Constructing new nuclear facilities would compound this folly. The construction of new nuclear facilities would inevitably add to the decommissioning waste, even if less operational waste is produced from new reactor designs.

It is worth pointing out that the lack of an agreed plan for nuclear waste management undermine nuclear industry claims that nuclear power is now economic. With open-ended liabilities on waste the costs of nuclear power are impossible to quantify accurately.

---

[12] Royal Commission on Environmental Pollution Sixth Report (1976), *Nuclear Power and the Environment*

[13] RCEP (2000), Energy – the Changing Climate, p 151

a. Nuclear power and security of supply

Nuclear power's contribution to security of supply is at best limited. As the stations age, they become increasingly susceptible to unplanned, safety-related shutdowns – as shown recently by both the Wylfa and Chapelcross closures. Even the newest station, Sizewell B, has recently closed down ahead of its scheduled outage because of damage caused by leaking boric acid.

Given that nuclear stations are not able to load follow, and that all nuclear output is used as baseload, nuclear power cannot be used to balance the grid at times even when the stations are operating normally. Nuclear power's overall contribution to grid stability is therefore extremely limited.

b. Nuclear power and employment

Employment levels at closed nuclear installations do not decline significantly in the short term, although the focus of the work shifts from operational to waste management issues. The industry's experience in nuclear waste management and decommissioning will prove increasingly valuable in an international decommissioning market worth hundreds of billions of dollars.

c. Why there must be no new subsidy to nuclear power.

This is an industry which has received billions of pounds in subsidy world-wide over the past five decades. If a fraction of this had been allocated to developing renewable power, we would not now be faced with arguments about whether wind, wave, solar and biomass are economic.

In the UK, past capital construction costs amounting to tens of billions of pounds have been largely written off by the state, and future liabilities have been underwritten by the Treasury. There is also a cap on commercial insurance payouts, which indicates that the insurance industry - experts in risk assessment - do not accept the nuclear industry line that a catastrophic accident cannot happen.

It is possible to quantify at least three of the subsidies the UK nuclear industry has received in recent years:

- Nuclear power received more of the Governments R& D budget than any other source according to the IEA – in 1999 it stood at **US $ 26 million**[14]

- The UK Government has undertaken liabilities for Magnox of at least **£ 3.7 billion** – this figure is likely to rise[15]

- UK electricity consumers have paid **£2.6 billion** to Magnox via the Fossil Fuel Levy[16]

Despite this huge subsidy the nuclear industry is lobbying hard for new support in the form of exemption from the Climate Change Levy (CCL).

Despite its name the CCL is an *energy* tax, not a carbon tax. The Government rejected the case for reflecting the carbon content of fuel in the tax following its consultation in 1999, a decision which Greenpeace supported. Only renewables and 'good quality' CHP are exempted from the tax. This is a sensible approach: there is a broad consensus around the need to increase their contribution to energy generation.

There are a number of large negative financial and competitive impacts that nuclear exemption from the CCL could have:

- **It would impact on Government finances**. It could reduce receipts from the electricity sector by up to 28%. To recoup this revenue Government would have either to increase the Levy on other energy sources or increase national insurance (which has been cut to make the CCL fiscally neutral).

[14] IEA(2000) *Energy Policies of IEA countries*, IEA Paris.
[15] The Government's undertaking for Magnox liabilities is £3.7 billion in 1998 money values, rising at 4.5% above the rate of inflation and due to be paid between 2008 and 2116. Depending on when payment falls due, this could add several hundred million pounds to the overall figure.
[16] This is based on FFL receipts apportioned to Magnox from 1990- 1996

- **It would disrupt competition between generators.** BNFL, British Energy & EdF would be able to charge more for the electricity they generate. Moreover since they own the only sites where new nuclear facilities could conceivably be constructed, they are the only generators who could ever have access to this subsidy. A basic analysis of wholesale prices suggests that these companies could be in a position to increase their cash-flow on electricity sales from UK nuclear supply by between 10-20% [17]. This would almost certainly increase their return on existing investment and might decrease the return on investment for gas and coal competitors.

- **It could undermine industrial electricity users focus on energy efficiency and renewable energy.** Because nuclear power currently contributes 28% of electricity generation its exemption would swamp the market for exempt electricity and weaken the energy efficiency signal to industrial users of electricity.

