UK climate change programme : memoranda relating to the inquiry submitted to the Committee / Environment, Transport and Regional Affairs Committee.

HOUSE OF COMMONS SESSION 1998–99

ENVIRONMENT, TRANSPORT AND REGIONAL AFFAIRS COMMITTEE

UK CLIMATE CHANGE PROGRAMME

Memoranda relating to the inquiry submitted to the Committee

Ordered by The House of Commons *to be printed*
20 January 1999

LONDON: THE STATIONERY OFFICE
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The Environment, Transport and Regional Affairs Committee is appointed under Standing Order No 152 to examine the expenditure, administration and policy of the Department of the Environment, Transport and the Regions and associated public bodies.

The Committee consists of 17 Members. It has a quorum of five. Unless the House otherwise orders, all members nominated to the Committee continue to be members of it for the remainder of the Parliament.

The Committee has power:

(a) to send for persons, papers and records, to sit notwithstanding any adjournment of the House, to adjourn from place to place, and to report from time to time;

(b) to appoint specialist advisers either to supply information which is not readily available or to elucidate matters of complexity within the Committee's order of reference;

(c) to communicate to any other committee appointed under the same Standing Order (or to the Committee of Public Accounts, the Deregulation Committee or the Environmental Audit Committee) its evidence and any other documents relating to matters of common interest;

(d) to meet concurrently with any other such committee for the purposes of deliberating, taking evidence, or considering draft reports.

The Committee has power to appoint two sub-committees and to report from time to time the minutes of evidence taken before them and their minutes of proceedings. The sub-committees have power to send for persons, papers and records, to sit notwithstanding any adjournment of the House, to adjourn from place to place and to meet concurrently with any committee appointed under the same Standing Order or any sub-committee thereof for the purposes of deliberating or taking evidence.

The membership of the Committee since its nomination on 14 July 1997 has been:

Mr Andrew F Bennett
Mr Thomas Brake
Christine Butler
Mr John Cummings
Mr Stephen Day *(discharged 17/11/97)*
Mr Brian Donohoe
Mrs Gwyneth Dunwoody
Mrs Louise Ellman
Mr Howard Flight *(discharged 20/07/98)*
Mr Clifford Forsythe
Mrs Teresa Gorman *(appointed 30/11/98)*
Mr James Gray
Mr Philip Hammond *(appointed 17/11/97)*
(discharged 22/06/98)
Mrs Eleanor Laing *(appointed 22/06/98)*
Mr Bill O'Brien
Mr Bill Olner
Mr Eric Pickles *(discharged 30/11/97)*
Mr John Randall *(appointed 20/07/98)*
Mr George Stevenson
Mr Graham Stringer
Mr Alan Whitehead

LIST OF MEMORANDA

MEMORANDA

SUBMITTED TO THE ENVIRONMENT, TRANSPORT AND REGIONAL AFFAIRS COMMITTEE

Memorandum by the UK Steel Association (CC 1)

UK CLIMATE CHANGE PROGRAMME

The UK Steel Association

The UK Steel Association (UK Steel) is the trade association for the UK steel industry. It represents the industry to policy and opinion formers, promotes the industry and the importance of steel to the public and provides information and services to its members. Over 95 per cent of UK steel producing companies, and many UK steel processing companies, are members of the UK Steel Association.

The UK steel industry

The sector is of major importance to the UK economy. It provides 60,000 direct jobs, is an essential supplier to a wide range of UK industries, and contributed some £2.3 billion to the UK's balance of trade in 1996 and because of the recyclability (40 per cent of "new steel" comes from recycled material) of its products and many of its by products is a significant contributor to the UK's sustainable development.

Steel is a commodity product traded worldwide. The UK steel industry exports over 50 per cent of its production in highly competitive markets, where quality and delivery are taken as read, and price is all. Cost increases generally cannot be passed on. Indeed the pressure is for prices to be reduced. For instance, between 1992 and 1997 the price of ferrous scrap, which is the major raw material input into electric arc furnaces, increased by circa 50 per cent. This cost increase had to be absorbed, an indicator of this being that the price of merchant bar, a product produced via this process, was virtually the same in 1997 as it was in 1992.

The strength of sterling has severely dented the profitability of the sector and its contribution to the balance of trade, which fell from £2.8 billion in 1995 to £1.9 billion in 1997, even though the volumes of exports increased between 1995 and 1997. In 1998 the situation has worsened due to events in the Far East and their impact on the global economy. Given that energy costs are responsible for up to 20 per cent of total costs, increases in UK energy costs relative to the rest of the world, say through taxes or inadequate competition in energy markets, would have a devastating effect on the ability of the industry to compete. UK steel companies already pay up to 40 per cent more for electricity compared to their European competitors.

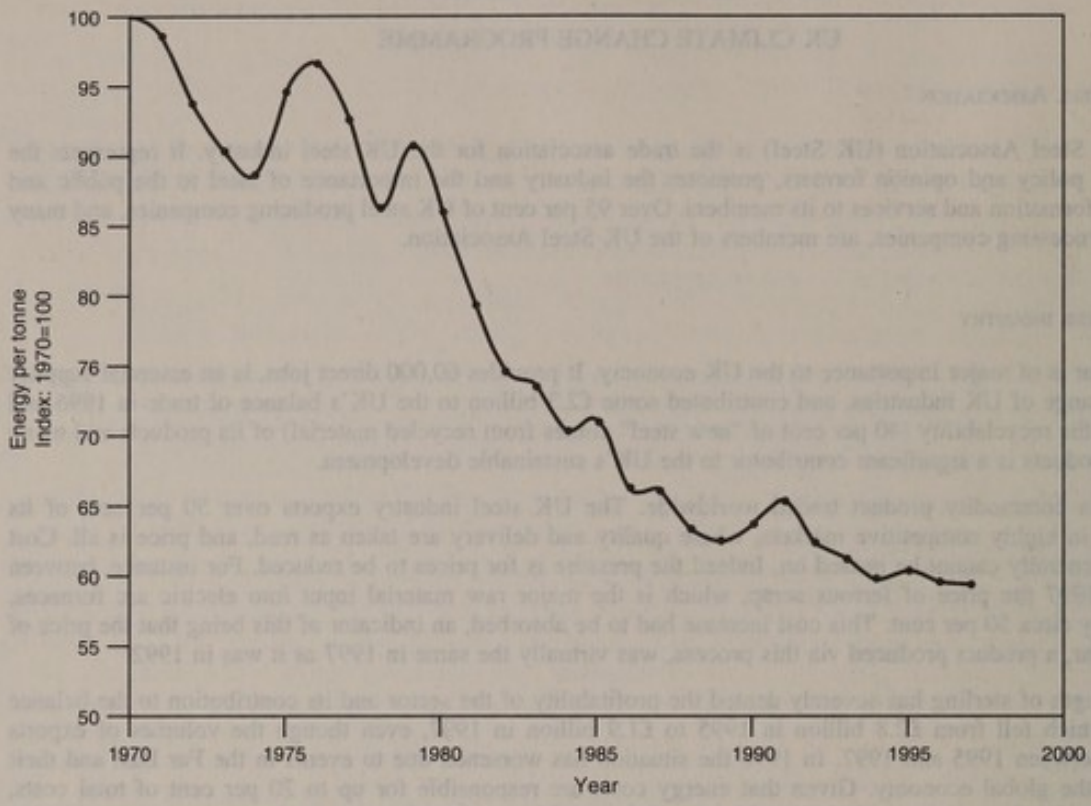
The sector's major energy users are regulated under UK Integrated Pollution Control (IPC) and also come under the provisions of the Integrated Pollution Prevention and Control Directive (IPPC).

UK steel and climate change

Past performance

The UK steel industry acknowledges that it has a role to play in assisting the UK government to achieve its Kyoto Protocol commitments. The extent of its contribution is strongly influenced by the fact that steel is an energy intensive industry and has, in order to remain competitive in a global market, already devoted considerable effort to improving energy efficiency. Compared to 1970 it now takes 40 per cent less energy to produce a tonne of steel, whilst carbon dioxide emissions have halved. In contrast, emissions from road transport have almost doubled and are now some five times those from the steel sector.

UK steel industry energy use per tonne of steel



Future contribution

The sector's members will continue to examine ways of improving their use of energy, but the process efficiency gains cannot continue at the same rate in the near term as the existing technologies are reaching their limits. Additionally, the primary process for producing volume steels uses carbon in the form of coke as a reductant, and alternative technologies will take considerable time and money to develop commercially. The result is that to obtain step reductions in process emissions of CO_2 a 2020 timescale is more appropriate.

Holistic (lifecycle) approach

However steel companies can, and do, play a significant role in CO_2 reduction by developing, in conjunction with their customers superior steels, that through down-weighting or improved system efficiency, have the potential to produce a net reduction in emissions of global warming gases over the product lifecycle. Examples are the ultra lightweight auto body and lighter beverage cans. The production of such steels requires slightly more energy during their manufacture but allows more efficient use of the steel. The products are therefore less energy intensive to make and use. This technical development emphasises the need to take a lifecycle approach.

For example the average weight of a 33 centilitre beverage can has been reduced from 31 grammes in 1983 to 25—a weight saving of 20 per cent. The can therefore uses 20 per cent less steel and consequently the CO_2 emitted in making the steel for a given quantity of cans is also reduced by 20 per cent.

Importance of competitiveness and profitability

The sector can only invest in these process and product developments if it remains competitive and profitable. Thus it is imperative that Government avoids policies that add to the sector's costs putting these developments at risk. Climate change is a global issue requiring global action. The UK's Kyoto 12.5 per cent reduction target is challenging: it is unclear how the Government's 20 per cent CO_2 reduction target is consistent with its desire not to damage competitiveness.

Negotiated agreements

The sector's preference is for a negotiated agreement, and we are currently working on the details of an agreement. The sector is ideally structured to formulate an agreement, since a small number of companies'

account for a very high proportion of its energy consumption. These companies are also regulated under IPC, and will also come under IPPC. Linking an agreement to the authorisation conditions under, for example IPC, would provide a legal basis for an agreement, with issues of monitoring and sanctions also being covered through that linkage.

The Lord Marshall Report on "Economic instruments and the business use of energy" acknowledged that: "*there is a case for considering some form of special treatment for the most energy intensive users*". He also went on to say "*Negotiated agreements could be a flexible approach which I hope will be examined in detail.*" And that "*agreements are only likely to have any prospects of success in cohesive sectors with a small number of large players*". The steel sector meets the criteria referred to.

The European Commission also recognise that agreements have a role to play in delivering environmental objectives—see COM(96) 561 final. They note that agreements can promote "*a proactive attitude on the part of industry, they can provide cost-effective, tailor made solutions and allow for a quicker and smoother achievement of objectives.*". They also observe that "*They can also be a means for implementing-in a cost effective manner-regulatory objectives established by Community Directives*" and that parties to an agreement can be exempted from, for example, an environmental tax.

Carbon—energy tax

UK Steel is opposed to a tax. It would be very damaging for the steel sector and perversely would be unlikely to result in a reduction in CO_2 emissions because:

- Its effect on the industry will be to push up input costs, not reduce unit energy consumption. In the case of the steel industry (and the same is true of many other sectors for which energy is an important cost), production processes are already very energy efficient and further improvements would be very difficult to achieve economically.
- In the short term, the erosion of EU competitiveness will result in loss of exports and in increased imports; frequently this loss of business will be to countries who have not committed themselves to CO_2 reductions. (Four of the top-10 steelmaking countries are not Kyoto Annex 1 countries; i.e., have no Kyoto commitments). In the longer term, relocation of manufacturing to locations outside the EU not subject to such a cost burden could occur. In both cases the likely result will be an increase in global CO_2 emissions. *A tax is not going to result in any additional UK savings in energy use/CO_2 emissions compared to those achievable from an agreement, except through loss of business and closure of plant.*
- By reducing the profitability of the sector it would reduce the funds available for investment in research and development and in the technology necessary to deliver energy efficiency, and other environmental, improvements.

Emissions trading

The theory underlying trading is simple, and looks convincing. However, the practice is another matter. Trading schemes, unless carefully designed, can be bureaucratic and impose an administrative burden out of proportion to their benefit. The theoretical cost advantages of trading may not arise in practice if super-imposed on existing regulatory instruments, such as IPC, and in time IPPC. A DoE publication of 1993 recognised this. We quote "*It is important to consider how regulatory and economic instruments fit together. If the scheme is not well thought out it could lead to perverse results*" and "*If substantive use of direct regulation remains, the economic instrument may not work well. An example might be a tradable permit scheme with significant constraints on trading.*" Thus UK Steel thinks it is premature to introduce a trading scheme. However, recognising that trading has potential, the sector is prepared to participate in work examining the options for trading and their relative impacts.

SUMMARY

UK Steel Association will play a full and positive part in the Government's consultation with industry, and will be looking for policies that:

- Deliver the environmental objective in the most economical way.
- Reduce greenhouse gas emissions across all sectors of the UK economy, including transport, domestic, industry and the service sector.
- Do not damage the competitiveness of the industry.
- Do not place a cap on the expansion, volume or added value of the sector.
- Provide flexibility so that the sector, and individual companies in it, can pursue those options most suited to its own circumstances;

— Take account of the past achievements of the sector in improving energy efficiency and the constraints this places on near term improvements;

— Recognise the need for a holistic approach;

— Recognise the long development and investment time scales in the sector.

A negotiated agreement is the best way forward, providing a win win opportunity for Government and the sector. A tax in contrast would result in lose lose.

Graham D Funnell

Head of Environmental and Technical Policy

17 December 1998

Memorandum by I G Blair Esq (CC 2)

I write with reference to the UK Climate Change Programme.

I wish to comment on the mechanisms required to monitor the effectiveness of policies in reducing emissions. I wish only to comment on carbon dioxide because of the central role that, we are told, it plays in contributing to global warming.

The statistical press release, P/98/594 prepared by the Government Statistical Service for the DTI makes it clear that:

1. CO_2 emissions from power stations decreased by over a quarter between 1990 and 1997.

2. CO_2 emissions by road transport increased markedly over the same period. The increase in CO_2 emissions has been mostly caused by a freight increase of nearly 50 per cent from 103 to 154 billion tonne kilometres.

These figures show that attempts to reduce CO_2 emissions must concentrate on reducing road transport and in particular freight transport by road. However, the Government has neither a policy nor a strategy for doing this effectively. The position appears to be monitored well enough but the Government, if it is serious about the threat of global warming, needs to redirect its policies into more productive policies in that regard.

There is a stark contrast between its failure to tackle the problem of freight on the roads and its much publicised support for renewable sources of fuel in electricity generation. Where carbon dioxide is concerned, it has clearly backed the wrong horse.

Consider, for example, what is achieved by a large wind turbine of 500 kw rated capacity in reducing carbon dioxide emissions. Such turbines rarely work at more than 25 per cent efficiency. Even if every unit produced by such a wind turbine displaced a unit of electricity from coal-fired sources the amount of CO_2 saved would be no more than 1,000 tonnes per annum. In practice, of course, this could never happen as coal now accounts for less than 30 per cent of fuel used in electricity generation and the actual CO_2 saving by the wind turbine would be about 580 tonnes per annum.

Assuming, for argument's sake, a saving of 750 tonnes CO_2 per annum for the wind turbine, it is easy to see that 1,000 such turbines would produce a saving of 750x1,000, or 750,000 tonnes per annum. Compare this with the figure for emissions of CO_2 from road transport in the UK of 30,000,000 tonnes per annum in 1996 (Chart 5 of the Press Release) and one can see how misdirected are present government policies.

The 1,000 wind turbines would save just 2.5 per cent of the CO_2 emitted by road transport in a year.

The environmental damage of erecting 1,000 wind turbines would be not inconsiderable. The savings in pollution would be paltry in the extreme. Although other sources of renewable energy are less likely to cause major environmental damage, there is still a need to monitor all renewable energy projects more closely. At the moment there seems to be a desire on the part of government to back them automatically without subjecting them to close scrutiny.

On the other hand, there is no comparable support given to policies to reduce freight on the roads, although everybody concerned knows full well that here lies the root of the problem.

"There is no possibility whatsoever that any targets for stabilising let alone reducing CO_2 emissions can be achieved against the increases in vehicle numbers and activity" (J Whitelegg, Transport for a sustainable future, 1993, page 16).

Here in Gloucestershire we see an M5 motorway increasingly clogged by traffic, much of which emanates from Europe. "By its very nature the SEM, (single European Market) seems certain to instigate a large increase in lorry traffic." (Tolley and Turton: Transport systems, Policy and Planning, 1995, page 350). We see also a large and ineffective wind turbine built in a nationally designated Area of Outstanding Natural Beauty with the direct and overt backing of the Department of Trade and Industry.

The UK Climate Change Programme Summary of Policies and Measures, contained in Annex 1 on page 7 of the 2nd Report Summary, lists four policies in the electricity generation sector and only one in the transport sector. The time has now come for the Government to concentrate on the transport sector and to acknowledge that some of its policies in the electricity sector need careful scrutiny to ensure that they do not cause more environmental problems than they can ever solve.

4 January 1999

Memorandum by the Engineering Council (CC 3)

UK CLIMATE CHANGE PROGRAMME

INTRODUCTION

In order to establish how best to meet the emissions targets and commitments for 2010, we need to look further ahead to, say, 2050–2100. A full review of the potential for non-fossil technologies to produce power and fuels on the scale required is needed.

The Climate Change Consultation Process (CCCP) as it stands will not deliver the savings the UK has committed itself to in the time-scale required, largely because of the over-optimistic assumption of the contribution which alternative energy sources and CHP could make and because the timescales for introduction of new generating capacity and for demand-side reductions are longer than the CCCP implies.

Electricity supply

As nuclear power stations are taken out of service according to the current plan, by 2003 we shall have lost approximately 3 GW of non-fossil fuelled power. In the main, it is planned to replace this with fossil fuelled power stations such as clear coal technology power stations and CHP plants.

The government appears to have been misled about the technical performance and benefits of CHP. We are concerned that the CCCP relies so heavily on CHP delivering savings in emissions. These savings are calculated on the basis that approximately 5 GW of low efficiency coal fired generation will be replaced with supposedly highly efficient gas fired CHP. However, CHP plant is only cost-and energy-efficient when running with balanced heat and power outputs. We do not believe that this state will be achieved in the majority of CHP installations.

There has not been sufficient independent research carried out into how much of a contribution renewable sources can make to the energy-mix in a reasonable time-scale.

To make the best use of renewable energy, there will need to be local generating systems with a back-up grid. Some renewable energy sources are variable and unpredictable in nature (e.g., wind power) and so a back-up system is required to ensure smooth and consistent power for customers. This will require fossil fuel capacity, to be run on variable load with associated reduced efficiency. There is also cause for concern about the stability of the grid being threatened through a large number of small capacity renewable energy supplies. More research is needed to understand fully the implications of this.

Planning time for any type of power generation plant is at least four years. Construction itself is a lengthy process for all such projects, shortest for Combined Cycle Gas Turbines (CCGT) and on-shore wind and longest for off-shore installations and nuclear power stations. The die is already cast for power generations up to 2010, with several clean-coal stations being commissioned in that time. There is not enough time to be able to do anything dramatic to the energy-mix before 2010. It is essential we consider our long-term plans now. Wherever possible and practicable, replacement generating capacity should make use of the existing embedded infrastructure.

The Magnox stations scheduled for taking out of service have the potential to have their operating life extended by up to five years to help "tide us over" whilst bringing the power stations running on alternative renewables on-line.

NFFO (the Non Fossil Fuel Obligation) is a powerful tool for encouraging the development of new renewable technologies. However, it is unclear that the targets for renewable could be met unless resources were made available at a much higher level, planning restrictions were overcome and guaranteed markets for the higher priced energy were found.

The government needs to increase the support for research, development and demonstration of offshore power generation technologies—wind, tidal and wave.

Reducing Energy Demand

The CCCP needs to examine the possibility of a demand-side reduction. There is plenty of technology available to help achieve this but it is not in common use. Energy efficiency is not generally high on the industrial, or domestic, agenda.

Measures such as requiring companies to publish information in their Annual Report on energy use can encourage "competition" between organisations to be more energy-efficient. In the USA, for example, engineering standards for products are mandatory and have had profound effects. For example, domestic appliances such as fridges have had tougher energy-efficiency standards introduced with manufacturer's being given a mandatory five-year deadline. Savings of electricity-use from the fridges alone over a 10-year period are estimated as being worth 16 power stations. The EU's labelling scheme has had a minimal effect on public, or manufacturer's, behaviour. The time-scale needed to introduce such changes is relatively short due to the high turnover in domestic appliances.

For small businesses the majority of their energy costs are tied up with the rent of business premises. Until the energy bill is separated, SMEs are unlikely to take action on energy efficiency. Energy service contracts, where the building is maintained at an agreed controlled environment, are a more effective way of reaching this sector.

The average stay in a house is only seven years and so the incentive for home-owners to carry out improvements in energy efficiency is relatively small. Naturally, for those renting properties there is no incentive at all. The government needs to work with local authorities and utility companies to address this problem. It will involve a major effort to improve the energy efficiency of existing building stock, as well as a campaign to improve the energy efficiency of new buildings. There is scope for encouraging energy service contracts for domestic as well as commercial buildings. The technology for improvements in energy and material efficiency in buildings already exists but it is not in general use. This fact is not reflected in the CCCP document, which repeats optimistic estimates of the scope for energy savings but with no new ideas on how to ensure that they are to be achieved. Better education is needed to make key stakeholders, such as architects and end-users, aware of what is available.

We need to reverse the notion that leading the way technologically is the most expensive option. There are large export markets for environmental technologies which currently are being dominated by Germany, the USA and Japan. Local initiatives with large companies providing assistance for SMEs in their area should be examined.

Transport

The problems of reducing greenhouse warming emissions from freight and passenger transport are rather different, and we suggest that the CCCP must make this more explicit.

In the short-to-medium term, the emphasis needs to be on reducing road and air movements, both by shifting to other modes of transport (primarily rail) and by reducing the number of journeys. Where feasible, freight needs to be moved away from road transport and back onto trains. Furthermore, the emissions from marine transport are small relative to most other modes, most notably air freight. While we recognise that only domestic flights are currently covered by the CCCP, we also recognise that international flights contribute significantly to global greenhouse emissions. Marine, coastal and inland shipping would all potentially reduce emissions from freight transport. Retailers, distributors and manufacturers need to examine the distribution infrastructure to minimise the number of goods vehicles travelling empty or making unnecessary journeys. It should be possible for the government to provide both "positive" and "negative" incentives for these kinds of changes.

In private transport, we call alteration to the disproportionate contribution to emissions arising from short journeys. The majority of car journeys are of less than 10 miles, arising largely from "domestic" activities such as deliveries to and from schools. The current policy of some local authorities to provide free bus travel only for pupils travelling more than three miles to school actively encourages parents to drive children up to three miles to school, causing local problems with congestion and higher emissions than could be achieved. The American system of school buses, throughout the country will address many problems, social and environmental.

In the medium term, alternative fuels and technologies can contribute to reducing greenhouse emissions. Some of these are already available and not all are mentioned in the CCCP. Electrically powered vehicles may have an important role in local transport systems, for both freight and passengers. These vehicles are not emission free—the emissions are transferred from the vehicle to the electrical generating plant, but they can nevertheless result in overall reduced greenhouse emissions (as well as emissions of more local atmospheric pollutants). "Hybrid" engines are likely to have a role for vehicles which are required to perform both local and inter-city journeys. Vehicles are under test which are powered by fuel cells using hydrogen, which is generated "on board" by reforming LPG or methanol. More conventional fuel-efficient engines are already available, but their take-up has been limited as consumers continue to opt for large saloons, "people carriers" and, most wastefully, "4x4" vehicles in preference to small fuel-efficient vehicles. A major campaign is needed to promote fuel-efficient transport, perhaps involving the kind of fiscal instruments which were effective in promoting the shift to lead-free gasoline.

In the longer term, alternative technologies will be needed to break the link between transport and non-renewable carbon fuels. Although these technological developments are unlikely to impinge on greenhouse emissions within the time period to 2010, they must be considered as part of any longer term strategy. Biofuels include methanol, which can either by burned directly or reformed to produce hydrogen, used in turn in fuel

cells. This could represent an intermediate step towards a "hydrogen energy economy", in which hydrogen produced from renewable energy sources serves as an energy vector. We note with interest the developments being pursued in Iceland to use excess geothermal energy to produce hydrogen, by electrolysing water, to act as an energy carrier. We recognise that there are considerable technological difficulties, for example in the safe storage and transport of hydrogen, but also recognise the potential importance of hydrogen for energy storage and transport in renewable energy scenarios.

Tackling the Effects of Climate Change

The strategy set out in the Consultation Paper recognises the seriousness of the threat posed by global climate change, but makes no mention of measures to deal with the effects of climate change. The Engineering Council recommends that the UK Climate Change Programme should incorporate such measures. We give just two examples of effects to be considered.

The forecast rise in sea level of between 15 and 95 cm will need major investment in coastal and river defences. Given the long lead-times for such work, planning needs to start as a matter of some urgency.

Climatological models predict that global warming will lead, *inter alia*, to reduced rainfall in the South and East of the British Isles and possibly increased rainfall in the North and West. Plans for major redistribution of water need to be addressed.

The Engineering Council and the engineering Institutions carried out a series of studies throughout 1996 which resulted in the publication of the 2020 series of publications. The 2020 Report on Transport, published by the Institution of Civil Engineers, addresses many of the issues which have been omitted by the CCCP and provides analysis of the problems and possible solutions. Similarly, the 2020 Report on Energy, published by the Institution of Mechanical Engineers covers problems of energy supply and demand and potential solutions. The Institution of Chemical Engineers organised in 1997 a major "virtual conference" (on the internet) which included process industry responses to the challenge of global climate change.

This brief overview of the response of the engineering profession to the CCCP has highlighted several flaws in the current strategy. If the Environment, Transport and Regional Affairs Committee need more detailed information, we should be prepared to provide oral evidence.

4 January 1999

Memorandum by English Nature (CC 4)

UK CLIMATE CHANGE PROGRAMME

Evidence from English Nature, the statutory body responsible for advising both central and local Government on nature conservation issues and for promoting the wildlife and natural features of England. In fulfilling its duties, English Nature:

- advises Ministers on the development and implementation of policies for nature conservation;
- advises Ministers on other policies affecting nature conservation;
- identifies, notifies and safeguards Sites of Special Scientific Interest (SSSIs);
- establishes, maintains and manages National Nature Reserves;
- provides guidance and advice on the principles and practice of nature conservation to a wide constituency;
- commissions and supports a wide range of research and other projects.

English Nature welcomes and supports the Government's commitment to tackling climate change and the international lead that it has taken over this issue. This is evidenced both in its work to secure targets for reducing emissions of greenhouse gases (Kyoto and domestic) and in its funding of research into the scenarios for and impacts of anthropogenically driven perturbations of the global climate system.

English Nature advocates that all areas of policy development should be underpinned by sustainable development principles and, therefore, fully supports the approach adopted in the *UK Climate Change Programme: consultation paper*. However, whilst the consultation paper clearly outlines a range of policy options and actions aimed at achieving greenhouse gas reductions in key sectors, English Nature is concerned that the programme fails to acknowledge and address the *likely impacts* of climate change on these and other sectors.

The effects of climate change are already being felt and are likely to increase considerably in decades to come—even with greenhouse gas reductions. In nature conservation, changes in species, habitats and natural processes in terrestrial, coastal and marine environments have already been observed which can be directly attributed to climate change. Many sites are of international importance and protected under the EU Habitats

Directive, and form part of the UK's contribution to the Biodiversity Convention. Management of the impacts of change within and across sectors should, therefore, be addressed explicitly in the Government's climate change programme, and appropriate policies and actions for adaptation and mitigation put in place.

English Nature recognises the political significance of the Kyoto Protocol and of the UK's targets for reducing greenhouse gas emissions to combat climate change, but believes that the environmental benefits are likely to be small in relation to the scale of the problem. The Intergovernmental Panel on Climate Change estimates that, without greenhouse gas reduction, average global temperature will rise by 1.4°C by 2050 relative to the 1961–90 average and that a 60 per cent cut in global emissions is needed to stabilise the Earth's climate. Kyoto should, therefore, be seen as a starting point in a process aimed at setting increasingly more challenging targets that will make a real difference in countering the socio-economic and environmental threats associated with climate driven global change.

English Nature will be making a detailed response to the consultation paper; policy issues relating to the six key sectors will be addressed and the over-arching points raised above will again be made.

Dr K L Duff

Chief Scientist

4 January 1999

Memorandum of the Institution of Highways and Transportation (CC 5)

UK CLIMATE CHANGE PROGRAMME

1. INTRODUCTION

1.1 The Institution of Highway and Transportation is a professional body with some 10,500 members whose vision is to represent professional excellence in the promotion, planning, design, implementation and maintenance of sustainable transport systems and infrastructure. It is part of the Institution's mission to promote political, professional and public debate and understanding of sustainable transport issues, to influence policy, promote investment and encourage public support.

1.2 Membership of the Institution includes transportation planners, traffic engineers, highway engineers and other transport professionals employed by local authorities and central government as well as those working in the private sector and academia. Their decisions play a large part in determining the impact that transportation infrastructure and operations have on the quality of life, business and leisure activities as well as safety and the environment.

1.3 The Institution welcomes the opportunity to submit evidence to the House of Commons Select Committee on the Environment, Transport and the Regions on the Department of the Environment, Transport and the Regions (DETR) consultation paper on the UK Climate Change Programme. This is a challenging and hugely important area of public policy. The Institution has a strong interest in all aspects of transportation, especially sustainable transport, and has made several recent submissions to Government and other bodies on related issues including:

- Integrated Transport White Paper (September 1998)
- Making Bio-diversity Happen (July 1998)
- Sustainable Development (May 1998)
- Developing an Integrated Transport Policy (November 1997)
- Local Authority Circular on Air Quality Management (February 1997)
- Review of "*Transport and the Environment*" (December 1996)

A complete list of the Institution's submissions is available from the IHT's web site: http://www.ith.org.

1.4 Much of the Institution's work is involved with the production of technical guidelines. These guidelines and manuals are essential for highway engineers, transport planners, traffic engineers, town planners and other transport professionals and represent nationally agreed standards in many technical fields. These technical guidelines include: "*Pedestrianisation*" (1989); "*Accident Reduction and Prevention*" (1990); "*Urban Safety Management*" (1990); "*Traffic Impact Assessment*" (1994); "*Cycle-Friendly Infrastructure*" (1996); "*Developing Urban Transport Strategies*" (1996); "*Safety Audit of Highways*" (1996); and "*Cycle Audit and Cycle Review*" (1998). In addition, in June 1998 the Institution published the technical manual "*Transport in the Urban Environment*". The Institution currently has projects to produce technical guidelines on: "*Planning for Public Transport in Developments*", "*Providing for Journeys on Foot*"; "*Pedestrianised High Streets*"; "*The Environmental Management of Highways*"; and "*Rural Safety Management*".

1.5 The Institution believes that the emerging policy developments on sustainable development, land-use and transport need to focus on "means" as well as "ends". In the IHT's response to the consultation paper on

Sustainable Development (May 1998) nine Action Areas were put forward to tackle current constraints or obstacles to building more sustainable communities which will contribute to towards the UK Climate Change Programme. These included the broad themes of: investment in infrastructure, the provision of effective powers, making connections between land-use and transport planning, promoting public transport, changing mode of journey to work and school, and setting new priorities.

2. General comments

2.1 Sustainable development, climate change and integrated transport are closely connected. Transport is pivotal to sustainable development—it is the means by which people take part in a range of activities: work, education, shopping, leisure. Efficient, accessible and sustainable transport facilities are central to the achievement of sustainable development.

2.2 The Institution welcomes the Government's vision of sustainable development:

- which recognises the needs of all of the community;
- provides effective protection of the environment;
- ensures prudent use of natural resources; and
- maintains high and stable levels of economic growth and employment.

2.3 The Institution also welcomes the Government's intention to:

- develop policies which look 20 years ahead or more;
- develop an integrated transport policy to meet the needs of people and business, while respecting the environment, and to
- develop a national programme to tackle climate change.

2.4 Transport only accounts for about 23 per cent of the UK's carbon dioxide (CO_2) emissions, but it is the sector where these emissions are growing fastest. Road transport accounts of about 85 per cent of transport's CO_2 emissions, and within road transport, cars produce about 70 per cent of the CO_2 from the road transport. The effects of road transport on climate change are about 95 per cent due to the emission of CO_2. This note will therefore concentrate on limiting CO_2 emissions (and therefore fuel consumption) from cars, and to a lesser extent from road freight vehicles. In passing, it should be noted that CO_2 emissions from international civil aviation are already significant and are rising more quickly than those from road transport. The emission of pollutants other than greenhouse gases will not be considered in this note. The Institution considers that air quality and the reduction of noxious emissions is at least as important for quality of life as is reduction of the emission of greenhouse gases. However, this has ben covered in other IHT submissions to Government, and is omitted from this response for brevity.

2.5 There are a variety of policy options for reducing the fuel consumption of road passenger transport:

- reduce the fuel consumption per kilometre of cars;
- encourage people to transfer longer journeys to more fuel efficient modes (bus, train);
- encourage people to transfer short journeys from cars to cycle and walk;
- encourage people to reduce the length of car journeys by using more local services;
- reduce congestion so that traffic flows smoothly and fuel consumption (and other emissions) is reduced;
- improve signing and information so that less distance is travelled by drivers who are lost or looking for parking space; and
- improve road maintenance (fuel consumption is less on smoother roads).

2.6 For road freight, the opportunities to reduce fuel consumption are similar:

- reduce vehicle fuel consumption (but there is less potential improvement for goods vehicles than cars);
- transfer freight to rail, which is more fuel efficient, at least for the longer trunk sections of the distribution chain;
- reduce journey lengths, by greater use of local distribution depots (but this will reverse the great improvements in the cost of distribution over the past two decades);
- reduce congestion so that traffic flows smoothly and fuel consumption (and other emissions) is reduced;
- improve signing and information so that less distance is travelled by drivers who are lost or looking for parking space; and
- improve road maintenance (fuel consumption is less on smoother roads).

2.7 It will be immediately apparent that the steps needed to reduce fuel consumption are the same as those needed for sustainable transport. Many of the steps are also consistent with those needed for the reduction of traffic, as required by the 1997 Road Traffic Reduction Act.

Car Fuel Consumption

2.8 The quickest and easiest way to reduce the total amount of fuel used by passenger road transport is to improve the fuel efficiency of the new cars purchased. This is primarily a problem of marketing, though technical improvements have much to offer in the medium to long term. The fuel consumption of the UK car fleet in 1995–97 was 9 litres/100 km. In 1997, the average consumption of new cars was 7.5 litres/100 km. There are cars available today with fuel consumptions of around 5 litres/100 km. If more economical cars are purchased, the fleet fuel consumption could be reduced 25–30 per cent quite quickly. The Institution strongly supports the EU's initiative with vehicle manufacturers to reduce CO_2 emissions from new cars to 140 g/km by 2008.

2.9 Some 60–70 per cent of new cars are purchased by companies, and there is some evidence that cars purchased are larger, heavier and more powerful than those purchased by individuals. To change the type of new cars purchased, companies must be encouraged to purchase fuel efficient cars. There are a number of policy options to achieve this. Firstly, the policies must focus on fuel consumption under standard conditions, not on proxies such as engine size or even engine power. Secondly, the incentives almost certainly have to be fiscal. Increasing fuel prices does seem to improve car fuel efficiency in the long term, but has little effect on vehicle use in the short term. There is little evidence that differential rates of annual vehicle tax or increasing the cost of fuel affect company policies for purchasing vehicles. One possibility that has not been tried is to only allow companies to offset against tax for those cars with a fuel consumption lower than some threshold, say 6 litres/100 km. This threshold could be made more stringent from year to year, as the performance of models available on the market improved. Care would be needed to avoid unintended side effects, such as the use of larger vehicles instead of cars, which has undermined the US CAFE fuel economy programme.

2.10 An essential factor is the need to stimulate behavioural and cultural change by transport users. Government information and advice programmes in energy efficiency and environmental technology in industry over the last 15 years have shown that such changes can be successfully catalysed by a planning, fiscal and regulatory framework which is supported and enhanced by a programme of "best practice". The Advisory Council for Business in the Environment has recently identified this as a useful means of stimulating behavioural change in transport and the IHT supports this concept.

2.11 A best practice programme is a framework and methodology which seeks to achieve behavioural change within a target group to improve their performance against some set criteria. It offers a means by which the Government can stimulate the accelerated up-take of fuel efficiency techniques and thereby achieve reductions in CO_2 emissions from the transport sector. Typically it can provide a link between Government and businesses, providing a means by which national policies can be translated into change "on the ground". Encouraging and achieving behavioural change can work alongside legislation and regulation to raise both efficiency and standards.

Reducing trip lengths and traffic

2.12 All the policies to reduce journey lengths, reduce traffic and encourage transfer of passenger journeys from car to public transport, walking or cycling are those needed for sustainable transport and integrated transport, and have been discussed in other IHT submissions to Government (see section 1.3 above).

2.13 For road freight transport, about 75 per cent of the growth in freight tonne km over the past 40 years has been the result of freight journeys getting longer. The average road freight journey has increased in length from 36 km in 1953 to 90 km in 1997. This increase is a consequence of the steps to increase the economic efficiency of distribution and manufacturing: smaller numbers of larger distribution depots; single manufacturing plants for the whole country; just-in-time delivery; world-wide sourcing. Analyses are needed of how to retain these benefits while reducing road freight journey lengths, and of the penalties for consumers if journey lengths were reduced. There may be scope for publicity campaigns, such as labelling the distance travelled by goods in shops, or the transport energy used to get them to the shop.

2.14 The current target for the reduction of CO_2 emissions by 12.5 per cent over the period 2008–2012 relative to the emissions in 1990, which the Institution supports, is only a beginning. In the longer term, world-wide CO_2 emissions need to be reduced to perhaps a quarter of present levels to restore the atmosphere to the condition it was in before the industrial revolution. Research is needed by the Inter-governmental Panel on Climate Change (IPCC) to determine what level of emissions would be acceptable long term. For the road transport industry, the implication is that vehicles will ultimately need to be electrically or hydrogen powered, with the electricity or hydrogen coming from sources that are renewable (wind, tidal, sun, etc.) or non-carbon producing, such as nuclear (if all the safety and waste disposal problems can be overcome).

2.15 Transport policies on their own cannot reduce traffic or emission of greenhouse gases. It is essential that land-use changes are encouraged to reduce the need to travel and to increase the choice of means of travel that are realistically available. Land-use changes will take a long time to become effective, but must be started immediately if they are ever to play their part.

2.16 Sustainable transport is central to promoting sustainable life-styles and building sustainable communities. However, there is no escaping the fact that there are shortages of both capital and revenue funding

for transport—and herein lies a key to improving transport systems, and promoting more sustainable travel behaviour with the resultant benefits of reductions in damaging emissions that cause climate change.

2.17 Present levels of transport funding, particularly for public transport, are inadequate. Transport expenditure in the UK must be brought more into line with other EU countries if pollution, congestions, safety, the environment, and access to opportunities are to be improved. Such actions should include:

- providing additional resources for a more integrated and sustainable transport system, locally and nationally;
- providing all levels of government with the powers to take action to promote sustainable development and transport in parallel;
- promoting non-car transport and responsible car-use; and
- setting new priorities for the use of roads.

2.18 Most fiscal and regulatory measures are best carried out by national government, such as: vehicle excise rates, fuel duty rates, VAT, overall target setting, motorway tolling, and national transport policy objectives. However, revenues from new streams of income—such as workplace parking charges and road pricing—should be used locally for transport activities, both of a revenue or capital nature. This requires *discretion* (local choice), *hypothecation* (dedicated to the transport budget), and *additionality* (acceptance that the funds are additional to those already allocated to current transport spending).

2.19 Modernising current appraisal techniques must be a high priority. Appraisal processes for transport expenditure should place greater emphasis on:

- Strategic environmental assessment—including wider social considerations, indirect and "secondary" environmental impacts, e.g., sourcing and disposal of materials.
- Sustainable transport audits—not just of transport policies, but across a range of private and public sector decisions, like school closures and catchment areas. This should include consideration of mandatory Sustainability Commentaries in public sector decisions, particularly in relation to planning and service delivery, along with mandatory Sustainable Transport Audits for significant employers to monitor and improve environmental performance, perhaps as part of wider eco-audit initiatives.
- Greater community involvement in defining problems, identifying alternatives and selecting options. This will stimulate ownership of problems and solutions.

2.20 Targets are essential; high profile, challenging national targets backed up by achievable local ones. They focus attention, promote action and permit performance monitoring. Targets must be: **S**imple, **M**easurable, **A**chievable, **R**ealistic, and **T**ime-related. They could take the form of:

- overall traffic reduction targets;
- air quality targets, particularly those related to vehicle emissions;
- key "network" targets, e.g., for the use of rail, and reducing the use of roads;
- targets for modes of journey to work and school;
- proximity of new development to public transport and necessary services and facilities; and
- the proportion of development using "brownfield" sites, including the number of people living in urban areas.

2.21 Similar targets will be needed to reduce the emission of CO_2 by road freight transport.

3. Comments on the issues raised

The desirability of the options contained in the UK Climate Change Strategy in the light of non EU countries commitments

3.1 Along with other members of the EU, the UK is a relatively prosperous nation. Furthermore other countries often replicate its actions. If any changes in behaviour are to be expected from countries that are less strong economically strong then countries like the UK must be seen to lead the way. Nevertheless other non-EU countries must be encouraged to adopt similar targets and commitments to those endorsed by the UK.

The role of the Climate Change Strategy as the first step towards greater reductions in emissions in the longer term, i.e., beyond 2010, with particular reference to the need for behavioural change

3.2 The Climate Change Strategy is just one part of the approach to develop more sustainable transport systems and communities. Clearly the actions recommended in the transport White Paper, "*A New Deal for Transport: Better for Everyone*", supplemented by Local Transport Plans and legislation will form the basis for the contribution from the transport sector. (See also paragraph 2.14).

3.3 The DETR Consultation Paper suggests that there are potential savings of up to 6 MtC available in the transport sector. The UK will face a major challenge to meet this target for the transport sector within the next 11 years. Vigorous and innovative policies and measures will be required in the transport sector and tackling CO_2 emissions reduction will need to be a major part of the Government's newly developed integrated transport policy.

The Government's timetable for producing and implementing its Climate Change Strategy

3.4 Although the timetable for changes to fuel price taxation is known, this will be inadequate on its own as a means of speedily promoting changes in travel behaviour and the introduction of more fuel efficient vehicles. More action will be required, both in terms of making the alternatives to private car-use much better and to introduce more effective traffic demand management. The Climate Change Strategy must maintain the momentum by encouraging and directing behavioural change more speedily.

The role of different sectors of the economy in meeting the emissions reductions targets and the merits of sectoral targets

3.5 Greenhouse gas emissions from road transport can be reduced in three ways: by reducing emissions from individual vehicles, by reducing the use of vehicles to satisfy a given transport demand, and by reducing the actual demand for travel. All three approaches can be influenced by planning, fiscal and regulatory policies. For example, land-use planning and associated urban traffic management measures can assist in reducing travel distances for certain journeys, restricting vehicle access to urban areas and optimising the design of public transport services.

3.6 The saving due to the 6 per cent fuel duty escalator is estimated at about 7–17 per cent of the car fuel consumption. This seems plausible by 2008. However the saving due to the EU initiative is estimated at around 17–27 per cent of car fuel consumption. This seems high, given that the fuel consumption of new cars will be reduced 25 per cent by 2010, so that in the period 2008–2012 no more than 20 per cent of cars will be subject to the EU initiative. The effect predicted is what would be expected by about 2020, unless the industry achieves the 25 per cent reduction in fuel consumption very soon after year 2000.

3.7 The saving due to the strict enforcement of the 70 mph speed limit is estimated at 1–7 per cent of total fuel consumption. This looks very high. Waters has shown (TRRL CR 233) that reducing the speed limit from 70 mph to 50 mph saves 2–3 per cent of car fuel. It is difficult to believe that enforcing the 70 mph could save even 1 per cent of total fuel usage. While 54 per cent of cars on motorways and dual carriageways exceed the speed limit, only 19 per cent on motorways and 13 per cent on dual carriageways do so by more than 10 mph. About a quarter of all car traffic is on non-built-up dual carriageway or motorways, so about 4 per cent of all car traffic is exceeding the 70 mph limit by more than 10 mph. The saving due to enforcing the limit is likely to be 0.5–1 per cent of car fuel consumption.