The main reason for rejecting a nuclear exemption, however, is not economic but environmental. It would give the wholly unjustifiable impression that nuclear power is environmentally benign, when in fact it is deeply destructive. Economists might argue that in an ideal world it would be optimal to have a climate change levy and a separate radioactive waste/emissions levy to internalise the external costs of these impacts. In practice it makes sense simply to continue to include nuclear power within the scope of the CCL.

If the Government feels the need to respond to the nuclear industry's lobbying on the CCL it should simply rename the Levy and explain that its purpose is to discourage all environmentally-damaging forms of energy.

Nuclear power has enjoyed unprecedented political support for 50 years, but the industry has repeatedly failed to deliver. The Government should seize this opportunity to recognise that the promises being made now are equally empty. Nuclear power is not an environmentally acceptable or

[17] Given that current wholesale price are approximately 2.4p inclusive of the 0.43p levy nuclear generators currently get around 2p per unit. Under CCL exemption they could charge 2.3 p, still come in cheaper than competitors, and pocket the extra 0.3p.

economically viable option for meeting the UK's climate change commitments.

The Government should reject any further subsidies to the nuclear industry, make clear that there will be no new nuclear power stations in the UK, and phase out existing stations as soon as possible.

5. Carbon sequestration/ sinks

Greenpeace does not support the concept of carbon sequestration. It is unlikely that any engineering solutions can guarantee that the carbon contained through geological sequestration will not escape. Even if it were possible to establish the long term monitoring (of the order of millenia) required, this would not constitute control. It would not be possible to eliminate the potential for a catastrophic release. Please see Appendix II on deep disposal of carbon dioxide for more detail on the risks associated with this approach.

Greenpeace is also opposed to the concept of using carbon sinks in forests, plants and soils to 'offset' greenhouse gas emissions. There are large uncertainties in the science of how carbon dioxide 'sequestered' by the biosphere behaves, how much of it is taken up by the biosphere, how it is released back into the atmosphere, and how long it is held in these sinks and therefore isolated from the climate system. The Hadley Centre for Climate Change has predicted that, by 2050, climate change will have caused forests globally to become a significant net source of CO2 emissions.

The best way to ensure that carbon remains locked up is to leave it unburnt in the form of a fossil fuel deposits. Carbon sequestration is also likely to prove an expensive distraction from the real tasks of increasing energy productivity and phasing in non-polluting renewable energy sources.

6. Conclusions

The decisions taken by this Government in the next three years will be central to determining the trajectory that Britains energy economy takes – they will either point the way to a renewable energy system that is more productive and many times less damaging to the environment, or they will point backwards to more of the same – one large polluting power plant will

be replaced by another large power plant, nuclear waste will accumulate, energy demand will continue to rise, and renewable energy technology will remain marginal in the UK economy.

Renewable energy and nuclear power are not compatible – both will require considerable financial and regulatory support and both will compete for new customers.

In this report we have identified seven key actions that the Government can take to ensure that the UK gets on the path to a productive renewable energy economy:

1. **Support the EU target of keeping global average temperatures below 2 degree C as a minimum boundary for long term climate policy.**

2. **Endorse the vision laid out by the Environment Agency for achieving a 50% reduction on final energy use by 2050.**

3. **Set a target for meeting 175 TWh a year (50% of current electricity use) from renewable energy by 2020.**

4. **Make it clear that new nuclear power stations will not be permitted.**

5. **Continue to tax nuclear generation of electricity under the Climate Change Levy**

6. **Phase out existing nuclear power stations as quickly as possible.**

7. **Reject underground and ocean disposal of carbon dioxide as a climate protection strategy.**

Appendices

I. DEWI (2000) *North Sea Offshore Wind – a Powerhouse for Europe: Technical Possibilities and Ecological Considerations*. Greenpeace International.

II. Johnson et al.(1999)*Ocean Disposal/ Sequestration of Carbon Dioxide from fossil Fuel Production and Use:An Overview of Rationale, Techniques and Implications*, Greenpeace Research Laboratories.

Please note: Because of the size of these appendices they are provided separately to the main document.

Greenpeace UK 10/09/01