3.8 Road transport should certainly be required to reduce its emissions in proportion to national targets, but this will be extremely difficult to achieve if traffic grows as forecast. Road transport has the advantage that the stock of vehicles turns over about every 12 years, while housing lasts at least 60 years. Increases in efficiency introduced now should penetrate the vehicle fleet within a decade, while changes to the building stock or to industry require the existing stock to be refurbished. On the other hand, transport is a service function, and the pattern of travel is largely set by the distribution of activities within the stock of buildings. It will take a very long time to change the pattern of land-use, and particularly to get rid of the many areas of low-density sprawl that force people to be car-dependent.

The policies from the consultation paper on Climate Change Strategy which will be required to meet the UK's legally binding target for the basket of six greenhouse gases and the domestic target for carbon dioxide emissions.

3.9 As the IHT stated in its submission to the consultation paper on *"Developing an Integrated Transport Policy"*, the most effective way to reduce environmental impacts from vehicles is to tighten regulations on emissions and noise, and to reduce fuel-consumption. At present there are many car models that average a fuel consumption of 5–6 litres/100 km, compared with the fleet average of about 9 litres/100 km. However consumers choose to buy larger cars that consume more fuel. If fuel were significantly more expensive, the existing economical cars would be more attractive to purchasers, and the development of even more efficient vehicles would become worthwhile for the motor vehicle manufacturers (see the IHT's Position Paper on *"Road Transport, the Environment and Sustainable Development"*). The tax system should be used to encourage companies to operate fuel efficient and low emission cars, for example by setting limits for fuel consumption or emissions beyond which companies could not claim vehicles against tax. It should be possible to follow Germany's lead and only allow very clean vehicles into certain city centres (CNG or electric buses and goods vehicles, for example). The IHT fully supports the Government's Clearzones project.

The uncertainties involved in emissions projections and the impact of policies upon those projections

3.10 It must be recognised that it is very difficult to forecast future CO_2 and other greenhouse gas emissions as well as fuel consumption but it remains necessary to do so. Regular monitoring of air quality must be adopted in more locations to provide an input into a flexible approach to the Climate Change Strategy. The monitoring of the Road Traffic Reduction Act, that is implicit in Local Transport Plans, should contribute much of the information required.

3.11 The Integrated Transport White Paper includes generic actions to manage transport demand. However, it is not certain that these policies on their own are going to be sufficient to achieve the targeted reduction in CO_2 emissions by the year 2010. For example, the relatively low elasticity for fuel quantity with respect to price implies that very large increases in real fuel prices will be needed in order to reduce fuel demand. Land-use planning and vehicle efficiency standards may require long lead-times before they have significant effects.

The mechanisms required to monitor the effectiveness of policies in reducing emissions

3.12 It must be recognised that it is very difficult to forecast future CO_2 and other greenhouse gas emissions and fuel consumption, but it remains necessary to do so. Regular monitoring of fuel use, fleet fuel efficiency, traffic and travel patterns for both passengers and goods must be adopted to provide an input into a flexible approach to the Climate Change Strategy. The monitoring of the Road Traffic Reduction Act, and the monitoring which is implicit in Local Transport Plans, should contribute much of the information required.

The extent to which "flexible mechanisms" should be used in achieving the legally binding target

3.13 The Climate Change Strategy must be sufficiently flexible to enable it to be modified to target those sectors where environmental damage is most serious or growing.

The economic and other costs of the options in the Climate Change Strategy

3.14 No doubt the implementation of the strategy will impose additional costs upon business in the short term. However those organisations that are able to adapt more speedily, for example as a result of introducing Company Travel Plans, may be less affected. Furthermore the strategy gives an opportunity for equipment manufacturers and others to develop new markets. In general, reducing fuel consumption through improved efficiency is self-financing.

4 January 1999

Memorandum by Eaga Holdings (CC 6)

UK CLIMATE CHANGE PROGRAMME

INTRODUCTION

Eaga welcome the opportunity to provide evidence to the Environment, Transport and Regional Select Committee on their proposed inquiry into the UK Climate Change programme.

In order to put our comments into context, it is necessary to briefly outline Eaga's role in the provision of energy efficiency across the United Kingdom.

Since 1991, Eaga have administered the Home Energy Efficiency Scheme (HEES), under contract to the Government. Almost three million homes have been improved. HEES provides a grant of up to £315 which can be utilised on a range of energy efficiency measures, such as loft insulation, draughtproofing, cavity wall insulation, central heating control upgrades, hot water tank jackets, low energy lightbulbs and energy advice. HEES is targeted towards low income and elderly households, specifically to combat the problem of fuel poverty.

Eaga have built upon our unique experience in the area of energy efficiency delivery, and now work in partnership with over 100 local Authorities and nine Public Electricity Suppliers administering projects on their behalf. Eaga have also administered work on behalf of the Energy Savings Trust.

No other organisation within the domestic sector has the same depth of knowledge, coupled with operational experience, in the arena of energy efficiency.

Addressing the areas identified by the Committee in Press Notice 82 where appropriate, our input into this important debate is detailed below.

The role of the Climate Change Strategy as the first step towards greater reductions in emissions in the longer term i.e., beyond 2010, with particular reference to the need for behavioural change.

Eaga welcome the publication of the UK Climate Change Consultation Paper, and look forward to being active in the consultation process.

It is important not to view the Climate Change process as finishing in the year 2011. Although the problem of Climate Change is global, the policies which the UK can adopt to meet our obligations can produce valuable benefits to all elements of the UK economy, particularly the Domestic sector.

It must be realised the attempt to change behavioural patterns regarding Climate Change will not happen over night, it may well take until 2010 until public, and business attitudes, soften and become more open to the policies needed to drive the process forward. In our experience, behavioural change can best be achieved where "the message" is built upon solid, passive actions, i.e., those initiatives which are visible and yet provide the desired effect without the need for behavioural change.

The Government's timetable for producing and implementing its Climate Change Strategy.

The production of a Climate Change Consultation Paper, making the UK the only country to undertake such a process, signals the commitment of the Government to the Climate Change issue.

Implementing the proposals however should not be seen as a one off event. A timetable for reporting the results of the proposals should be established, possibly on an annual basis. This will keep the Climate Change process at the forefront of current thinking, from the point of view of the public and future policy making. It will also provide much needed emphasis in ensuring the behavioural change needed from all sectors to secure a successful Climate Change strategy. There must also be a transparent reporting regime, open to all sectors, to ensure *all* contributions are counted and that none are double-counted.

The role of different sectors of the economy in meeting the emissions reductions targets and the merits of sectoral targets.

According to the information in the Climate Change Consultation Paper, the contribution from each sector to the Climate Change targets can be summarised as:

Sector	Projections for 2010 (MtC)	Possible Measures (savings in MtC)	Further possible measures (savings in MtC)
Energy	59	0	5
Business	75	3	7
Transport	42	4	2
Domestic	41	3	2
Agriculture	22	0.5	0
Public	9.4	0.5	0.6
Total	194	11	18
Change from 1990 (six gases)	–10 per cent	–15 per cent	–24
Change from 1990 (CO_2)	–3 per cent	–9 per cent	–20 per cent

Splitting the contribution into different sectors is a useful step only if it is recognised that each sector of the UK economy will view the impact of the proposals from a different perspective. Sectors such as Energy, Business and Transport provide a significant proportion of the emissions total, however, changes in practice or investment in new, more efficient technology carry an associated capital cost to these sectors. Costs which will, eventually, be passed on to the consumer.

Until a way is established to promote sustainability as a lever for competitive advantage, the policies needed to sustain the Climate Change process will never be at the forefront of strategic thinking by these sectors. In order to draw attention to the benefits (and costs) of strategic, sustainability planning, the Directors of organisations should be asked to consider this issue in their annual reports under the companies' act.

Domestic programmes of energy efficiency, such as the Home Energy Efficiency Scheme, approach the problem from a different angle. The funds utilised under the scheme are *an investment in each property, not a cost to be passed on*, providing a value added aspect to each installation.

As well as reducing the amount of greenhouse gases emitted, each job carried out under HEES and other domestic demand side management schemes also results in lower fuel bills for the households, sustainable employment and a warmer, healthier home.

The policies from the consultation paper on Climate Change Strategy which will be required to meet the UK's legally binding target for the basket of six greenhouse gases and the domestic sector target for carbon dioxide emissions.

The contribution of energy efficiency to the necessary reduction required in carbon savings should not be under estimated.

A fact realised by Andrew Turnbull, Permanent Secretary to the Department of the Environment, Transport and the Regions, who when questioned on the success of HEES stated in evidence to the Public Accounts Committee of the House of Commons, on 9 March 1998:

> *"I think it has been a success in a number of senses. It has greatly increased the take up of measures, it gets very high satisfaction ratings from the people who have benefited from it and it has made a significant contribution to the Government's energy global warming policy. I think that if continued at this level it will be a significant part of achieving the reduction in CO_2 that we are looking for." Committee of Public Accounts, Minutes of Evidence, Question 55, 9 March 1998.*

Later in the Climate Change Consultation Paper, published by the DETR (paragraph 158) less emphasis is given to the Environmental Impact of HEES:

> *"We fund financial incentives to help the less well off improve the energy efficiency of their homes. The Home Energy Efficiency Scheme (HEES), which provides grants for energy efficiency measures for the less well off and the elderly, focuses on improving living conditions, but it has also contributed to carbon savings."*

Whilst HEES is undoubtedly meeting many social policy objectives its environmental benefits should not go unqualified.

Although HEES is aimed primarily at alleviating fuel poverty, it is imperative that the full magnitude of the carbon savings associated with it are also fully understood.

The effect of each installation on the saving in carbon is cumulative, it increases year by year.

For instance if 400,000 installations are carried out over two years, the savings for the second year are calculated for 800,000 jobs not 400,000. The installations carried out in the previous year do not disappear, but keep on contributing year after year—for the lifetime of the installation—which for many of the measures is equivalent to the life expectancy of the house.

Eaga are on course to carry out the 3,000,000th HEES installation during Spring 1999. The first households insulated have now contributed seven years worth of carbon savings.

Discussions with the DETR are in progress to establish an agreed methodology for calculating the Carbon saving from HEES. *However, even using the lowest case scenario, maintaining the current rate of investment would provide an annual carbon saving from HEES alone of approximately 1 MtC during the year 2010.* This is a significant proportion of the total domestic sector saving. Recognised by the Permanent Secretary in March 1998.

The uncertainties involved in emissions projections and the impact of policies upon those projections.

Eaga recognise that the calculation of emissions projects is not an exact science.

The calculation of savings from each sector is not just dependent upon getting the baseline figure correct, but also relies upon predicting buyer behaviour.

For instance, it is easy to quantify what the potential savings would be from a car which produces less emissions than presently experienced. Accurately predicting how many people would then go and buy this car is not so easy to predict.

It is the responsibility of Government to ensure that signals are sent to the public as to the sustainability of the climate change proposals, as a behavioural shift is essential to the success of the whole Climate Change process.

Incentives, such as the reduction of VAT on energy efficiency materials, or, the reduction of duty paid on new more efficient cars, need to be seriously considered before any policy will succeed. Introducing policies and assuming that the buying public will fall into line will not provide the necessary results required to halt the emission of greenhouse gases.

The mechanisms required to monitor the effectiveness of policies in reducing emissions.

The Domestic sector is perhaps the easiest of all to establish the actual savings in Carbon emissions.

Our current work establishes a baseline figure for each type of energy efficiency improvement, it is then a simple task to calculate their contribution to the annual savings combined with information on the associated gain in energy efficiency (per property) using the Government's Standard Assessment Procedure (SAP). This is reinforced by the random quality control process in place to ensure the standards of work are kept at the highest level and thus the estimated savings are actually delivered.

The added advantage is that investment of this type allows the Carbon savings (and their cost) to be measured with a degree of certainty, whilst other sector targets rely on predicting buyer behaviour for their accuracy.

However consideration needs to be given to the checking how sectors actually perform once policies have been decided. This builds upon the point raised earlier about annual reporting of progress to keep the Climate Change issue current in thinking at all times.

The economic and other costs of the options in the Climate Change Strategy.

The economic effects of investment in energy efficiency should not be viewed as a one off cost. The associated costs of energy efficiency are an investment in the country as a whole which pays off not just in savings in Carbon, but also provides a host of social benefits including:

Thousands of jobs across the country, not just in the administration of the schemes, but also in the installation and materials manufacturing industries. The National Audit Office in the Value for Money report on HEES concluded that HEES has provided an extra 1,600 jobs and 2,100 training opportunities, spread between manufacturers, installers and Eaga itself.

The benefits for vulnerable households across the country are also obvious. Warmer homes which are cheaper to heat, releasing money previously tied up within the households budget. The potential savings from relatively "low level" assistance is of the order of 15 per cent, about 50 per cent of which can be expected to be taken as increased comfort rather than energy savings.

Warmer homes help combat the health problems associated with cold, damp housing. Asthma, respiratory problems and hypothermia are all prevalent in occupants in the poorest housing across the country. Releasing extensive resources within the NHS.

The social benefits, coupled with a low case saving of 1 MtC per year by 2010 indicates that investment in energy efficiency has many (quantifiable) benefits—not all of which are currently fully appreciated, but which can be readily built upon.

5 January 1999

Memorandum by Friends of the Earth (CC 7)

UK Climate Change Programme

Friends of the Earth welcomes the opportunity provided by the Committee's enquiry to submit evidence on the UK Government's Climate Change Consultation. While the Kyoto Protocol sets legally binding targets for the basket of six gases, this submission focuses on carbon dioxide emissions, the most significant of the climate changing gases and the gas for which domestic action is most readily quantifiable. Friends of the Earth's submission to the Government's consultation will address all six gases.

In Friends of the Earth's view, global climate change is probably the single most serious environmental and social threat facing populations of the world and represents a fundamental challenge to economies driven by coal, oil and gas. While the Protocol adopted in Kyoto in December 1997 represented a very important first step, if ratified, in tackling this threat, successive and more sweeping cuts in global emissions of climate changing gases will be needed if the worst impacts of climate change are to be averted.

The Intergovernmental Panel on Climate Change (IPCC) has advised governments that *even if* global emissions of carbon dioxide from fossil fuel burning were to be stabilised *at just the present rate* of 6.5 Gigatons of carbon per year, they would still lead by 2100 to a near doubling of pre-industrial atmospheric concentrations which would result, in all probability, in at least a global 2 C degree warming: that is the benchmark used by the IPCC for the onset of dangerous climatic change.

While these remain predictions and many uncertainties remain in climate change science, Friends of the Earth considers that global trends in extreme weather events underline the urgency and need for early action. This was reinforced in November 1998 by the UK's Hadley Centre which predicted that global climate change impacts would be more severe than suggested by the IPCC.

The IPCC has also told governments that worst impacts of climate change could be averted if global emissions of carbon dioxide were to be reduced by 60 per cent by 2050, i.e., to around 2.5 Gigatons per year and stabilised thereafter. This is likely to mean cut of the order of 80 per cent for industrialised nations by 2050.

The UK Government's manifesto commitment to a unilateral cut in CO_2 emissions by 20 per cent by 2010, greater than its legal obligation under the Kyoto Protocol, is therefore welcomed by Friends of the Earth. Friends of the Earth considers that there are considerable environmental, economic and employment advantages which could be achieved from a range of policies to meet this target and that the Government should implement this manifesto commitment regardless of the action taken by other countries. Such a step would not be damaging to the UK economy and would be important in ensuring that UK industry develops a significant competitive advantage.

Friends of the Earth considers that such leadership by example would also considerably strengthen the influence of the UK Government in the international climate negotiations under the UN Framework Convention on Climate Change and will be critically important in proving that significant emission reductions are achievable in a cost effective manner which does not damage economies.

In October 1998, Friends of the Earth published the results from research conducted by Energy for Sustainable Development using the SAFIRE model on behalf of FOE to identify the policies, fuel mix and other measures that would enable the government to meet its 20 per cent target.[1] The report—"Cutting CO_2—Creating Jobs—An economic analysis of policies to cut UK CO_2 emissions by 20 per cent or more"—also considered the scope for a 30 per cent reduction in UK CO_2 emissions by 2010. SAFIRE is an economic model for the assessment of the potential of new energy technologies and is used to examine the market penetration of such technologies and the factors and policies that influence their market take-up.[2]

ESD's report showed that 20 per cent cut in CO_2 emissions is not only feasible but also economically attractive. It goes further to show that the UK can make a more ambitious cut of 30 per cent by the same date. The following summarises this research (enclosed).

UK record on CO_2 emissions

While the UK's record on CO_2 emissions in recent years has been better than that of most other countries, an upward trend in emissions is expected post-2000. According to Government projections (Energy Paper 65), a continuation of current trends would result in an increase of CO_2 emissions of 7 per cent between 1990 and 2010, with the largest increase occurring between 2000 and 2010 (Department of Trade and Industry, 1995).

A more favourable scenario might result in emission reductions of 1 to 2 per cent. This would involve a continuation of existing policies in the energy efficiency area (e.g., £1 per customer energy efficiency allowance for the Regional Electricity Companies, voluntary programmes of the Energy Efficiency Office) and of renewable energy support under the Non-Fossil Fuel Obligation (NFFO). While business-as-usual results offer low energy prices, quality of life diminishes due to increasing congestion and pollution in the transport sector. If similar trends are observed in other industrialised countries, the risks of dangerous climate change are greatly enhanced.

Emission reductions and jobs—The breakdown

There are a number of possible pathways to a 20 per cent CO_2 reduction in 2010, with differing contributions from different sectors. In the ESD modelling, which aims at cost minimisation, the largest contributions come from energy efficiency (especially in the domestic and commercial sectors), as well as a switch to combined heat and power (CHP) and renewables in the electricity sector.

Renewables generate 11.3 per cent of electricity by 2010, while CHP contributes 17.1 per cent of electricity, with a CHP capacity of 13.4 GW, which is higher than Labour's target of 10 GW. Changes in the generational mix in the electricity sector are shown below:

Table 1

Per cent changes in electricity generation mix

Year	1995	2010
Total TWh	301.2	240.2
	Per cent	Per cent
Renewables	2.2	11.3
Nuclear	25.6	10.4
Coal	44.7	17.1
CHP	6.2	17.1
Gas	19.1	41.7
Oil	2.5	2.3

The ESD scenario shows that the 20 per cent target can be met whilst maintaining a significant share of the electricity generation market for deep-mined coal (17.1 per cent by 2010). Policy measures to favour deep-mining above opencast or imports will help protect jobs. The share of nuclear power diminishes as the Magnox power stations face a shut-down by 2010. Energy demand would decrease as follows: 8.2 per cent in the domestic sector, 7.9 per cent in the commercial sector and 0.3 per cent in the industrial sector.

The projected costs of the policy measures for the energy sector work out at £8.9 billion over the whole implementation period to 2010. This amounts to £0.79 billion a year, which is much less than would be raised through a moderate industrial carbon/nuclear energy tax. The 20 per cent target can be achieved in a cost effective manner without the need for any emissions trading.

The transport sector contributes 15 per cent of the overall CO_2 reduction, arising from a 10 per cent reduction in traffic levels.[3] However, due to the current fast growth rates in the transport sector, this actually presents a considerable challenge and implies a 34 per cent reduction of projected 2010 business-as-usual figures for this sector.

Achieving the 20 per cent CO_2 target would have considerable benefits in terms of jobs, as many of the beneficial options (renewable energies, CHP, public transport) are labour intensive. These jobs would more than off-set the jobs lost in other sectors (coal mining, car industry). In total, the ESD research suggests that 235,886 net new jobs could be created from policies measures to promote renewable energy (94,093 jobs), CHP (33,793 jobs), energy efficiency (21,000 jobs) and action to reduce traffic levels (87,000 jobs).

The ESD research also showed that a 30 per cent reduction in UK CO_2 emissions is achievable by 2010, although at greater cost. In the 30 per cent scenario, energy demand is reduced as follows: 19.4 per cent in domestic sector, 18.5 per cent in the commercial sector and 5.6 per cent in the industrial sector. Traffic is cut by 17 per cent. Renewable energy increases its share to 23 per cent of the electricity market (with additional development of wave, solar, offshore wind and biomass) and CHP to 22.5 per cent. The projections from this scenario are an investment cost of £26.4 billion (or £2.2 billion per year) and the creation of 536,658 new jobs by 2010 in the energy and transport sectors.

A number of other studies suggest that ESD's findings about the job creation potential of various climate change policy measures is actually quite conservative:

- Recent modelling by Cambridge Econometrics for FOE and Forum for the Future shows that an environmental tax reform package, including an industrial carbon-nuclear tax (as recommended by the Marshall report) and an increased road-fuel duty escalator (recycling the revenues in reductions in employers' national insurance contributions) would result in a 7 per cent cut in CO_2 emissions and 391,000 extra jobs by 2010;[4]
- A study by the Energy Saving Trust (EST) suggests that over 20,000 additional jobs could be created through energy efficiency programmes in the domestic sector, achieving a 14 per cent CO_2 emissions cut on current domestic sector emissions;[5]
- Additionally, a 15 year programme of insulation measures to eradicate fuel poverty in the domestic sector could create almost 30,000 jobs while reducing domestic sector emissions by 3 per cent.[6]

The policy measures identified by ESD to achieve a 20 per cent and 30 per cent reduction include:

1. Energy supply industry

- The Government's 10 per cent renewables target is achievable and could create 90,000 new jobs in this sector. The policy instruments needed to achieve this include:
- a percentage obligation, whereby electricity suppliers over a particular size are required to supply a percentage of their electricity from renewable energy source. Friends of the Earth considers that this should be set at 1 per cent extra per year, to achieve the 10 per cent target by 2010. This will act as a market support instrument for renewable energy technologies that are already entering the market;
- continuation of the Non-Fossil Fuel Obligation to support new market entrants in the renewable energy market. This will take technologies out of research and demonstration into market supply. The new NFFO should include extended opportunities for combined heat and power;
- as a general CO_2 reduction measure, the Government should introduce a tax on industrial energy, equivalent to $1 per barrel of oil equivalent, rising by $1 per year. Renewables should be excluded from this.
- Nuclear power is not necessary. ESD's modelling has shown that the 20 per cent CO_2 target can be achieved without any new nuclear plant and by closing down the Magnox plants by 2010;
- Utility regulation—energy liberalisation offers opportunities for the development of a market for "green electricity" to commercial and domestic sectors. The Government should do all it can to support this market. It should also recognise that competition brings risks, for example falling energy prices could lead to increased carbon dioxide emissions. It should therefore set clear social and environmental objectives for energy liberalisation to ensure that sustainability goals are met;
- Combined Heat and Power. There is great potential for CHP in the UK, bringing economic benefits to business and the public sector as well as cutting emissions through higher efficiency. CHP should be supported through the Non-Fossil Fuel Obligation. ESD's modelling shows it could contribute over 17 per cent of our total generation mix by 2010;
- Energy services. The consultation paper recognises the value of energy companies switching from selling units of gas or electricity to providing the services we need (heat, light power) in an efficient way at lower overall cost for the consumer. Such a transition will require greater action by government to develop the appropriate economic, institutional and regulatory frameworks;
- The government should require disclosure on energy bills, sourcing energy supply and indicating energy efficiency programmes put in place by the utilities. Such information would help consumers identify the most sustainable energy choices and supplier, as well as action they can take as individual companies or householders to reduce emissions associated with their energy use.

Going beyond the 20 per cent CO_2 reduction target:

With greater support, renewables could contribute 23 per cent towards the UK's electricity supply and help achieve a 30 per cent cut in CO_2 emissions by 2010. The following would achieve this:

— the government should form new partnerships with industry to consider new horizon technologies, e.g., fuel cells for transport and decentralised electricity generation;

— the NFFO should be expanded to concentrate on small scale renewables technology development that is below 1MW;

— increased research and development should concentrate on higher risk categories, such as offshore wind and wave, biomass gasification and pyrolysis, in partnership with industry.

2. Business

While partnerships with business are important and valuable, there should not be an over-reliance on voluntary agreements. The voluntary approach has been shown to be less effective than regulation in achieving environmental objectives. There is still scope for increased energy efficiency in this sector (as identified by Lord Marshall's taskforce).

The UK should take the lead in European legislation to reduce industrial sector energy use. This should include:

— implementation of BAT (Best available Technology) rather than BATNEEC (Best Available Technology Not Entailing Excessive Cost) and push for a strengthening of BAT over time to provide a minimum statutory efficiency level for technology in each industry;

— a legal requirement on industries spending over a certain percentage of total overheads on energy to have an energy manager;

— information on "specific energy consumptions" and "specific CO_2 consumptions" should be collected for each industry to allow development of best practice for each industrial sector, and these should be available for public scrutiny;

— targets should be set for energy efficiency improvements of 20 per cent for the whole of industry, and those falling behind the average should be investigated by a special government inspectorate and be required to implement recommendations;

— the government should place legislation to provide a minimum of 10 per cent of products produced from energy intensive materials (e.g., aluminium, steel, iron and glass) to be recycled;

— energy audits should become part of annual accounts for the commercial sector. All companies should have a nominated energy manager trained through government programmes, responsible for preparing legally-required audits and implementing energy efficiency policy;

— the commercial sector should work with local authorities to address the reduction of energy use in their buildings. This should become part of the local authority's commitment under the Home Energy Conservation Act.

Going beyond the 20 per cent CO_2 target

— there should be an increased programme of industrial research and development into more efficient processes and technologies;

— industry and government should work together to develop new horizon energy technologies, such as industrial heat pumps.

3. Transport

Emissions in the transport sector are due to rise sharply. Transport can contribute to the Government's 20 per cent CO_2 reduction target through the following measures:

— implementation of the Road Traffic Reduction (National Targets) Act 1998 in conjunction with the Road Traffic Reduction Act 1997, which require local authorities to develop local traffic reduction plans;

— a cut in the Government's roads programme and use of the money saved (plus some of the money from higher motoring taxes) to pay for improvements to public transport;

— tougher planning controls including a ban on out of town shopping centres and business parks in favour of inner city regeneration and new housing policies to favour use of brownfield, not greenfield sites;

— the introduction of more fuel efficient cars as envisaged in the voluntary agreement the European motor industry has recently negotiated with the Council of Ministers;

— increased fuel duties and a graduated road tax to favour more efficient vehicles;

— abolition of tax breaks for company cars.

4. Domestic sector

There is enormous potential for cutting domestic energy use—the Buildings Research Establishment suggests that cost effective efficiency measures in housing could save 63Mt–CO_2 per year, saving households over £2

billion a year. Realising this potential requires two main barriers of lack of information and lack of financing for energy efficiency improvements to be overcome:

- all distribution networks for domestic appliances should be required to have qualified sales staff and information on the energy use of each appliance, its total energy consumption per year and relative running costs;
- the UK should lead European legislation to forge improved targets at European level for the efficiency of appliances. This should not be left to voluntary agreements;
- the government should allow financing for energy efficiency through distributors and provide tax relief on such financing, ensuring a lower lending rate than the High Street banks provide on small scale loans. Home development loans for energy efficiency measures should be allowed tax exemption;
- there should be a legal requirement for a SAP (energy efficiency) rating on all housing. This should be accompanied by information on how to improve the efficiency and the costs and benefits of such improvements. This rating should be part of every mortgage survey and be taken into account when arranging mortgages;
- there should be a requirement by government on energy suppliers for disclosure on energy bills to help householders assess their energy consumption, contribution to CO_2 emissions and the most cost-effective means to reduce these;
- the government should encourage utilities to offer "green electricity" to domestic consumers and make this economically attractive through fiscal and regulatory measures (e.g., a carbon tax would reduce the cost of electricity from renewable sources);
- the government should encourage the formation of energy service companies to help domestic consumers save energy in the home.

Going beyond the 20 per cent CO_2 target:

- for domestic appliances, research and development of advanced energy efficiency technologies would reduce prices and ensure market penetration. These offer the technical potential for a further 50 per cent improvement in the energy efficiency of domestic appliances;
- the Government should extend the levy on energy consumers' bills to support energy efficiency measures and continue support for the Energy Saving Trust;
- VAT on energy-saving materials should be reduced to zero. As a first step the recent welcome reduction to 5 per cent should be extended to cover all materials, not just those used under some government-funded projects;
- the energy efficiency standards in the building regulations should be improved. The Government is currently reviewing these. Existing minimum standards are well below those mandated in Scandinavia where a house built to current regulations will consume only 31 per cent of the energy of a house built to UK standards, despite the more severe climate;
- to tackle fuel poverty, a national £1 billion per year investment programme in domestic energy conservation should be run over 15 years, targeted at low income households.

5. Public sector

- local authorities should be provided with specific funding to implement sustainable policies. Each local authority should be required to go through a programme of education for its officers involved in land use planning and how to implement sustainable planning programmes;
- local authorities should have a remit to act as a contracting body to facilitate decentralised markets in sustainable energy (e.g., combined heat and power) and energy efficiency;
- local authorities and the commercial sector should work in partnership to address the reduction in energy use in commercial buildings (see Business section);
- local authorities should judge planning permission based on the previous activities of a company and its energy efficiency performance;
- implementation of the Road Traffic Reduction Act (1997 and 1998) (see Transport section).

Conclusions

The ESD study clearly shows that the achievement of the 20 per cent CO_2 reduction target by 2010 is not only feasible but also extremely attractive in economic and social terms. There is a large job creation potential in decentralised electricity generation (CHP and renewable energies). Energy efficiency improvements and sustainable transport options also promise the creation of many jobs. Increased home energy efficiency would

improve health and help reduce fuel poverty, and pollution and congestion problems in transport would be relieved.

Friends of the Earth therefore considers that the government's climate programme should not be driven by its legal obligation under the Kyoto Protocol. Friends of the Earth considers that the Government should devise a Climate Change Programme by the end of 1999 that enables it to go beyond its Kyoto obligations and achieve its manifesto commitment of a 20 per cent reduction in CO_2 emissions by 2010.

Dr Patrick Green

Senior Energy, Nuclear and Climate Campaigner

5 January 1999

NOTES

[1] Friends of the Earth (1998) Cutting CO_2—Creating Jobs—An Economic Analysis of policies to cut UK CO_2 emissions by 20 per cent or more. A Report by Energy for Sustainable Development Ltd for Friends of the Earth.

[2] SAFIRE—Strategic Assessment Framework for the Implementation of Rational Energy, used for example in The European Renewable Energy Study (ESD/European Commission, 1997).

[3] The transport figures used in the ESD study are based on previous modelling work carried out for Friends of the Earth by ECOTEC. See Friends of the Earth (1997) Less Traffic, More Jobs, London: Friends of the Earth.

[4] Cambridge Econometrics, 1998. Industrial Benefits from Environmental Tax Reform in the UK FOE/FFF, London. Note: It should be noted that these figures were generated by a model which was up-to-date as of January 1998. They do not therefore reflect changes in the employers' NIC regime introduced in the 1998 Budget. However, it seems unlikely that these changes would significantly alter the model's outputs.

[5] Energy Saving Trust (1997) Energy Efficiency and Environmental Benefits to 2010, London: EST.

[6] ACE (1997) Campaign to end fuel poverty is launched, The Fifth Fuel, No. 33, Spring 1997.

Memorandum submitted by the Institute of Directors (IoD) (CC 8)

UNITED KINGDOM CLIMATE CHANGE PROGRAMME

INTRODUCTION

1. This is the IoD's response to the Committee's invitation to comment on the issues raised in the Government's consultation paper, *UK Climate Change Programme Consultation Paper* [Department of the Environment, Transport and the Regions (DETR), London, October 1998]. We have addressed the issues listed in the Committee's Press Notice 82/97–98 of 19 November 1998. We shall also be making a response to DETR, on some of the specific questions posed in the Consultation Paper.

2. In our response we have incorporated the findings from several *surveys of IoD members* on matters pertaining to climate change and the environment.

3. In the following, references are made to sections of the Consultation Paper.

Summary of the IoD's Response

4. The Government should be more explicit about some of the scientific and technological uncertainties associated with climate change and global warming, and be prepared to be responsive to new developments.

5. Any burdens of climate change policies must not fall only on businesses: domestic energy use should be targeted as well.

6. Taxes or a permit system could seriously damage many businesses that are unable to save energy without contracting or closing down. Any taxes should therefore be set at a low level.

7. Business is uncertain and divided about the merits of different policy options. A more in-depth assessment of their effects on industry will be needed before proceeding any further.

8. All nations must play their part: the UK should not go it alone.

Climate Change Strategy, the Long-Term View and Behavioural Change

9. IoD members are concerned about global warming. For example. in a telephone survey of 500 IoD members, conducted in September 1998 by NOP Business, 66 per cent of the respondents said that they were

concerned about it (*Climate Change—The Carbon Question*, Institute of Directors Environment Comment, by Richard Baron and Natasha Howard, IoD, London, November 1998). They also agreed that the Government should set targets to reduce greenhouse gas emissions. The main reasons given for supporting such reductions were to protect and clean up the environment (35 per cent of respondents), followed by concern about global warming *per se* (21 per cent).

10. We note that the UK Government wants to set a lead in meeting the legally binding Kyoto agreement as applied to the European Union (EU) as a whole, of a 15 per cent reduction in carbon dioxide (CO_2) emissions by 2010, by aiming for a 20 per cent decrease. We are also aware that there is an ongoing debate around the balance between measures to try to reduce continued warming of the Earth's atmosphere and trying to alleviate or cope with the resulting consequences. There are economic choices to be made about how much the world is willing to expend on either possibility, given that unwanted disbenefits may arise either way. It seems likely that only a *global reduction* in CO_2 emissions of *30 per cent* will actually have any significant effect on mitigating the consequences of human-caused climate change (see, for example, "The world needs more than protests", Pete Wilkinson, former director of Greenpeace International, *Nature*, volume 396, 10 December 1998, pages 511-512).

11. Given that, neither the EU nor the UK's own current aims in greenhouse gas emissions seem to be the answer to achieving diminution of global warming. We leave aside for now other questions about scientific *uncertainty* concerning the extent of global warming, and how much may be due to human activity (some of the evidence and arguments either way are set out in *Global Warming—Implications for Business*, IoD Research Paper, Geraint Day, IoD, June 1988). That debate will no doubt continue, however, if it does turn out that even a 20 per cent reduction in CO_2 emissions would not "solve the problem", the Government should be honest about that, and be explicit about the uncertainties surrounding the matter of climate change.

12. An earlier DETR document, launched by Minister of State for the Environment, Michael Meacher, made reference to the likelihood that atmospheric greenhouse gas accumulation had already meant that climate change effects would result "whatever we do now" (*Climate Change Impacts in the UK*, May 1998, page 2.) To be sure, that document also advocated emission reductions, but also covered much that is relevant to coping with climate change—certainly the probable adverse effects, e.g., on the water and insurance industries, but also possible benefits, such as to tourism and forestry. We would not wish for these issues to be lost sight of; given that coping with the effects of global warming are likely to present *opportunities* as well as threats (paragraphs 29 and 30 of the Consultation Paper do make brief reference to the scope for economic benefits).

13. The achievement of the Kyoto targets and beyond will certainly involve not only Government and business, but also *individuals* changing their behaviour (Consultation Paper, paragraph 4). The IoD recognises that public concern about environmental issues including global warming often leads to calls for business to act. Although levels of concern have risen in recent years, there is evidence that many people view environmental degradation as a problem somewhat remote from themselves.

14. Thus the 1996 British Social Attitudes Survey found that levels of actual practical public support for practical *measures* that should be taken to improve the environment are generally lower than levels of expressed *concern* about environmental problems ("Green in word . . . ", Bridget Taylor, in *British Social Attitudes the 14th Report*, edited by Roger Jowell, John Curtice, Alison Park, Lindsay Brook, Katarina Thomson and Caroline Bryson, Ashgate Publishing, Aldershot, 1997, pages 111 to 136). So, as the Consultation Paper mentions (for example, referring to encouraging people to drive cars less, in paragraph 145), the challenge of achieving this kind of change should not be underestimated. Individuals often put immediate economic concerns about issues such as unemployment, inflation, and law and order, ahead of worries about the environment (*Greening the Millennium Public Opinion and the Environment*, Robert M Worcester, MORI Research Papers, London, 27 September 1996).

Uncertainties in Emission Projections

15. As with the scientific uncertainty associated with climate change itself, there is considerable uncertainty about the availability, reliability and costs of the various technological issues, including projections of greenhouse gas emissions (*Climate Change Policy: Facts Issues, and Analyses*, Catrinus J Jepma and Mohan Munasignhe, Cambridge University Press, Cambridge, 1998). As those authors state, the interactions between new inventions, venture capital, markets and government incentives for research and development are crucial. As part of a *flexible approach*, the Government should be prepared to be explicit about areas that are less than certain and be prepared to modify its policies as technological and other developments occur.

The Government's Timetable

16. We note that DETR plans to produce a *draft* programme for further consultation (Consultation Paper, paragraphs 7 and 36). In view of changing circumstances it is wise that there are plans to initiate a national debate about the targets.

17. One area that merits attention is of renewable energy sources. There may well be technological developments that will increase the use of renewables, but the mere adoption of a target (10 per cent of UK

electricity demand to originate from renewables by 2010, Consultation Paper, paragraph 57) is not necessarily the best approach to take. Falling prices of "green" electricity and recent Government approval of more than 250 environmentally friendly electricity generation projects make the future for renewable energy look more promising than hitherto. However, quantities of green energy will still be limited in the short term to about as much as the output of one large coal-fired power station. Our IoD member survey showed that business has yet to embrace green energy: only 1 per cent of respondents currently used it. The question of cost of renewables versus "non-renewables" is clearly an important factor.

Policies from the Consultation Paper

18. Some businesses will be obliged to improve efficiency under new *regulations.* Only 40 per cent of the CO_2 emissions from business come from firms that will be regulated by the Integrated Pollution Prevention and Control Directive so these regulations might not be sufficient to meet the Government targets.

19. The use of *voluntary agreements* for specific business sectors so as to raise awareness amongst businesses is an option (Consultation Paper, paragraph 94). However, their scope would be limited because some sectors are very diverse or do not have strong trade associations.

20. The DETR and Department of Trade and Industry Energy Efficient Best Practice Programme exists to provide businesses with information and advice about *best practice* in reducing their energy use. The IoD is opposed to mandatory environmental reporting (Consultation Paper, paragraph 98): companies should be allowed to decide individually whether reporting is appropriate for them.

21. We commented earlier (paragraph 13) on the need to consider more than just the business sector. Not all businesses would be affected by new regulations or voluntary agreements. Unfortunately the discussion around Lord Marshall's report only considered applying controls to the business use of energy, not to *domestic use* (consultation document and report, both entitled *Economic Instruments and the Business Use of Energy A Report by Lord Marshall,* HM Treasury, June 1998 and November 1998). The restriction to business use reflects Government policy, but we believe that the policy should be changed.

22. Only 6 per cent of respondents in our September survey thought that if an energy tax were to be introduced it should be applied to businesses only, contrasting with 62 per cent who thought it should be applied equally to business and domestic users. Targeting only the business use of energy would be unfair and would be motivated by policy considerations that run counter to environmental goals.

23. Furthermore, simply targeting business use would not leave the general public untouched. Businesses would have to pass on higher costs through higher prices or lower profits: price rises that would hit consumers directly, while reduced profits affect both pension funds (which are very large investors in British industry) and private investors.

24. It would also be much easier to implement an energy tax on all users: the tax could be imposed at the point of generation of electricity, taxing only a few generators instead of millions of businesses. It would then be possible to take account of each particular power station's polluting effect and unnecessary to know who would receive the electricity generated.

25. Our survey showed business to have strong reservations about rationing energy use through permits and to be opposed to an *energy tax.* If energy had to be cut back, 55 per cent of respondents said they would be against introducing an energy tax, compared with 32 per cent who would be in favour. When asked what level of tax would be effective, 24 per cent of businesses said that no matter what the level, cutting energy use would not be an option: they would therefore simply be damaged by a tax, with no environmental benefit. Among those businesses that could save energy, 57 per cent said that a 1 per cent to 10 per cent rise in electricity prices would make them reduce by a significant amount and 22 per cent said that an 11 per cent to 20 per cent rise would be sufficient.

26. A low tax rate would therefore be more appropriate than a high rate: it would be effective in reducing the energy consumption of business that could make cuts and would be less likely than a high rate to damage the business that could not.

27. Under a *permit* system, the use of energy would only be allowed if the necessary permit were to be held. Permits could be issued free by the Government, perhaps on the basis of previous energy use, or they could be sold by the Government, possibly by auction. If a business held more permits than it needed, it could sell the surplus to other businesses (permit trading). Survey respondents were less opposed to a permit system than to a tax. Thirty seven per cent were in favour of a system of permit trading, with 27 per cent against, 21 per cent undecided and 15 per cent said neither for nor against.

28. Respondents were divided about the best way to allocate permits in order to ration energy use. Thirty six per cent thought that rations should be based on the previous year's energy use, 24 per cent thought that they should be fixed through sectoral negotiation, 17 per cent thought that national targets should be set and

then permits should be auctioned and 37 per cent said they did not know or did not support any of these options (some respondents chose more than one option).

29. The IoD has reservations about permit systems because of the regulatory burden each of these options would impose. They would require measuring and setting limits on energy use. The potential complexities of a permit system are also recognised in Lord Marshall's November 1998 report. It suggested that in view of the complexities, permits should be used for only a limited number of firms, with taxes being used for the majority of firms. Such a split system would, however, make it very difficult to ensure fairness between firms in the two categories.

30. Both taxes and permits that the Government sells (as opposed to distributes free) would result in money being taken out of the business sector. In order to maintain the *UK's competitiveness*, it would be essential to return all such money to the business sector by reducing employers' national insurance contributions, corporation tax or other taxes on businesses.

31. We welcome the fact that Lord Marshall's November 1998 report emphasised the importance of recycling tax revenues, although there are unresolved issues about the mix of recycling by reducing general taxes and recycling into schemes to encourage energy efficiency. The danger of recycling into specific schemes is that it can introduce new economic distortions. A tax itself should attach the appropriate price to carbon emissions, and as a general rule once that price has been attached the market should be left to decide whether to pay, or invest in ways to avoid emitting carbon.

32. Lord Marshall acknowledged that rationing energy use or an energy tax would impose more of a burden on some businesses than on others. Our survey showed very little support for outright exemptions for certain classes of business although the option of concessions was more popular. Forty five per cent of respondents thought that small businesses should be given concessions, 30 per cent thought that they should be treated in the same way as larger businesses and 19 per cent thought they should be exempt. Only 7 per cent thought that heavy manufacturing, a sector for which energy is an especially large cost, should be exempt. Forty-seven per cent thought that it should be treated the same way as other sectors and 38 per cent thought that it should get concessions. Forty-one per cent of respondents thought that companies that reduce greenhouse gas emissions abroad should receive concessions to reduce the burden of a UK tax on energy.

33. From the business perspective *transport policy* must not inhibit essential activities, such as journeys by staff and the movement of goods.

34. There could be opportunities for the UK to benefit from *exporting or licensing commercial technologies*, following the agreement at the recent United Nations climate conference in Buenos Aires that a Clean Development Mechanism (CDM) should go ahead as soon as possible to encourage firms to engage in projects on wind, solar or other alternatives to fossil-fuel energy technologies, in developing countries ("Green futures", Fred Pearce, *New Scientist*, 21 November 1998, page 16). If the rules around CDM are made not too inflexible, there may well be opportunities in this scheme for carbon credits to be earned by businesses investing in renewable energy projects, or enlarging "carbon sinks" such as forests, in developing countries. A note of caution: cheap forest projects could conceivably drive down the market price of carbon credits and actually stifle investment in "clean" energy technologies ("Promising the earth", editorial, *New Scientist*, 21 November 1998, page 3).

Economic and Other Costs

35. We concur with DETR's stated intention of undertaking a thorough cost benefit analysis, building on responses to climate change consultation (Consultation Paper, paragraph 7). Policies should not be allowed to lead to a net cost.

Mechanisms for Monitoring

36. We welcome the recognition (Consultation Paper, paragraph 112) that small and medium sized enterprises are disproportionately affected when it comes to regulations. That could apply to monitoring schemes.

The UK and Non-EU Countries

37. Our September survey of IoD members has indicated worries about unilateral policy measures by the UK that could disadvantage British competitiveness. Only 7 per cent of the respondents thought that the UK should introduce measures to meet its targets before other countries had done the same. Forty-nine per cent thought that the UK should be participating in action taken by *all* countries, and 29 per cent that the UK should only act in conjunction with other *developed* countries.

38. Therefore, separate from the question as to whether even a global 20 per cent reduction in CO_2 emissions by 2010 could actually achieve truly beneficial effects on climate change (see paragraph 10 above), the differential effects on the UK economy, as compared with other countries (and even other EU countries having less stringent emission reduction targets) must be considered.

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6 January 1999

Memorandum by Environment Agency (CC9)

UK CLIMATE CHANGE PROGRAMME

PREAMBLE

Within England and Wales the Environment Agency is responsible for the regulation of processes which give rise to about 50 per cent of the emissions of greenhouse gases from anthropogenic sources. In addition the Agency is responsible for a range of functions—Flood Defence, Water Resources, Conservation and Fisheries—which will be directly impacted upon by a changed climate, and others, for example water quality, which will receive indirect impacts such as reduced dilutions of effluents.

Whilst our response focuses mainly on the points raised by the Committee in its call for memoranda, we would wish to stress the importance we attach to addressing the issue of climate change in an integrated and holistic manner. Central to this is the need to take a wider view of the underlying policy on energy, with due regard being given to long term projections consistent with the time frame within which climate change has to be examined (decades and centuries). A full appraisal of options is necessary, so that actions to reduce emissions of greenhouse gases do not neglect broader impacts on say local air quality, landscape and social progress. We want to see serious attention being given to demand side measures—energy efficiency, thermal efficiency of buildings and consumer attitudes.

We believe the three main pillars of policy should be:

- *Regulation* to tackle point sources of emissions and to set standards for the thermal efficiency of buildings;
- *Taxation* to provide the economic incentive for change and to drive innovation;
- *Education* to inform the public and to gain support for the very considerable changes which are necessary.

Our views on the points which the Committee wishes to examine are set out below. We append our recent evidence to the Royal Commission on Environmental Pollution's Enquiry into Energy, which gives a more extensive account of our views on energy policy. We will also shortly be responding to the Government's Consultation on a UK Climate Change Strategy itself.

1. *The desirability of the options contained in the UK Climate Change Strategy in the light of non EU countries commitments:*

The EU countries have generally come out of the Kyoto negotiations with the highest reduction targets. In many respects this is a fair outcome, because it is Europe along with the US who are responsible for the majority of the increased atmospheric concentrations of greenhouse gases. Achieving higher reductions will also put the EU countries at the forefront of international markets as we progress into the next century, and begin the transition to an environmentally sustainable economy. Whilst recognising that any reductions that the EU makes will be futile unless we get all the countries of the world on-board, the EU will benefit massively from being the first block of countries to achieve substantial reductions. And the UK could really increase its options for prosperity in the next century, if it aims to be the leader of this leading group.

2. *The role of the Climate Change Strategy as the first step towards greater reductions in emissions in the longer term, i.e., beyond 2010, with particular reference to the need for behavioural change*

2.1 The Consultation paper focuses on the Kyoto target almost as an end-point in itself, rather than using it as an interim step. The UK Strategy should acknowledge the need to begin a process of reducing emissions, to the point where global atmospheric concentrations of carbon dioxide are stabilised at levels which will prevent dangerous anthropogenic interference with the climate system [in order of a reduction of 60 per cent to 80 per cent by the year 2100 to stabilise at 450 ppmv according to the Intergovernmental Panel on Climate Change]. The UK's Climate Change Programme must not underestimate the scale of the task ahead—that of a transition to a less carbon intensive economy—and should state the size of the challenge that the UK, and the world, faces

over the next century in reducing its dependence on fossil fuels. It is particularly important to get this message across to business, so that they are aware of the future implications for investment decisions taken today.

2.2 By gradually introducing policies over the next 10 years and beyond, which will establish an economic, regulatory and institutional environment that encourages efficient energy use, and the replacement of fossil fuels by renewable sources, we should at the same time stimulate a behavioural transformation in the way our citizens and society operate. Nevertheless, this will need to be accompanied by a radical education programme, to inform the public why a change in behaviour is needed, and the policy measures that are being put in place to try and help achieve this.

3. *The Government's timetable for producing and implementing its Climate Change Strategy*

The Consultation Paper does not indicate the planned timetable that the government has for the implementation of a climate change strategy, other than by way of the target end-dates for the Kyoto obligations. A detailed timetable of domestic action would re-enforce the Government's commitment to reducing greenhouse gas emissions.

4. *The role of different sectors of the economy in meeting the emissions reduction targets and the merits of sectoral targets*

It is essential that the burden of emissions reduction is fairly and efficiently distributed between the sectors. Some sectors may have already made substantial progress in reducing emissions or in using energy more efficiently. We should ensure that all sectors make a substantial contribution to the target, even those which are difficult to access with policy measures, or where it may be considered politically difficult to do so. For some sectors tradeable permit may be a way of introducing transparency and cost effectiveness into the process.

5. *The policies from the consultation paper on the Climate Change Strategy which will be required to meet the UK's legally binding target for the basket of six greenhouse gases and the domestic target for carbon dioxide emissions;*

The Government should affirm the 20 per cent reduction target as its 2010 objective. Aiming for the higher 20 per cent target would also speed-up the UK's ability to achieve further CO_2 emissions throughout the first half of the next century. This would also improve the UK's competitive advantage through both an international carbon trading scheme, and through the export of cleaner technology innovations driven by this target.

6. *The uncertainties involved in emissions projections and the impact of policies upon those projections;*

The uncertainties associated with emissions projections come from two sources:

(i) the uncertainties related to how the activities leading to emissions will change in the future; and

(ii) the lack of accuracy in estimating emissions at the present.

The measurement and monitoring of greenhouse gases needs to improve significantly, so that we can be confident of how emission levels are changing over time, and have the ability to measure the effectiveness of chosen policies in reducing emissions. We support the introduction of standardised carbon dioxide reporting by organisations in this respect. It is highly likely that the present percentage reduction targets are within the range of uncertainty of existing rates of emission. This situation needs to be addressed methodically and quickly.

7. *The mechanisms required to monitor the effectiveness of policies in reducing emissions;*

7.1 We support the work being done by DETR to further develop a methodology for businesses to measure their greenhouse gas emissions, which has arisen from work done by UNEP and NPI. This methodology allows companies to calculate a single number measuring their total greenhouse emissions.

7.2 The Environment Agency's newly development Inventory of Sources and Releases requires industry to report on emissions of all the greenhouse gases for releases above a specified value. For carbon dioxide the threshold value is 10,000 tonnes which will capture all the big emitters. This will help provide a good picture of carbon dioxide discharges from large point sources, but it will not provide coverage of all the small diffuse sources which could be extremely difficult to measure. However, it should be possible to cover these diffuse sources indirectly by measuring the amount of fuel used and distributed higher up the chain.

8. *The extent to which "flexible mechanisms" should be used in achieving the legally binding target;*

We believe that the UK should only use the flexible mechanisms as an adjunct to effective domestic reduction measures. The international emissions trading scheme could be used as an opportunity to sell excess carbon

credits gained by reducing our domestic emissions beyond our Kyoto target, and the Clean Development Mechanism could be used to exploit technology transfer, and thereby gain additional carbon credits. Choosing their 20 per cent CO_2 target level will help the UK into a position whereby it can exploit these market opportunities.

9. *The economic and other costs of the options in the Climate Change Strategy*

9.1 In the long-run, the costs to society and the economy of not reducing greenhouse gas emissions would be much higher than any costs associated with the economic transition that will be encouraged by the climate change programme. There are already many economically and socially beneficial improvements, such as better insulated and ventilated buildings, more energy efficient business and better public transport which will help to reduce emissions.

9.2 Under paragraph 7 the paper states that *"after this consultation is complete we will develop more concrete proposals on how the UK might meet its targets. These will be based on thorough cost benefits analysis . . . "*. We would like to see these cost benefit studies incorporating a much wider range of interests than is currently the practice under more traditional CBA studies. As the benefits of the policy measures will not actually be seen until sometime in the future (under conditions of less intense warming), normal discount rates would simply discount the long-term future benefits out of the equation. Other considerations that need to take a high priority are ethical issues, the precautionary approach and dealing with uncertainty. In fact, addressing climate change, in the same way as addressing other sustainable development issues, will prove a real test of our ability to formulate and evaluate policy measures under conditions of uncertainty, and long-term costs and benefits.

9.3 The Agency supports the concept of ecological tax reform as a policy tool. An environmentally-structured taxation system would help to encourage environmental improvements on both the demand and supply side of energy and resource use. It would also shift the tax burden from areas such as employment, onto environmentally-damaging activities so that a more healthy and sustainable economy can develop. Thus, economic measures used to help achieve our greenhouse gas reduction targets, could help towards a restructuring of our entire fiscal system that would result in benefiting our economy ready for the next century.

A key benefit of economic instruments is that they tend to achieve the desired outcome in the most economically efficient way possible, by ensuring that those economic entities who find it easiest (cheapest) to reduce emissions do so, whilst driving innovation amongst those who find it more expensive.

9.4 It is also important to note that the UK can exploit the international emissions trading scheme if it takes an opportunistic view of reducing its CO_2 levels in excess of its Kyoto target.

9.5 The consultation paper states that the Government *"will not introduce measures that would damage competitiveness, nor will take any action that would bring unacceptable social costs"*. This seems to be a very sensible position to take, but should not be misinterpreted to rule out necessary transitional measures, which may be unpalatable, otherwise it will stifle necessary action. As the consultation paper on numerous occasions points out, efforts to realise the Kyoto target should be viewed as an opportunity for job creation and economic growth/diversification, and not a cost to be incurred by the UK economy. Indeed, if managed properly, the achievement of the Kyoto, and future targets, should lead to an overall enhancement of the UK's longer term competitiveness. However, the very action of changing our economy so that it is less carbon intensive, will mean that there are winners and losers (although, if the losers are wise enough they could take advantage of the new market opportunities and become the winners themselves). If the losers are able to have a loud voice and lobby against the Government's policy measures, then they will argue that the measures are damaging UK competitiveness—when, in fact, they will simply be enabling the transition from old, environmentally damaging industry, to new environmentally sustainable industry. The Government, and the country as a whole, needs to be aware of this issue—and the spanner that may be thrown in the works by old, inert unsustainable industry. It will not be plain sailing for everybody, and the Government must come out and say this, so that the country knows what is ahead of it.

Environment Agency

5 January 1999

APPENDIX

ROYAL COMMISSION STUDY OF ENERGY AND THE ENVIRONMENT: ISSUES ON WHICH EVIDENCE IS SOUGHT

MAIN POINTS

- need for a long term energy policy, which sets key parameters for action but is flexible enough to respond to changing circumstances;
- scope for IPPC to contribute should be maximised by enabling it to take a sufficiently broad look at the costs and benefits of proposals;

— environmental impact, in particular of energy considerations, should have an equal first place in key decisions, such as building regulations and control, planning, etc.;

— achievement of success on climate change can only be on a global basis, with the UK leading by example, and moving fast to take advantage of possibilities.

ENERGY SOURCES

1. *In the light of political, economic and social constraints, what key policies would be needed to force the pace of adoption of renewable sources of energy in the UK on the scale required to replace fossil fuels by the middle of the next century, and how could such policies be implemented?*

A major plus for renewables is that they provide energy at local level, reducing demand via losses on the transmission system. In particular small scale solar or wind installations could supply large isolated sites, such as rural water and sewage treatment works.

However, is replacement of fossil fuels a reasonable target? Fossil fuels may still be valuable for diversity. Renewables may not be as reliable as fossil fuels, e.g., if no wind blows on a cold day, and renewables are not without environmental problems.

Replacement may be possible, but would require:

— revamped planning system, making renewables easier and fossil fuel harder to construct;

— reduced demand for energy, making replacement easier;

— big renewables could be built, e.g., barrages (but again with substantial environmental cost);

— massive injection of funds into development and introduction of renewables, such as solar, etc., and into development of storage systems.

2. *Are there environmental impacts of renewable sources of energy which would be critical limiting factors?*

Yes:

— land use (e.g., of wind farms, solar arrays, biomass);

— severe visual intrusion and noise (e.g., windfarms);

— conservation impact (e.g., of barrages).

However perceptions and science can change, and some of these may be overcome.

3. *Which renewable sources of energy are likely to offer the most scope in technical terms in the UK?*

Wind, wave and tidal have the greatest energy potential in the UK, although there may be technical difficulties, particularly in the case of wave power. Active solar is limited, although solar heating is possible. Storage technology could also help.

4. *Is there a realistic prospect of technologies (for example for sequestration of carbon at source of emission) that would help make some continuing use of fossil fuels as an energy source acceptable)?*

Technological solutions (e.g., dissolving emissions of gases in seawater) may work, but if climate change is to be addressed in the longer term, may only allow low levels of fossil fuel use. The costs and total effort would be comparable to dealing with radioactive waste. Alternatively fossil fuels could be converted to hydrogen, if a technology could be deployed which avoided greenhouse gas emissions.

5. *What might conventional nuclear power contribute? To what extent will its contribution be dependent on:*

innovations in technology?

establishing valid disposal strategies for wastes?

public attitudes?

It could fuel hydrogen production! The economics for new plant are not in favour: capital costs remain high. A European-wide approach could assist by spreading research and development, capital costs, and disposal.

Technology innovations, such as passively safe reactors, may help.

Public attitudes are crucial, especially to waste disposal, and accident risk. Science alone will not "solve" problems such as waste disposal.

6. *Should fast breeder reactors or nuclear fusion be regarded as potentially viable energy technologies in the next century?*

In the longer term, potentially yes. Further scientific and technical advances are needed, particularly for nuclear fusion, as are changes in public attitude, especially for fast breeder reactors (which have fission products as waste). As regards public attitude, it will be possible to learn from the experience of the existing nuclear programme.

IMPROVEMENTS IN ENERGY EFFICIENCY

Note: Discussion should probably focus on global Warming Potential (GWP) rather than energy efficiency. Energy use is not necessarily the most significant factor when looking at environmental damage, especially in the case of greenhouse gases. It is clearly a useful surrogate in many cases not least because it can be measured through existing systems quite easily. If we were to shift to looking at the carbon intensity or GWP of energy sources we could construct a new type of energy efficiency, such that a business could maintain the same use of energy but at the same time become more carbon efficient by switching the source of that energy. This could help promote renewable sources and may be a way of creating an internal trading market within the constraints of BAT derived, traditional energy efficiency targets.

7. *Can UK primary energy demand be stabilised by the middle of the next century? Can it be reduced over that timescale, and if so by how much?*

Evidence suggests that primary energy demand has been relatively stable, with increased efficiency being offset by increased demand for energy services. However the energy demand by the UK, including embodied energy imported via goods and services may have increased substantially—does anyone know?

In order to reduce demand, one would need ongoing increases in efficiency, together with reduced demand, and use of renewables (assuming that the RCEP's question is concerned with non-renewable or extractive energy sources—i.e., nuclear and fossil fuels).

Specific sectors such as air travel, which have seen substantial increases in energy use in recent years, may have to be addressed specifically.

8. *What are the actual and potential drivers and barriers for reducing demand for energy? How are the drivers and barriers affected by the structure and regulation of the energy market? How could the drivers be enhanced and the barriers be reduced?*

Affluence increases demand, but poverty is not a solution! Issues to be addressed are:

- access to capital (for energy efficiency investments);
- inertia, or ignorance of the issues;
- the use of alternatives, e.g., more efficient transport solutions;
- the implications of household size and other changes;
- changes in relative prices of fuels, and of energy consumption relative to energy saving options;
- changing expectations, such as increased heating expected in homes;
- increasing differentials on fuels, based on environmental impacts (e.g., the Dutch use of LPG for long-distance haulage);
- technological changes;
- giving power companies an incentive, as well as a duty, to save energy (set-aside for power stations!).

9. *In comparison with other strategies, how attractive is reducing demand as a way of reducing the impact of energy on the environment?*

This depends on how it is done—financial and social impact of the reduction is crucial. Increased fuel poverty is not acceptable.

It is also possible that, in some societies or sectors, some approaches to reducing demand could lead to alternative practices which are less desirable (e.g., burning wood, rather than using gas). This links to the social impact—people with less options, or less money, may be driven to less desirable outcomes.

10. *What contribution can increased efficiency of generation and distribution make to reducing the environmental impact of energy?*

Very substantial difference. Key elements being:

- location of generation, possible with smaller more efficient sets;
- use of waste heat (with implications for how housing and other settlements are planned, and the construction of a heat infrastructure, such as is found in Sweden);

— integration of planning and regulatory regimes (e.g., local planning with regulation of electricity and requirements to use heat), reducing despoliation of the countryside with power lines.

11. *What more needs to be done to integrate a concern for energy efficiency into professional training and practice in fields such as architecture, engineering and land-use planning?*

Much more, not only for the professionals, but also for the clients. At a planning level, it may require changes in how we deal with waste, e.g., opting for local solutions rather than using energy intensive sewerage systems.

12. *How should considerations about energy efficiency enter into determinations of what represents the best practicable environmental option and into implementation of the EC Directive on Integrated Pollution Prevention and Control?*

The key lessons are:

— include lots of processes in IPPC to get broad coverage;
— include information on carbon efficiency [and equivalent units] in guidance notes;
— broaden boundaries for "costs" in BAT appraisal;
— enable and encourage the IPPC process to "force" change, including:
  — identifying promising sectors for development;
  — speculating and promoting consideration of future developments;
  — including conditions in authorisations requiring R&D into future solutions;
  — go beyond the authorisations towards more ambitious negotiated solutions.

(There is also a link to fiscal incentives here.)

13. *Where should lead responsibility lie for promoting energy efficiency, and are additional powers required?*

This will have to depend on the sector (e.g., IPPC has a role in key industrial situations, building regulations, transport, product design, planning regime).

It also needs co-ordination. Moreover, because the task is to get each regulatory sector (e.g., EA, DTI, EEO) to make environmental considerations integral to their role, it may be better to co-ordinate activity and strengthen the resolve of the individual responsible regulatory body, so that each of them can address positively how their respective lobby or interest groups specifically deal with the environment.

IMPLICATIONS OF CLIMATE CHANGE

14. *What measures should be taken*

in the UK

in the European Union

in other parts of the world

in order to adapt to environmental changes that are inevitable as a consequence of higher concentrations of greenhouse gases in the atmosphere?

We must not give up on changing the direction of climate change, but positive action can be taken:

— having a monitoring system to see precisely and accurately what environmental changes are occurring as a result of climate change;
— strategies for meeting and reducing unnecessary water demand;
— improving flood defence warning;
— changing the approach to planning (with a view to use of floodplains especially);
— reforestation.

15. *Is the factor which effectively limits utilisation of fossil fuel reserves likely to be requirements to reduce emissions of greenhouse gases, or the availability or distribution of reserves, or the relationship between the cost of exploiting those reserves and the cost of competing energy sources? How different are the respective limits on fossil fuel use likely to be imposed by these three constraints?*

Relationship between relative costs of exploitation and competing sources is most important now. The availability and distribution of reserves is important, but depends on relative costs. However availability is a

long-term constraint—fossil fuels are not running out yet, but a change in political will could make the first factor the driver.

SOCIAL ISSUES

16. *How will different strategies to reduce the impact of energy on the environment affect different groups in society?*

Price-based instruments, without special safeguards, will be largely irrelevant to the rich and will hammer the poor, and those in isolated communities.

17. *How can approaches be developed to reconcile reductions in demand for energy with greater equity in access to the services provided by energy?*

Improved efficiency, especially if linked to improved services to the poor, would help. Particular attention must be paid to access to capital, both for low energy appliances, and energy efficient materials, but also to efficient production. The planning and design of social housing, whether local authority or housing association, could also be driven by environmental considerations.

18. *What will be the health effects of different energy strategies?*

Air quality improvements should be a significant impact, but it is necessary to note that there is a crucial link between wealth and health.

INTERNATIONAL CONSIDERATIONS

19. *Are future trends in market prices likely to move the UK energy system in the desired direction, and if so how quickly? To the extent that interventions in markets will be required, how far does the UK have the ability to pursue its own energy policies?*

The answer to the first question is "no". Price trends seem to suggest that fossil fuels will remain economically attractive, although long-term resource constraints may raise prices, but only on a long timescale at best. Interventions, such as price incentives (tax) or changing standards will be needed.

International considerations include UK competitiveness or World Trade Organisation compliance.

20. *Should the UK adopt policies to phase out use of fossil fuels in the absence of equivalent action by other countries?*

The choice of policy (i.e., phasing out or reducing) will depend on costs. The choice is between some kind of first mover advantage—following on from advantages gained by UK water industry, or the disadvantages following the UK's loss of lead in coal gasification—or moving second, in which case, how do we know when to move? How much the UK will benefit will also depend on where in the economic cycle the economy is at the time.

21. *How should the UK seek to influence the development of policies internationally to limit fossil fuel use? How can a sufficiently wide coalition be formed to obtain agreement on a global carbon tax?*

The UK must set an example, showing:

- that it is possible for countries to develop without being energy intensive, (including helping by transfer of technologies and techniques); and
- how countries can learn from the UK's own example of the damage that can be caused by development that is resource intensive.

It is critical that developing countries trust that the environment is not a Western (or Northern) ploy to constrain their development.

Should we be looking at a carbon tax at a global level? If so it needs to include account of carbon sinks. Incremental systems, such as international trading, may be easier to achieve.

22. *Does research need to demonstrate specific national impacts of global climate change before the people in a given country will be prepared to support strong international action to counter it?*

Yes. This is especially true for business, but the population at large also needs to learn the issues, and have demonstrated for them the possible impacts. The shift in emphasis in recent press coverage from global warming to increased storminess in the UK may have helped focus the issues in this country.

Different lobbies have power in different countries, and the message may have to address the powerful lobbies in different ways.

A major link has to be made between climate change and survival issues in some developing countries.

23. *What scope is there for the UK to profit from exporting or licensing commercial technologies developed for clean energy supply?*

There is no scope if it develops no such technologies. The UK needs to see the long-term gain, and seize the opportunity.

Memorandum by The Institute of Energy (CC 10)

UK CLIMATE CHANGE PROGRAMME

The Institute of Energy supports a co-ordinated approach to the production and use of energy and believes it should be central to the UK's policy on the reduction of greenhouse gas emissions. The Institute agrees that there is considerable scope for improvement of the energy component of all sectors of the economy. The Institute and its members are actively promoting the technical and managerial means by which these advantages could be gained and have consistently supported their introduction. Much has already been achieved but much remains to be done to increase the enthusiasm in business and at home for the introduction of improvements, many of which have the potential to reduce costs. Ways must be found to put energy higher on the agenda.

The reductions necessary to reach 2008–12 targets that would be applicable to the UK under the Kyoto agreement are reasonably accessible. But it will become progressively more difficult for greenhouse gas emissions to be reduced further to the 20 per cent reduction in carbon dioxide emissions in 2010 which is the Government's aim. As discussed below, there is an urgent need for a full examination of the scope for energy savings on the one hand and of the role which alternative energy and technologies such as CHP could play.

For the period beyond 2010 the problem will be made more difficult by the progressive retirement of existing nuclear power stations which provide about 30 per cent of our electricity without significant greenhouse gas emissions. Longer term studies would need to include options for more massive reductions in energy consumption (with potentially major effects on lifestyle), together with a reappraisal of the role of nuclear power.

An important consideration must be the contribution which the UK could make to the means of energy supply and the economy of energy use in developing countries to meet the requirements of their growing populations. The improvement of energy use in the UK must be accompanied by improvements all over the world if climatic effects are to be significantly reduced.

Britain has the potential to set an example of what can be achieved by co-ordinated action and to achieve its Kyoto targets in cost effective ways. In addition there are advantages to be gained by being among the world leaders in the evolution of the expertise of energy supply and use. Experience gained during the recent restructuring of the former nationalised industries has already been successfully exploited overseas by British firms. New commercial and technical approaches to improving the cost effectiveness and environmental impacts of energy utilisation, of the kind already being developed in the UK by Group Affiliates (company members) of the Institute, could similarly be promoted abroad to the country's advantage.

In response to the questions posed by the Committee:

— *the desirability of the options contained in the UK Climate Change Strategy in the light of non EU countries commitments*

The Government's consultation document contains proposals for meeting two different objectives: one is the reduction of greenhouse gas emissions by 12½ per cent by 2008–2012 and the other is to reduce carbon dioxide emissions by 20 per cent by 2010. The first objective is derived from the EU's overall commitments undertaken at Kyoto and would become a legal obligation when the Kyoto Protocol is ratified. The second is a target which first appeared in the manifesto of the Labour Party before the election.

The Meteorological Office have estimated that with full implementation of the Kyoto Protocol the effect on climate change could amount to about 0.1 degree C compared with the change of some 3 degrees C which it forecasts on present trends in greenhouse gas emissions. If developing countries do not introduce effective measures to reduce their growing emissions, developed countries like the UK would have to reduce their emissions to half or less to prevent further global increases of greenhouse gases.

The Institute supports the present objectives as a first step. Without making such commitments themselves industrialised countries would have no basis for encouraging others to limit their emissions. However, given the disparity of living standards between the "haves" and the "have nots" such encouragement may be of limited

effect. Moreover, in the UK we have been able to reduce our emissions largely by the replacement of a major part of electricity generation from coal by generation from natural gas and by an improvement in nuclear operations. Such special circumstances do not apply to countries like India and China, where there is no immediate substitute available for indigenous coal, their use of which will continue to increase.

There may be social consequences of policy actions. These would be unlikely to be severe if achieving the Kyoto targets were accepted as the only objective. The Government's more ambitious manifesto target for 2010 is however likely to require greater intervention in individuals' freedom of choice, and the achievement of greater savings in the longer term will certainly do so (see below).

There has also been concern about possible damage to the competitivity of British industry if we impose arbitrary restrictions on emissions while other countries do not restrict their industry in this way. The Government recognises the danger and therefore has undertaken not to introduce measures that would damage competitiveness, nor any action that would bring unacceptable social costs.

The Government therefore intends to concentrate on measures that will have positive benefits to living standards and with potential advantages for industry. The Institute supports this approach and hopes that the Government will encourage efficiency improvements by positive incentives. The Institute would also like to see active promotion and support in overseas markets for companies which have developed innovative energy efficiency techniques and services for use in the UK.

— *the role of the Climate Change Strategy as the first step towards greater reductions in emissions in the longer term i.e., beyond 2010, with particular reference to the need for behavioural change.*

Even if the present emissions targets can be achieved by such "gain not pain" measures, it is doubtful whether significant longer term reductions could be achieved so painlessly. In the longer term, with or without major programmes of nuclear power, there would have to be major changes in methods of generation. There would also need to be major changes in energy consumption patterns, particularly in the transport sector (including personal transport). The transport sector is particularly important as it is growing rapidly and is largely responsible for the projected growth in emissions. The prospects for achieving such reductions without major changes in lifestyle are poor, though technology improvements may mitigate some of the effects.

There is a need to examine in detail the role which alternative energy could play. Any programme of large scale replacement of generating capacity will require large capital expenditure and may lead to increases in the cost of energy. These would have widespread implications for industry and for living standards. There is a need for public debate on these wider issues, including the investigation of means by which living standards could be maintained in a low-emission society.

On the other hand, if emissions continue to grow from non-EU countries, or if the climate continues to change for other reasons, there will be a need to take measures to counter the effects of climate change on local weather patterns and land use. More work needs to be done on the development of means of coping with these effects, for instance of developing new crops and agricultural systems and the investigation of new means for the protection of low-lying land, in the UK and overseas, from the rise in sea levels which is expected to occur whatever is achieved in reducing emissions.

— *the Government's timetable for producing and implementing its Climate Change Strategy*

One of the main features of the Government document is the goal of supplying 10 per cent of electricity needs from renewables by 2010. the Institute of Energy agrees that there is scope for more use of renewable energy sources, but the they tend to be capital intensive, albeit with low running costs. This means that they are inherently expensive to finance and may continue to need subsidy. The Institute believes that the review paper which is being prepared should consider whether or not the proposal to continue the levy supporting renewables would be sufficient to be effective on the scale required. Given also the lead time required for planning permission and for construction, it is doubtful whether renewables could achieve the target in time. A drastic curtailing of the planning procedures would be necessary and public opinion would need to be supportive.

There is also a need to demonstrate the realistic scope for CHP given the advances made in the efficiency of generation of conventional sources and the need to identify sites where heat loads and power loads can be matched. The relaxation of planning procedures may be needed to facilitate the installation of the smaller CHP plants which are envisaged as making up a proportion of the total future installed capacity.

The Institute is supporting the Government's present Best Practice Programme on energy efficiency. Techniques for energy conservation, higher efficiency and general energy management are available and the Institute is promoting their adoption in a number of energy efficiency initiatives. There is still scope for considerable energy savings in the business and domestic sectors. However, energy savings have not materialised on the scale that might have been hoped. Energy saving has not been high on the agenda either at work or at home, partly because energy costs are still a relatively small part of total expenditure, and partly because of an insistence on unreasonably short pay-back times. The present proposals need to be amplified by practical suggestions for improved incentives to ensure that these "theoretical" savings are achieved in practice. The merits of energy taxes and other fiscal devices need to be further explored.

In general the public still need to be convinced on the needs for energy saving and for the reduction of emissions. Unless that problem can be successfully addressed it may become necessary for higher standards of domestic and industrial equipment to be enforced, rather than hope for improvement within the necessary timescale by voluntary means, especially if the Government's more ambitious target saving is to be attained and, perhaps more important, maintained in the longer term.

Mark Baker CBE

President of The Institute of Energy

4 January 1999

Memorandum by the Electricity Association (CC 11)

UK CLIMATE CHANGE PROGRAMME

INTRODUCTION

The Electricity Association is the trade association representing the major electricity generation, transmission, distribution and supply companies in the UK.

This submission addresses some of the specific issues proposed in the Committee's Press Notice and the following headings refer to the bullet points in that Notice, although their order has been changed in order to help the logical flow of our particular comments.

"—the desirability of the options contained in the UK Climate Change Strategy in the light on non-EU countries commitments"

The electricity industry recognises the desire of the Government to be taking an international lead in responding to the threat of climate change and considers it appropriate that the developed nations, including of course the EU, do recognise their responsibilities on the issue. The question implicit in the Press Notice is whether a vigorous UK and EU response will disadvantage the UK's business and economic competitiveness.

We consider that the Kyoto international mechanisms of joint implementation, clean development mechanism and emissions trading provide options for reducing the potential disadvantages. Partly, this would be through their greater economic efficiency reducing the costs of necessary responses but, more particularly, the implementation of responses on an international basis will tend to even out the costs of measures in different countries. For example, international trading in carbon emissions would help reduce any differentials between countries in costs of carbon reductions, allowing the underlying industrial competitiveness of companies to remain key.

We recognise the concerns of some on issues such as "hot air" and that it may be appropriate to have a limit on the share of a country's emission target which may be achieved through the Kyoto mechanisms. However, we consider that these issues can be taken into account in designing the rules of the mechanisms, while still maintaining their valuable role in the response to climate change.

"—the role of different sectors of the economy in meeting the emissions reductions targets and the merits of sectoral targets"

While the Government's consultation paper does not propose a particular strategy yet, it does set out an emissions forecast for 2010 based on current measures which suggests the UK is close to meeting its Kyoto target. This outcome relies heavily on the reductions in CO_2 from the energy supply industry, the reductions in methane emissions from landfill sites and the reduction in nitrous oxide from the chemical industry. These are tending to be projects which are "one-hit" and do not suggest the start of an ongoing programme for the UK extending beyond 2010. The paper itself recognises the dangers in this, stating in relation to the target for 2000 that

"changes in the fuel mix for electricity made a disproportionate contribution to meeting the 2000 target, relieving pressure from other sectors such as transport to reduce emissions".

Climate change is a societal issue and, with the need to begin a process which will extend beyond the 2010 Kyoto target, all sectors need to start to contribute. This is implicit anyway in the principle of "the polluter pays". UK Government must share the burden equitably between sectors.

"—the Government's timetable for producing and implementing its Climate Change Strategy"

Because of the nature of much large industry, decisions on its infrastructure need to take a long term view for the industry to adapt efficiently and cost-effectively. In order to avoid wasteful misdirection of investment, industry needs to be acting within a clear framework which takes account of the environmental, social and economic dimensions rather than responding to short term signals, whether from the regulators (economic or environmental), from Government or others.

The Electricity Association considers that environmental goals are best met by market-based approaches including:

— customer choices (such as "green tariffs" for electricity);

— market instruments (such as greenhouse gas emissions trading);

— voluntary actions (such as tree-planting to absorb carbon dioxide).

Government policies need to be framed so as to encourage the means for supporting sustainable development. The Government should foster voluntary and market-based, and hence long-term, solutions to environmental problems.

"—the policies from the consultation paper on Climate Change Strategy which will be required to meet the UK's legally binding target for the basket of six greenhouse gases and the domestic target for carbon dioxide emissions"

The forecast for 2010 in the consultation paper for the six Kyoto gases is for current policies to deliver 10 per cent of the 12.5 per cent target reduction. The extra reduction of around 5 MtC equivalent could be delivered by a range of possible low cost measures which the paper identifies for various sectors. One higher cost measure which has already been widely discussed as a possible government response is to increase the share of electricity generation from renewables to 10 per cent. The industry supports the principle of such a renewables target, *provided* a suitable framework of policies is put in place to overcome the high costs and planning difficulties associated with the use of renewable technologies.

The domestic target for CO_2 emissions is far more problematic. The forecast in the consultation paper shows that current policies are only expected to deliver 3 per cent out of the proposed 20 per cent reduction. This leaves a requirement for an additional reduction of 29 MtC over and above the existing 2010 forecast.

Carbon dioxide emissions (MtC)	1990 Actual	2010 Forecast (Per cent change from 1990)	2010 20 per cent Reduction Target (Per cent change from 1990)
Energy supply industry	63	54 (−14 Per cent)	49 (−22 Per cent)
Other sectors	105	109 (+4 Per cent)	85 (−19 Per cent)
Total	168	163 (−3 Per cent)	134 (−20 Per cent)

The reduction from the "energy supply industry" is already forecast at 9 MtC of CO_2, and full implementation of the Government's 10 per cent renewables target would increase this to 14 MtC. The challenge is to deliver the 20 MtC reduction needed from the other sectors instead of the forecast 4 MtC increase. Based on the effect of measures as quantified in the consultation paper (which are in any case for the six Kyoto gases), this would require implementation of every single CO_2 measure proposed and still leave a shortfall.

Last year the Electricity Association commissioned a study[1] of the potential for improving energy efficiency in the UK across all end-use sectors. The report concluded that cost effective energy efficiency measures could provide a 14.5 MtC reduction in emissions at an investment cost of £20 billion. Overall the study suggests that all technically feasible energy efficiency options could provide an annual emission saving of 27 MtC, but at an investment cost well in excess of £100 billion.

"—the role of the Climate Change Strategy as a first step towards greater reductions in emissions in the longer term i.e., beyond 2010, with particular reference to the need for behavioural change"

The difference between the Kyoto target, which appears within reach, and the proposed domestic 20 per cent CO_2 reduction, which is extremely onerous, emphasises the challenge in seeking further reductions beyond 2010 when the other greenhouse gases are less significant and the possible options are increasingly concentrated on CO_2 alone.

As shown, the changes on the energy supply side, particularly in electricity generation, are already expected to deliver substantial CO_2 reductions; the need therefore is to also have programmes of action which are beginning to reduce or at least limit the growth of energy end-use, both through energy efficiency measures and through behavioural changes.

The programme which is eventually agreed must include these approaches to convey the message to *all* sectors that the 2010 Kyoto target is not an end in itself but merely the first stage in a longer term realignment. This is essential to avoid sectors spiralling out of control in the interim, if Government concentrated on the initial target by placing the onus on a few sectors alone.

"—the uncertainties involved in emissions projections and the impact of policies upon those projections"

[1] "A realistic strategy for reducing greenhouse gas emissions in the period 2000 to 2010 using improvements in end-use energy efficiency", October 1997, Association for the Conservation of Energy and Energy-Environment Policy Research Group, Imperial College. A summary of the report is attached for reference.

The consultation paper does not take account of the White Paper on the *Conclusions of the Review of Energy Sources for Power Generation*. Hence there are further uncertainties around the future emissions of the energy supply industry which are not reflected in the consultation paper as presented. However, in broad terms, we foresee a pattern similar to that shown in the consultation paper of the electricity industry's CO_2 emissions reaching a minimum sometime around 2000 and then increasing as the measures to reduce emissions from generation are offset by the continued growth in electricity demand and closures of some nuclear plants, although still substantially below 1990 levels by 2010.

We understand that there is to be a second Government consultation paper on Climate Change, taking account of the comments on this first general paper and which will be based on updated Government projections.

The presentation of the emission figures in the current consultation is not helpful in assessing the trends in sectors and hence discussing possible choices of response and areas for targeting action. The decision to show emissions from the energy supply industry separately and reallocated amongst the end-use sectors is one source of confusion as is the allocation of expected changes to landfill practice and their effects on methane emissions between sectors. For example, the report shows an expected decrease in CO_2 emissions from the domestic sector but, omitting the effects of actions taken by the energy sector (mainly electricity generation) reveals the underlying effect of trends within the sector itself and shows an increase.

Carbon dioxide emissions (MtC)	1990	2010	Change
Domestic sector including energy supply industry	43	38	–5
Domestic sector excluding energy supply industry[1]	22	24	+2

"*—the economic and other costs of the options in the Climate Change Strategy*"

In considering policies for implementing measures, the source of any capital investment may not necessarily be the beneficiary of any running cost savings, except in terms of society as a whole. The separate costs, benefits and on whom these fall is needed to assess preferences for pursuing alternative options.

The Government's Climate Change consultation paper includes some assessments of costs per tonne of carbon saved for certain measures. These appear to be net costs which allow for subsequent benefits offsetting the initial capital costs of the measures. However, it is unclear as to what benefits are included (energy running cost savings only?) and what is the balance between the cost and the benefit leading to the net benefit. Hence it is not possible to comment on the energy or economic data used, nor judge the balance of risk of the net benefit accruing in practice. The inclusion of this information in the consultation paper does not aid the ability to discuss any programme or to choose between options.

"*—the extent to which flexible mechanisms should be used in achieving the legally binding target*"

As outlined previously, the Electricity Association considers that the international flexible mechanisms can have a significant role in helping maintain the industrial competitiveness of countries compared to others implementing climate change programmes.

However, an approach such as carbon emissions trading can also be helpful in the UK's domestic activities on its climate change target, particularly for the business sector. If Government is concerned that emissions trading should not be used by the UK to avoid domestic action, a scheme could include defined proportions of internationally tradeable and purely domestically tradeable permits. The latter would ensure that action was taken within the UK but still allow greater flexibility and economic in doing so.

D A Baggs

Head of Energy and Environment Group

5 January 1999

ANNEX

Summary of findings in the ACE/Imperial College Study on the practicable contribution of energy efficiency measures to UK CO_2 reductions

Last year the Electricity Association commissioned a study of the potential for improving end-use energy efficiency in the UK for all end-use sectors. The study, undertaken by the Association for the Conservation of Energy (ACE) jointly with the Centre for Environmental Technology at Imperial College, considered the domestic, commercial, industrial and transport sectors and assessed the full savings achievable from a range of practicable energy efficiency improvements, and the potential savings from those measures which would be cost

[1] Based on additional information received separately from DETR.

effective. Fuel switching and other responses to climate change were not included in the study. The study suggests that the potential from cost effective measures would be as follows:

	Carbon saving (MtC)				Investment cost
	Gas	Electricity	Other	Total	(£ million)
Domestic	2.8	3.0	0.3	6.1	11,200
Commercial	0.6	1.0	0.1	1.7	3,000
Industrial	0.3	0.3	2.1	2.7	1,700
Transport	0	0	4.0	4.0	4,300
Total	3.7	4.3	6.5	14.5	~20,000

The report concludes that cost effective energy efficiency measures could provide a 14.5 MtC reduction in emissions at an investment cost of £20 billion.

Overall the study suggests that all technically feasible energy efficiency options could provide an annual emission saving of 27 MtC, but at an investment cost of well in excess of £100 billion.

Memorandum by The Fire Industry Council (CC 12)

UK CLIMATE CHANGE PROGRAMME

The role of Sectoral Voluntary Agreements in reducing emissions

1. Introduction

1.1 The Fire Industry Council (FIC) represents the active fire protection industry in the UK, bringing together manufacturers and installers of fixed extinguishing systems, portable fire extinguishers, detection and alarm and other fire protection systems. FIC works with individual companies, trade associations and the fire authorities to deliver quality, environmentally responsible, fire protection.

1.2 The fire protection industry has been actively involved in environmental protection issues for a number of years working closely with governments in the UK, European Union and at international levels. It has been instrumental in the phase-out of ozone-depleting substances following the Montreal Protocol, notably through the Halon Alternatives Group (HAG), UN Halon Technical Options Committee (HTOC) and other fora and has taken an active role in the climate change debate in both the European Union and the UN Framework Convention on Climate Change.

1.3 In the UK the Industry concluded a Voluntary Agreement with the Government in 1994 which was renewed in 1997. This was one of the earliest agreements signed following the publication of the Government's commitments under the Rio Convention.

1.4 Under the Agreement the Government confirms the acceptability of fluorocarbons for use in fire fighting applications "*which are considered as non-emissive uses, except for their very rare use in the actual suppression of fires*" when agreed control strategies to minimise emissions shall be applied. The use of fluorocarbons in fire protection is appropriate where careful evaluation shows them to be the best choice when other practical considerations of personal safety, cleanliness, speed of suppression, space, weight and cost are taken into account.

1.5 For its part the UK Fire Industry fully supports the Government's objective of a progressive reduction in emissions of potentially global warming gases and when evaluating alternative fire suppression agents, minimising global warming is one of the issues considered. In order to achieve the twin aims of ensuring that fire protection needs are fully met and global warming emissions are minimised. the Industry has voluntarily agreed to implement a programme which includes emissions control strategies, elimination of discharge testing, the use of approved equipment including regular inspections to BS standards and recycling and re-use of the agents. The Industry reports annually on emissions and the Agreement is regularly reviewed.

1.6 A copy of the Agreement is attached to this submission.

1.7 The remainder of this submission sets out in detail the contribution of the fire industry sector in helping to meet the Government's emission reduction targets demonstrating through our own experience over the last four years the effectiveness of monitoring mechanisms and the usefulness of flexible mechanisms—particularly voluntary sectoral agreements—in achieving emission reduction targets.

2. Background to the use of fluorocarbons in fire protection

2.1 Fixed gaseous fire fighting systems provide clean fire protection for life, property and the environment. There are many other effective fire fighting systems using water, foam or powder but these may in themselves damage the items to be protected and are therefore unacceptable for many applications.

2.2 The most widely used gaseous agent is carbon dioxide; but it is dangerous and therefore unacceptable where people may be present. As a result, Halon 1301 became widely used because it provides clean fire protection and is safe for people. However, it is an ozone depleting substance and also has a global warming potential. Consequently, following the Montreal Protocol, replacements have been developed replicating the space, weight and safety advantages of halon, using zero-ODP fluorocarbon gases. These gases act directly on the fire at low concentrations in a similar manner to halon.

3. The benefits of using fluorocarbon systems

3.1 Fluorocarbons at extinguishing concentrations give a safe, breathable mixture with air because they are used at well below toxic levels. *Benefit: People are safe.*

3.2 Fluorocarbon systems require only a small amount of gas and achieve design concentrations in under 10 seconds. *Benefit: In many cases speed is critical to protecting the environment, preserving life and property and maintaining continuity of operations.*

3.3 Fluorocarbon systems are compact, with little storage space required for the cylinders. This means they offer the most effective solutions in terms of space/weight considerations. *Benefit: Valuable space is preserved for more productive use and installation costs are kept to a minimum.*

3.4 Because of these benefits of safety, speed and compactness, fluorocarbons are essential for some vital applications where occupant safety, space weight constraints apply and/or speed of action is critical. Such applications include the protection of critical communication and data processing assets, civilian and military aircraft engines and vehicles, and particularly ships and control rooms; protection of hazardous atmospheres where fire could develop; becoming rapidly severe and where personnel are often present such as chemical and nuclear industries or oil and gas production.

4. Environmental effects of using fluorocarbon systems

4.1 Fire protection is a non-emissive application, except in the rare event of a fire. To fulfil their role of continuous fire protection, systems must not leak.

4.2 The fire protection industry has changed substantially in recent years. System commissioning discharge tests have been eliminated. Recharging and recovery systems are now also non-emissive. Further more, modern fire detection systems and improved maintenance means that false discharges and fugitive emissions are now largely a thing of the past. Through its Voluntary Agreement with the UK Government the Industry is committed to maintaining and improving these housekeeping standards.

4.3 As a result, experience in the first few years of fluorocarbon usage in fire protection systems suggests that emissions are less than 1 per cent per annum of the installed quantities.

4.4 At the end of the life of the system, or where it is no longer required, the fluorocarbon can easily be removed and recycled, as it will not have deteriorated or been mixed with oils or other contaminants. The high price of fluorocarbons will also ensure that they are husbanded and recycled carefully with no unwanted emissions.

4.5 Even taking into account the GWP of fluorocarbons—which is similar to the halons they replace—the relative contribution to global warming from their use in fire protection is minuscule. A UNEP Halon Technical Options Report on chemical gaseous alternatives to halons stated: "When used only as fire suppressants there is no likely emission scenario of these compounds which results in measurable environmental impact".[1]

4.6 In comparative terms, the global warming impact of a typical fluorocarbon system operating over a 15 year lifetime is comparable to the global warming impact of a 100 watt light bulb operating for the same period.

5. The situation in the European Union

5.1 Like the UK, the European Union recognises the need for fluorocarbons in fire protection. The policy approved by the Environment Council aims to "limit HFC and PFC emissions through optimisation of their use in all activities"[2] rather than imposing restrictions on use.

5.2 Fluorocarbons are already in use in fixed fire protection equipment in 14 EU countries: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and United Kingdom.

5.3 Voluntary Agreement shave been concluded by the Fire Protection Industry with the UK and Dutch governments and are being negotiated with other countries.

[1] UNEP. Report of the Halon Fire Extinguishing Agents Technical Options Committee. December 1994.
[2] Environment Council of March 1995.

6. Conclusions

6.1 The use of fluorocarbons in some fire fighting applications is essential if ozone-depleting substances are to be completely replace and continuing vital fire protection needs are to be met in the UK.

6.2 The non-emissive nature of fluorocarbon systems results in minuscule global warming impact and only in the rare event of a fire. Moreover, their speed and effectiveness in extinguishing protects the environment from avoidable fire damage which could result from using inappropriate systems.

6.3 These considerations lead to the conclusion that selection of the most appropriate fire protection systems of a particular risk should therefore continue to be determined by the UK fire protection industry and experienced fire engineers. They are the only people qualified to judge what system is necessary in each case to provide the optimum protection of life, property and the environment.

6.4 This policy, backed up by the Voluntary Agreements between government and the Fire Protection Industry to ensure minimal emissions, has already led to significant reductions in the UK.

6.5 Such a policy would also greatly assist the UK and European fire protection industry to continue to implement an orderly and progressive phasing out of halons and other ozone-depleting systems.

January 1999

ANNEX

Voluntary Agreement Between UK Government and the Fire Industry Concerning the Use of HFC and PFC Fire Fighting Agents

"Climate Change—the UK Programme", published by the Government in January 1994, sets out to fulfil the commitments contained in the UN Framework Convention on Climate Change (FCCC). It outlines measures aimed at returning emissions of greenhouse gases to 1990 levels by the year 2000. The most notable of these are CO_2, (except where used for fire protection), methane and N_2O, but reference is also made to other gases including hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) because of their high global warming potentials. HFCs and PFCs are being commercialised as replacements for ozone-depleting substances such as chlorofluorocarbons (CFCs) and halons.

A stated aim of the Programme is to avoid damaging current efforts to phase out ozone depleting substances, and the Government recognises that the accelerated and successful halon production phase out is due in part to the commercialisation of replacement systems using HFCs and the potential availability of systems using PFCs.

The Government confirms that there is no plan to ban the production or import of HFCs and PFCs for fire fighting applications which are considered as non-emissive uses, except for their very rare use in the actual suppression of fires when the control strategies set out below are applied. The Government further accepts that the use of HFCs or PFCs is appropriate in fire fighting applications where careful evaluation shows them to be the best choice when other practical considerations of personnel safety, cleanliness, speed of suppression, space, weight and cost are taken into account.

The UK fire industry fully supports the Government's objective of progressive reduction in emissions of potentially global warming gases, and when evaluating alternative fire suppression agents, minimising global warming will be one of the issues considered. However, the fire industry's overriding concern remains that there should be no resultant threat to people and property whose safety is protected by their products. With the aim of ensuring that both these ends are achieved, the fire industry, therefore, voluntarily agrees that the strategies set out below will be applied.

Emission Control Strategies

- Use leak-free storage equipment to BS 5306, BS EN3: 1996, BS 7867: and BS 7863: 1996 or equivalents.
- Use approved, high quality detection systems to BS 5839 and BS EN 54 or equivalent.
- Use approved control equipment to BS 7273 or equivalent.
- Ensure that installations are inspected regularly in accordance with the relevant BS.
- Eliminate the discharge of agent in system testing unless required by regulation.
- Support the Government in pressing for the revision of such regulations.
- Eliminate discharge of agent in training.
- Reclaim agent for re-use.
- Recycle using facilities registered with HUNC and listed to FIC Code of Practice.

The Fire Protection Industry undertakes to report annually to the Department of the Environment, Transport and the Regions in the first half of the following year on the mass of greenhouse gases and its global warming CO_2 equivalent emitted from fire protection systems in the United Kingdom, commencing January 1997.

The Government and the fire protection industry undertake to meet at least annually to review this voluntary agreement and any actions resulting from it.

November 1997

APPENDIX TO FIC VOLUNTARY AGREEMENT

BS 5306 Part 3: 1985—Code of Practice for Selection, Installation and Maintenance of Portable Fire Extinguishers

BS 5306 Part 4: 1986—Specification for Carbon Dioxide Systems

BS 5306 Section 5.1: 1992—Specification for Halon 1301 Total Flooding Systems

BS EN3: 1996—Portable Fire Extinguishers (Parts 1–6 as appropriate)

BS 7867: 1997—Specification for Portable Fire Extinguishers for use in Aircraft

BS 7863: 1996—Recommendations for Colour Coding to Indicate the Extinguishing Media Contained in portable Fire Extinguishers

BS 5839 Part 1: 1988—Fire Detection and Alarm Systems in Buildings Code of Practice for System Design, Installation and Servicing

BS EN54: 1996—Fire Detection and Fire Alarm Systems

BS 5839 Part 4—Specification for Control and Indicating Equipment

BS 6266: 1992—Code of Practice for Fire Protection for Electronic Data Processing Installations

BS EN27201–1: 1994—Code of Practice for Safe Handling and Transfer Procedures

BS 7273—Code of Practice of the operation of Fire Protection Measures:

Part 1: 1990—Electrical Actuation of Gaseous Total Flooding Extinguishing Systems

Part 2: 1992—Mechanical Actuation of Gaseous Total Flooding and Local Application Extinguishing Systems

BS 7327 Part 1: 1990—Specification for Small Fixed Fire Extinguishers

NOTE

The standards applicable to Halon and CO_2 have been included because of the absence of standards for the new extinguishants and should be used as a guide to current practice where appropriate.

Memorandum by Country Guardian (CC 13)

UK CLIMATE CHANGE PROGRAMME

Country Guardian was established in 1992 in response to the introduction of the Non-Fossil Fuel Obligation, when it was realised by a number of environmentalists that the United Kingdom's last wildernesses were threatened with massive industrialisation in the form of wind turbines and that the benefit in terms of clean energy would be negligible. Country Guardian is a voluntary organisation funded entirely by its members' subscriptions and donations and represents no vested interests.

While the UK has the greatest wind resource of any European country, the areas of greatest wind speed overlap almost entirely the most highly regarded landscapes—National Parks, Areas of Outstanding Natural Beauty, Heritage Coasts, Areas of Great Landscape Value—as well as spectacular landscapes like the Radnor Forest which have no designation through anomalies of planning history. Designated Areas have no special protection from wind farm projects, and the NFFO tendering system tends to drive developers to the high wind speed sites. There have been or are currently planning applications within an AONB (Weardale), on an SSSI (Denbigh Moor), immediately next to the Pembrokeshire National Park at Jordanston and Cilciffeth, and a mile from the Lake District National Park at Lowick Beacon. There are a tiny fraction of the total number of projects for prized landscape locations.

The planning system provides the only protection from wholesale industrialisation by wind turbine.

Because the wind "turbine" (more properly called an air-screw generator) produces a tiny amount of electricity compared to other generation technologies, vast numbers are required to produce a significant amount of energy. The two largest wind farms in Europe, both in Mid Wales, produce on average a total of 20 MW between them towards a national average demand that exceeds 40,000 MW.

In 1996 UK sales of electricity were 298,878 Gigawatt hours and UK wind power output was 505 Gigawatt hours from approximately 550 turbines (ETSU figures). The UK has currently 719 wind turbines in 40 wind "farms" producing probably 0.25 per cent of the nation's electricity consumption. During the last five years, electricity consumption has grown by a about 2.4 per cent per annum. On this basis, we would need to build some 7000-plus turbines each year just to keep pace with the growth in demand. As the Government's consultation paper *Sustainability Counts* notes: "Carbon Dioxide emissions are mainly driven by energy consumption." To try to address pollution problems on the supply side is thus folly.

If the current 700 plus turbines produce less than one quarter of one per cent of our electricity supply, then more than 17,000 turbines of the same average capacity would be required to produce 6 per cent. Estimates of turbine numbers below 5,000 to produce that percentage are based on the unrealistic assumption that they would all be of 1.5 MW rated capacity or more. The industry consistently tries to minimise estimates of turbine numbers.

Depending on capacity, the wind turbine is between 150 and 300 ft high and can be seen from twenty miles away. While its "footprint" is tiny, its "shadow" is enormous. In the areas of high windspeed the landscape would be transformed by the construction of tens of thousands of turbines into a wind "farm" landscape of endless installations intervisible with each other. This is already happening in Montgomeryshire in Powys where some 200 turbines have accumulated in a small area and where many more projects are proposed.

The scale of wind developments has given rise to widespread opposition in the areas where developments are proposed and to the expression of grave concern from informed NGOs like CPRE, CPRW, APRS, the Ramblers Association, the Council for National Parks and the National Trust, as well as the Countryside Commission and the Countryside Council for Wales. Partly as a result, local planning committees have tended to reject wind "farm" applications and Public Inquiry inspectors have generally upheld refusals, seeing the small environmental gain as massively outweighed by landscape damage, loss of local amenity and potential damage to the interests of the tourist industry (see inspectors' reports for Drigg, Cumbria, and Cilciffeth, Pembrokeshire, but most tellingly, the Inquiry conducted by Mr David Lavender into the proposed wind "farm" at Barningham High Moor, County Durham in 1998. This proposal was for the largest wind power station in England. Mr Lavender concluded " . . . it seems to me that the individual contribution to energy generation needs from High Moor would be insignificant and unreliable, and that pollution savings would be both correspondingly small and uncertain." [Report Page 62]).

Wind is an unreliable and intermittent source of energy. If 10 per cent of our supply were, notionally, provided by wind, every kW of wind energy would require backup from a nuclear or conventional power station because consumers would not tolerate power cuts when wind was unavailable. Thus wind can never close any power stations.

Pound for pound spent, energy conservation measures and cleaning up existing sources of supply will deliver a much greater pay-off in emission reduction than the cost of guaranteed premium price markets delivered to wind developers via NFFO. Such measures would be likely to create many more jobs than large scale wind development.

California began experimenting with wind power 20 years ago. Since the tax breaks which encouraged wind development there began to wind down, capacity has steadily fallen—by about 11 per cent in the five years 1992 through 1996 (source: *Wind Power Monthly* February 1997). The chief of the American Wind Energy Association was quoted: "Turbines are being run without maintenance until they break down."

Carbon Dioxide emissions fell in the UK in the first half of the 1990s mainly because of greater use of gas and reduced use of coal in electricity generation. Recently the Government has, in the interests of the surviving parts of the coal industry, halted the move to gas. Whatever the merits of that decision it renders pointless the drive for renewables and reduces wind energy development to mere window dressing and gesture politics. No wonder communities in the areas targeted by wind developers feel aggrieved.

Because of problems of intermittency the grid could not accept a proportion of more than 10 per cent of national electricity supply from on-shore wind while ensuring continuity. Since only 33 per cent of UK and 0.66 per cent of global CO_2 emissions derive from electricity generation in Britain, building enough turbines to produce 10 per cent of our electricity would reduce national CO_2 emissions by 3.3 per cent and global emissions by 0.066 per cent and have no impact on global warming. The impact on our best landscapes would however be devastating. There has been a presumption in favour of protecting fine landscape, which is itself a finite non-renewable asset, within the planning law for the last 50 years, and this should not be thrown away now in return for a derisory benefit in terms of emission reduction which could be exceeded massively and more cheaply by energy conservation and measures to clean up existing sources of supply.

Robert Woodward

Vice Chairman

5 January 1999

Memorandum by BNFL (CC 14)

UK CLIMATE CHANGE PROGRAMME

Introduction

BNFL welcomes the inquiry of the Environment, Transport and Regional Affairs Committee into the UK Climate Change Programme. We would like to comment on the specific issues raised by the ETRA inquiry. We would also like to provide some background information relating to climate change and the DETR UK Climate Change Programme consultation paper (the DETR Consultation Paper).

Background

BNFL believes that many of the measures outlined in the DETR Consultation Paper will be beneficial to the United Kingdom, both for business and for all citizens. Measures to improve energy efficiency have already been implemented by many UK businesses to improve competitiveness; additional measures may help competitiveness further. We fully support policies designed to improve public transport. BNFL is seeking to encourage its employees to use public transport where possible, both on environmental and safety grounds.

We welcome the recognition in the DETR Consultation Paper that nuclear power contributes "significantly to the UK's electricity and plays an important part in helping the UK to meet its climate change targets." We endorse the statement that "existing nuclear power stations should continue to contribute to UK emission reduction, provided that high standards of safety and environmental protection are maintained".

Nuclear power makes a major contribution to reducing the emission of greenhouse gases. In 1997, nearly 30 per cent of all electricity supplied in the United Kingdom was generated by nuclear power stations. Were this electricity generated by burning gas, the extra emissions of carbon dioxide would total 38 million tonnes (10 MtC) which equates to nearly 7 per cent of total UK CO_2 emissions from all sources. If the same quantity of electricity was generated by burning coal 82 million tonnes of CO_2 (22 MtC) would be emitted, more than the entire annual emission of CO_2 accounted for by the use of private cars and taxis in the UK.

UK nuclear reactors have shown a significant improvement in performance over the last seven years whilst improving on already high levels of safety. Between 1990 and 1997 the amount of electricity supplied by nuclear power rose from 59 TWh to 87 TWh,[1] an increase of 47 per cent. Part of this increase can be attributed to the start up of Sizewell B, which supplied 8.4 TWh of electricity in 1997.[2] The remaining 21.6 TWh increase has been due to improved efficiency in the rest of the United Kingdom nuclear generation plant. The output from BNFL Magnox and British Energy AGR stations has risen by an average of 35 per cent. The DETR Consultation Paper predicts that national annual emissions of carbon dioxide will have fallen from 168 MtC in 1990 to 157 MtC in 2000. If nuclear energy was replaced by the current fossil fuel mix UK annual CO_2 emissions would have risen to around 173 MtC.

BNFL does not agree with the presumption that in the longer term the contribution of nuclear energy will decline. There will be a decline in the contribution of the UK's existing nuclear power stations as they reach the end of their operating lives. However we do not believe that this means that nuclear power can not or should not contribute significantly towards avoiding greenhouse emissions in the long term.

BNFL agrees with the statement in the DETR Consultation Paper that "other environmental and economic factors need to be taken into account when considering a longer term role for nuclear energy". However, we are at a loss to understand why the opportunity has not been taken in the consultation paper to seek views on the future of the nuclear programme. New nuclear build is undeniably an option to avoid significant greenhouse gas emissions in the medium and longer term. In 1997 the Government's Energy Advisory Panel addressed the economic issues relating to climate change. The Panel's report concluded that the "theoretically lowest economic cost solution" to meeting the Government's 20 per cent carbon dioxide reduction target included 16 GW of new nuclear build, the equivalent of twelve Sizewell B reactors.[3]

The nuclear industry in the United Kingdom also makes a valuable contribution to the economy and to providing highly skilled jobs. 30,000 people are employed directly in the nuclear industry—around 11,000 in electricity generation and around 18,000 in nuclear services. BNFL has a turnover of over £1.3 billion and contributes significantly to the UK balance of payments, in 1997–98 BNFL exports were more than £440 million.[4] In 1996, according to the DTI, companies within the nuclear sector contributed £3.2 billion to the GDP.

The excellent performance and reliability of the UK's nuclear power stations will allow many of the reactors to operate beyond the lifetime expectations of even a few years ago. This means that nuclear power will be able to make a greater contribution to avoiding greenhouse gas emissions in 2010 than previously predicted. However the contribution made by the current generation of nuclear power stations will decline over the next 20 years if

[1] UK Energy in Brief, DTI, July 1998.
[2] British Energy Monthly Output Figures 1998.
[3] Energy Report 1997, pp. 211–219.
[4] BNFL Annual Report 1997–98.

no replacement construction is embarked upon. Only Sizewell B is currently scheduled to be operating beyond 2025. If nuclear energy is to continue to contribute to avoiding greenhouse gas emissions construction must start on replacement nuclear plant in the next decade.

Last year, the Trade and Industry Select Committee Report on Energy Policy made the statement:

> "While a major effort would be required to turn around public opinion, and despite the current unfavourable economic case for new nuclear plant, the question as to eventual new nuclear build cannot and must not be ducked any longer. We recommend that a formal presumption be made now for purposes of long-term planning that new nuclear plant may be required in the course of the next two decades".[1]

We welcome and support this statement and wholeheartedly agree that the issue of replacement nuclear build must not be ignored. Nuclear power is a vital part of efforts to minimise greenhouse gas emissions over the next decade. It should also be part of the solution to bringing more substantial long-term reductions in greenhouse gas emissions.

COMMENTS ON SPECIFIC ISSUES RAISED BY THE COMMITTEE

1. *Desirability of the options contained in the UK Climate Change Programme Strategy in the light of non-EU countries commitments.*

Many of the options contained in the DETR Consultation Paper are desirable because they promote energy efficiency which increases competitiveness and helps reduce greenhouse gas emissions. However, the consultation paper recognises that some measures will require additional private and public expenditure to achieve the Government's climate change targets.

It is important that non-EU countries meet their commitments to reducing greenhouse gas emissions and that individual countries do not seek to make short-term commercial advantage by reneging on their commitments. The United Kingdom should use its influence to ensure that all of the countries committed formally to controlling their greenhouse gas emissions make real progress in meeting their targets.

It should also be recognised that many countries fall outside the scope of the Kyoto and Buenos Aries agreements. These countries are already significant contributors to greenhouse gas emissions and will become even more so in the future. It will then be necessary to integrate these countries into international efforts to control greenhouse gas emissions on a sensible basis and on a reasonable timescale.

2. *The role of the Climate Change Strategy as the first step towards greater reductions in emissions in the longer term, i.e. beyond 2010, with particular reference to the need for behavioural change.*

We believe that the reduction in greenhouse emissions to be achieved by 2008–2012 needs to be a first step towards further reductions in greenhouse gas emissions if the potentially devastating effects of climate change are to be minimised.

The DETR Consultation Paper outlines many of the possible changes which will allow reductions in greenhouse gas emissions to be achieved through improved energy efficiency measures. These and other measures can be achieved at relatively little cost, require relatively little change in behaviour and can improve UK competitiveness. According to the consultation paper these measures will be more than sufficient to meet the 12.5 per cent greenhouse gas emissions reduction target by 2008–2012.

However to make the further reductions in greenhouse gas emissions needed to meet the Government target of a 20 per cent reduction in carbon dioxide emissions more substantial behavioural changes will be needed. In addition the period beyond 2012 needs serious attention, particularly as the significant contribution from nuclear power will fall away unless new nuclear build is undertaken. BNFL is not aware of any credible ways of meeting longer term greenhouse gas reduction targets without a major ongoing contribution from nuclear power.

At this point we would like to put the impact of one behavioural change in the context of the contribution nuclear electricity generation makes to avoiding greenhouse gas emissions. Nuclear power supplies approximately 30 per cent of the electricity demand of the UK. If this electricity was generated by gas-fired power stations there would be an additional 38 million tonnes of carbon dioxide emissions. This represents around a half of all emissions from private cars and taxis. In other words, if nuclear power was replaced by gas-fired electricity generation all private car and taxi journeys would have to stop on at least three days of every week to counteract the additional greenhouse gas emissions.

We would suggest that maintaining a strong nuclear component to the electricity generation mix is a prudent strategy for substantially reducing greenhouse gas emissions.

The replacement of nuclear energy with gas-fired generation would also result in an over-dependence on gas. Gas-fired generation is presently relatively cheap. However the sudden increases in fossil fuel prices in the

[1] Trade and Industry Select Committee Report on Energy Policy, 1998.

1970s indicate how volatile fossil fuel process can be. At present UK gas production buffers the UK economy from such variations in fossil fuel prices. However, as UK gas reserves are exhausted we will become increasingly dependent on gas imports. Ensuring a diversity of supply protects consumers and the UK economy more broadly against such fluctuations in the cost of specific fuels.

3. *The Government's timetable for producing and implementing its Climate Change Programme.*

We believe the timetable is challenging but necessary in order to produce the change required to make sustainable reductions in greenhouse gas emissions. However, it is important to ensure that the policies put in place address the long term objectives of minimising climate change.

In particular we note the two-stage approach towards the introduction of economic instruments in the business sector proposed in the Marshall Report.[1] In the Report two economic instruments are identified, a tax and a tradable permit scheme. It is proposed in the Report that a tax should be introduced ahead of a trading permits system on the grounds that it would be easier to introduce a tax system than to establish a trading permits system ahead of an international trading permits scheme. We concur with this assessment, however we disagree with the conclusion that a downstream tax should be imposed. A downstream tax would not differentiate between the carbon content of different electricity generation methods. If the taxation route is followed an upstream tax levied on the carbon content of the emissions of the generator concerned would be the most effective method in reducing greenhouse gas emissions. Similarly, a tradable permit scheme would ultimately need to be based on greenhouse gas emissions for it to have the desired impact.

4. *The role of different sectors of the economy in meeting the emissions reductions targets and the merits of sectoral targets.*

The use of sectoral targets does help subdivide the different policies and strategies being proposed and the contribution each sector can make. However the cross-sectoral aspects of emission reduction must not be ignored. For example power consumption can contribute significantly to the emissions attributed to industry. British Telecommunications (BT) have stated that they used to have a carbon dioxide reduction target. However, BT found that whether they met the target or not was essentially determined by the mix of fuels used for UK electricity generation.[2]

Cross-sector interactions are likely to increase as more reliance is placed on the electricity sector as a supplier of primary energy. In the transport sector alternatives are being developed to replace petrol and diesel engines. Electrically powered vehicles (EPV) are now entering the commercial market. As the use of EPVs increases they will place an increasing demand on the electricity generation industry for battery recharging.

Whilst the use of EPVs will reduce the direct emissions of greenhouse gases from the transport sector it will put an increasing demand on the electricity sector. It is therefore important that the electricity generation sector does not become more carbon intensive and on this issue we do not accept the presumption made in the DETR Consultation Paper.[3] A more carbon intensive UK electricity generation sector would be a very perverse outcome of government policy directed to reduce greenhouse gas emissions.

5. *The policies from the Consultation Paper on Climate Strategy which will be required to meet the UK's legally binding target for the basket of six greenhouse gases and the domestic target for carbon dioxide emissions.*

6. *The uncertainties involved in emissions projections and the impact of policies on those projections.*

In response to both issues we note that the predictions in the consultation paper indicate that all of the possible and "further possible" measures will be required to meet the 20 per cent carbon dioxide reduction target set by the Government.

Because of the uncertainties involved in projection of emissions all the measures suggested in the report will have to be fully exploited to meet the Government's domestic carbon dioxide target. It would therefore be prudent to investigate other means of reducing greenhouse gas emissions. This should include a continuing significant long term role for nuclear power.

7. *The mechanisms required to monitor the effectiveness of the policies in reducing emissions.*

We have no specific comment, save to note the clear requirement for transparency, openness and fairness, whilst not imposing unreasonable bureaucratic costs on industry.

[1] "Economic instruments and the business use of energy", A Report by Lord Marshall, November 1998.
[2] BT Environmental Report 1997.
[3] Paragraph 49 " . . . In the longer term electricity generation is likely to become more carbon intensive as the contribution from nuclear declines . . . "

8. *The extent to which "flexible mechanisms" should be used in achieving the legally binding targets.*

Flexible mechanisms do have a role to play in enabling countries to co-operate in meeting emission targets. However, mechanisms for emissions trading should protect against the heaviest polluters relying on purchasing permits to meet their obligations. The United States indicated at Buenos Aires that it supported the proposal that countries would be able to account for almost all of their greenhouse gas emissions through the purchase of tradable permits. Such a policy would allow a nation to avoid making any changes to its own policy or behaviour to promote a long term reduction in greenhouse gas emissions. Real changes in behaviour are required from all countries to make credible reductions in greenhouse gas emissions.

9. *The economic and other costs of the options in the Climate Change Strategy.*

The economic costs outlined in the DETR Consultation Paper show that a 15 per cent reduction in greenhouse gas emissions can be achieved though measures which are "planned or lower cost". However, in order to meet the 20 per cent reduction target for CO_2 emissions all the "further possible measures" will be required which will involve higher costs. The question of who should bear these costs is key.

Within the electricity sector we feel the principle of "the polluter pays" should be applied. This principle already applies to the nuclear industry. The costs of treating and disposing of the wastes arising from the generation of electricity from nuclear power are already fully included in the price of nuclear electricity generation. The nuclear industry is also tightly regulated to ensure that radioactive emissions do not harm the environment.

In contrast the fossil-fuelled generation industry is allowed to emit millions of tonnes of greenhouse gases which are known to have the potential to seriously affect the environment through climate change. Society as a whole bears the cost of these emissions.

BNFL would support a tax or trading permit scheme levied on greenhouse gas emissions emitted by the energy supply industry. This would extend the concept of "the polluter pays" to the whole energy supply industry. BNFL concurs with the Marshall report that a national carbon tax would be easier to introduce than a national trading permit scheme in advance of an international trading permit scheme.

BNFL does not support the introduction of an energy tax. Such a tax would be much less selective because it would penalise low greenhouse gas emitters, such as nuclear, renewable and hydro generation, as much as it would penalise fossil fuel generation.

BNFL

January 1999

Memorandum by Pilkington Plc (CC 15)

UK CLIMATE CHANGE PROGRAMME

INTRODUCTION

Pilkington acknowledges the threat to the global environment posed by Climate Change, resulting from man's increasing emissions of greenhouse gases, principally carbon dioxide. We recognise that firm action to reduce emissions has to be taken by governments. Targets have to be set, and the legislative frameworks established, which will make or encourage industry, householders and the public sector to deliver these reductions.

For that reason, Pilkington welcomes the UK's post-Kyoto target of reducing greenhouse gas emissions by 12.5 per cent, and the government's manifesto commitment of a 20 per cent reduction in CO_2 emissions by 2010. We look forward to the policies and legislative instruments which will be necessary to deliver both targets.

Carbon dioxide is caused almost exclusively by the combustion of fossil fuels. Improving the efficient use of energy will therefore be key to delivering the targets. Pilkington has an involvement in energy-efficiency issues in three respects: firstly as a major user of fossil fuels in glass manufacture, secondly as a producer of energy-saving glazing for buildings and transport, and finally in the production of photovoltaic panels and mirrors for solar power generation. Actions by companies like ours will play a vital role. We therefore welcome the committee's inquiry, and are pleased to submit the following evidence.

1. *The UK Climate Change consultation process*

Whilst welcoming the DETR Consultation Paper on the UK Climate Change Programme, we would like to see an acceleration in the process of consultation and policy development. Paragraph 36 refers to the Paper as being "only the start of a process", yet the government has had a CO_2 reduction target since well before it came

into office, and there have already been consultation papers on issues such as sustainable development, sustainable business, sustainable construction, economic instruments and building regulations—all of which impact on Climate Change.

Whilst it is important that the policy measures should be right, and particularly that they should not damage our international competitiveness, we feel that sufficient is known about the various options and their benefits to enable an early implementation of a number of major initiatives. Indeed, the consultation papers referred to above, each presented more precise and specific proposals than the more general questions posed in the Climate Change paper.

Early implementation of policies will place Britain in a position of some moral authority internationally, and would strengthen our leadership role as we try to persuade other countries to adopt targets and implement measures.

Furthermore, reducing our emissions of greenhouse gases beyond the level of our Kyoto obligation would enable the UK to build up credits which could be traded under any Emissions Trading mechanism, to the economic benefit of the country. UK could therefore gain politically and economically from the vigorous pursuit of policies to reduce the emissions of greenhouse gases.

2. *Priority sectors for action*

Carbon dioxide accounts for approximately 80 per cent of the global warming effect of the basket of six greenhouse gases identified at Kyoto. The major source of CO_2 is the combustion of fossil fuels. Therefore, reducing the use of fossil fuels must be achieved if climate change targets are to be met.

We believe that improving the efficiency by which energy is delivered and consumed offers many positive opportunities. Greater energy-efficiency allows more to be done with less. Delivering energy-efficiency will benefit not only the energy-user, but the businesses for whom new markets for energy saving products and services will be stimulated.

Perhaps the most fundamental statistic that should be borne in mind throughout all deliberations related to energy-efficiency is that *buildings* account for as much energy consumption as all other sectors added together. The 1998 "Non-domestic building energy fact file", produced by the Building Research Establishment for DETR, gives the breakdown of both energy and CO_2 emissions by end-use sector. The latest figures (1994) are shown to be:

Sector	Primary Energy (Petajoules)	CO_2 emissions (million tonnes)
Transport	2,335 (26 per cent)	156 (29 per cent)
Agriculture	90 (1 per cent)	5 (1 per cent)
Industrial processes	2,009 (23 per cent)	123 (23 per cent)
Buildings	4,422 (50 per cent)	249 (47 per cent)
	100 per cent	100 per cent

Furthermore, of the energy consumed by buildings, approximately two-thirds is by housing, and one-third by commercial, public and industrial buildings. Our view is that there are major opportunities for reducing energy and CO_2 emissions from the building sector, and this should be the priority and focus of policy measures. The technical means to deliver substantial savings, particularly in housing, are well-established, proven and widely available. They are simple measures such as thermal insulation, improved heating controls, draught-proofing, condensing boilers and low-emissivity glazing. These do not require further research or development. They are widely available. Their benefits have been quantified (see the Energy Saving Trust's report "Energy efficiency and environmental benefits to 2010", which quantified the fuel and CO_2 savings of a range of simple domestic energy conservation measures).

As a result of studies which we have conducted, including the design, construction and monitoring of energy-efficient buildings, we are convinced that improvements in the energy-efficiency of buildings of at least 20 per cent, and often up to 50 per cent, are practically and economically achievable using existing technologies. We feel the targets for carbon savings in the domestic sector in the Climate Change consultation paper are too modest.

3. *Current barriers to delivery*

In all sectors of the economy, falling energy prices mean there is now less financial incentive to invest in energy-efficiency strategies. In the domestic sector this has been compounded by the reduction of VAT on fuel and power to 5 per cent, whilst the rate applying to products designed to save energy has remained at 17.5 per cent. All the current financial signals, and the marketing strategies adopted by the utilities, militates against investment in energy-saving measures by consumers—whether domestic or industrial.

The one policy that has remained consistent throughout successive governments has been the use of Information and Advertising campaigns to stimulate consumers to invest in measures. To some extent these have been successful in establishing an understanding of the environmental benefits of energy-efficiency, but there is a gulf between acknowledgement in the abstract, and action taken at a personal level if expenditure is involved.

Experience shows that only when such campaigns are underpinned by grants or regulation is action stimulated. For example, when the last Labour government introduced, in 1978, modest grants to homeowners to insulate their lofts, such dramatic uptake resulted that by the time the scheme came to an end in the late 1980's over 90 per cent of UK lofts were insulated. In the new building sector, experience shows that improvements in the energy performance of new building only takes place when Building Regulations are strengthened. Information campaigns may increase awareness, but it is Regulation and financial incentive which stimulates action.

4. *Specific proposals for the Buildings sector*

The Consultation Paper refers to a review of the Building Regulations, and we are convinced that this is the mechanism for substantial improvement in the key sector of Buildings.

Improving the Building Regulations is one of the most direct and effective means of increasing the energy-efficiency of buildings. During the current review of the Regulations a series of workshops of experts has been held, and it is clear there is strong support from these workshops for a considerable tightening of the requirements. Products are readily available to achieve this cost-effectively, for example low-emissivity glass could be required in all new windows (as is required in the Regulations of most European countries). The incremental cost is small, and the payback less than five years.

The major opportunity however lies in extending the scope of the Building Regulations to cover *existing* buildings. There should be a requirement that when any part of an existing building is being refurbished it is brought up to the standards of insulation that would be required for new build. Such regulation exists in Germany, and in certain other European countries.

Pilkington supports the review of the Building Regulations, encourages its early implementation, and particularly urges that the scope be extended to embrace existing buildings when refurbished.

We believe that reducing the rate of VAT on energy-saving materials, to the same rate as applies to domestic fuel and power, should be implemented as soon as possible. Treasury ministers have said that EU VAT law currently prevents this, but have undertaken to explore ways of amending the current restrictions. We urge ministers to deliver on this undertaking.

Finally, the government should recognise the power of grants—however modest—in stimulating action. The Energy Saving Trust should be resourced to embark on a major extension of their "cashback" schemes to support domestic energy saving measures. This resource could come from levies on the Utilities. In an era of falling fuel prices, the impact of such a levy on the consumer would be imperceptible.

5. *Specific proposals for the Industrial sector*

Industrial manufacturing processes account for 23 per cent of UK energy consumption and CO_2 emissions. Many energy-intensive industries have made significant improvements already; for example a typical Pilkington float glass plant currently uses 40 per cent less energy than was required to melt a tonne of glass in the early 1970's, and this is not far from the theoretical minimum requirements. An increase in energy prices would not therefore result in significant energy savings in many cases, but might add to costs, which could harm global competitiveness.

During 1998, Lord Marshall consulted industry on the use of economic instruments to stimulate energy-efficiency. Pilkington submitted a detailed report to the inquiry. In summary, our response took the view that:

- Energy taxes are a very coarse way of influencing energy consumption, and would have to be set at an exceptionally high level to significantly influence energy consumption. (A carbon/energy tax of $10 per barrel of oil on top of the current oil prices of £10 per barrel looks small in relation to the 1979 price which was equivalent to $50 per barrel).
- Increasing energy price risks damaging international competitiveness.
- Any revenues raised from an energy tax should be re-cycled into supporting measures to improve energy-efficiency.
- The manufacture of energy-saving products should be exempt from an energy tax, to avoid increasing the price and damaging the cost-effectiveness of products designed to save energy.
- A system of emissions trading between major energy-consuming industries would be effective in delivering energy-efficiency.

6. *Summary*

The government faces a dilemma: how to achieve its manifesto commitment of reducing CO_2 emissions by 20 per cent at the same time as the effects of energy market liberalisation are encouraging consumers to use more energy. It has been helped to date by the switch from coal to gas for power generation, but these gains have now been pocketed. It is unclear where further reductions in CO_2 will come from with present policies.

We believe that the buildings sector offers a major opportunity. This is because buildings account for 50 per cent of our primary energy consumption and that the technology to improve the energy-efficiency of building is proven and readily-available. One example, well-known to us, is low-emissivity glazing which—if installed in every building in the UK—would save 9 million tonnes of CO_2 annually. There are many other simple, low-tech measures to improve buildings.

But increasing their uptake will require intervention. Specifically we believe Building Regulations should be improved to require higher standards of insulation in new buildings, and that their scope should be extended to cover existing buildings. If it proves administratively too difficult to bring existing buildings within the scope of the Building Regulations, financial incentives will be crucial to persuading consumers to invest in measures. In either event, it is vital to send the right price signals to consumers by reducing the rate of VAT on energy saving materials (currently 17.5 per cent) to that which applies to the domestic fuel they are designed to save (5 per cent).

In the industrial sector, a system of emissions permit trading between major energy consumers should be developed with a pilot system introduced as a matter of urgency.

If there is to be an energy tax to change behaviour in SMEs, etc., the revenues generated should be recycled to encourage investment in energy-efficiency measures.

Renewable energy technologies, particularly photovoltaics, desperately need re-examination by government in order to determine the most appropriate way of facilitating their future.

Manufacturers of energy-efficiency materials and services have researched and developed the products to achieve substantial improvements in energy-efficiency, particularly in buildings and industry. What is required now is the regulatory and policy framework to deliver the uptake of these measures.

Pilkington

January 1999

Memorandum by Professor Michael Laughton, University of London (CC 16)

UK CLIMATE CHANGE PROGRAMME

The Press notice 82/97 listed a number of questions which the Committee wished to examine. Replies to these questions are as follows and deal primarily with the contributions from and implications for the electricity supply industry.

— *The desirability of the options contained in the UK Climate Change Strategy in the light of non EU countries' commitments;*

There may be valid reasons for other non EU countries commitments being at variance with those of the UK which need be considered in answer to this question. With regard to the difference of opinion between Congress and the White House in the United States over the ratification of the Kyoto Protocol targets, for example, the Committee's attention is drawn to the scientific scepticism which throws doubt on the whole existence of man-made global warming. Satellite data drawn from some 40,000 readings every day are the only truly global temperature data scientists have. Contrary to surface temperature readings, satellite measurements supported by weather balloon data show a slight cooling trend. Such is a preliminary report which appeared in the Washington Times last September by Dr Roy Spencer, Senior Scientist for Climate Studies at NASA's Marshall Space Flight Centre. (Dr Spencer along with a Dr J Christy developed the precision satellite monitoring method). A more complex and thorough analysis covering the period 1979–todate requiring a reprocessing of the raw data should be available by the end of 1999.

Without prejudging the results, it is to be hoped that radical measures to effect "behavioural changes" will not be introduced by the Government before this new satellite evidence is properly assessed.

— *the role of the Climate Change Strategy as the first step towards greater reductions in emissions in the longer term, i.e., beyond 2010, with particular reference to the need for behavioural change.*

In the longer term beyond 2010 the electricity supply industry loses the non-emitting contribution of the AGR nuclear stations, most AGR reactors being closed by 2015, all by 2024. The replacement of these stations will have to be considered; thus the Climate Change Strategy is the first step in the planning of a long-term energy supply policy as well as providing an opportunity to consider not only behavioural changes, but also the

integrated planning of supporting infrastructures, e.g., road, rail and public transport requirements. In addition possible technology developments should be anticipated. The advent of zero or low emission vehicles or the use of hydrogen as a fuel, are but examples of the way in which emission-driven transport policy decisions would be influenced.

— *the Government's timetable for producing and implementing its Climate Change Strategy;*

The use of energy, especially savings and greater efficiency of use can be influenced in the short term by a variety of economic sticks or carrots or by setting mandatory standards of performance for vehicles and equipment. The pattern of production of energy, as in the electricity supply industry, changes far more slowly, however, and significant changes are not foreseen before 2010. Two energy supply issues in the Climate Change Strategy consultation document need addressing, first of all CHP, secondly renewables.

Reference is made (page 16) to the 1997 ETSU Report indicating "that the *economic* potential (of CHP plant) for use in industry, commerce, the public sector and community heating is in the range of 12,000–19,000 MW". In practical terms these figures represent a case for capital investment to replace existing plant of the order of £7–13 billion on some 55,000 sites, most new CHP plant being fuelled by gas. With total industrial investment being of the order of only £10 billion per year the achievement of any sizeable proportion of these MW capacities is not practical. Apart from the financial there are also other constraints on skilled manpower. The Government would be misled, moreover, if the economic potential were confused with the potential for the reduction in emissions. Over wide ranges of heat to power output CHP plant is less efficient than stand-alone boiler plant and grid supplied electricity from CCGT stations, i.e., CHP plant produces more emissions. In addition there is now considerable data and experience which shows that annual operating efficiencies of CHP plant are considerably less than the 80 per cent or more which are claimed during the periods when heat and power loads match the optimum design ratios. This is because these two loads vary individually and, as the years pass and plant requirements change, the CHP plant loads becomes less and less well matched and, therefore, less and less efficient. The Government should request this data before embarking on an extensive promotion of CHP.

Emissions-free renewable energy is the other main hope for the future on the supply-side. The only emission-free technologies developed to a state of operational readiness are wind, tidal, hydro and solar. Biomass technologies produce gaseous emissions during operation although dubious accounting practices assert that these technologies are zero-emission forms of generation over several years. Successive NFFO support has led to the present level of 2 per cent of electricity generation from renewables, mostly still from pre-existing hydro, but, perhaps more importantly, has enabled new plant to be developed and operated in pilot projects. In this the NFFO scheme has been a success. To others, however, it has been an iniquitous scheme which is making property developers wealthy at a cost of the industrialisation of previously protected countryside. The high costs of renewable generation output appropriate for recovering capital costs in short NFFO periods are covered by guaranteed sales to RECs, i.e., consumers, but when the initial investments have been recovered, the consumers have not benefited from the lower cost electricity because the prices at which REC's buy from the Pool are determined by high cost marginal conventional plant elsewhere in the system. All of the NFFO generated profit goes to the developers for the remaining two-thirds or so of the technical lifetime and none to the consumers who have paid for the plant.

Without the NFFO support the DTI foresee only a growth in renewable generation from the present 7.3 TWh at present to about 13 TWh by 2010. To achieve the Government's target of 10 per cent would require about 40 TWh. If tidal power is not to be developed and wind is the main resource used, then 1 TWh represents the annual output of about 304 of the largest new 1.5 MW wind-turbines. An increase to 40 TWh represents many thousand new turbines, in the limit about 10,000 both on-shore and off-shore. The environmental damage would be catastrophic and the network reinforcement problems both expensive and time consuming, leading to the conclusion that although the DTI estimate may be slightly low, it is far nearer the likely figure than the 10 per cent target.

Neither CHP nor renewable energy is likely to achieve the levels desired by the Government in 2010.

Even if renewable energy could supply 10 per cent of electricity generation by 2010, its potential for much further growth would be limited by the technical problems of maintaining system stability. Grid Engineers believe that the limit is somewhere between 15 per cent and 20 per cent.

— *the role of different sectors of the economy in meeting the emissions reduction targets and the merits of sectoral targets;*

Setting sectoral targets centrally may have an intellectual appeal, but such targets could easily be wildly over optimistic (or possibly pessimistic). A further implementation problem seen in the electricity supply industry is that policies are set centrally, but planning decisions are taken locally by companies or communities. It is to be hoped that this local right will not be altered.

Although technology is not the answer it can contribute significantly in all sectors in the achievement of the legally binding targets. The United States, for example, has already achieved substantial energy savings by introducing mandatory performance standards in 1987 for new domestic appliances, has plans to impose minimum efficiency levels on motors sold in the country, as in Canada, (a typical high efficiency motor has power losses 30–50 per cent lower than standard motors) and has recently announced the setting up of a national research centre for power electronics to standardise and improve the systems that control 60 per cent of the

power used in the US, thus achieving a 30 per cent saving in power consumption within 10 years. Although the appreciation of such technical possibilities requires a certain specialist knowledge, nevertheless the Climate Change Consultation programme paper would benefit if it contained some Engineering vision on which opinions could be sought.

— *the policies from the consultation paper on Climate Change Strategy which will be required to meet the UK's legally binding target for the basket of six greenhouse gases and the domestic target for carbon dioxide emissions;*

The Kyoto target could almost be met by the electricity supply industry alone if the following scenario holds:

— the demand for electricity between 1996 and 2010 grows at an average annual rate of 1.6 per cent per annum, reflecting 10 year average trends and ongoing improvements in energy efficiency of 0.5 per cent *per annum*;

— by 2010 gas supplies 50 per cent of the electricity market by CCGT and CHP plant;

— renewables increase to only 3 per cent (DTI forecast);

— no new nuclear build so nuclear decreases to 14 per cent;

— coal decreases to 27 per cent of the market.

Taking into account the DETR forecasts of reductions in the other (non CO_2) greenhouse gases, the overall Kyoto target could be met in about 2005–07, but with the growth in electricity demand, would not be met in 2010. With savings from other sectors of the economy, it would appear that the Kyoto target could be met safely. The only proviso is that the investment in CCGT plant continues, although no new nuclear build is required.

On the other hand if, say, half of the Government's unilateral target of a 20 per cent cut in CO_2 emissions by 2010 were to be assigned to the electricity supply industry, then analysis shows that in addition to gas supplying 50 per cent of the electricity market, coal would have to decrease to 17.5 per cent (about half its 1996 level) with oil at 5 per cent, but there would be a requirement for 6GW of new nuclear build (five Sizewell B stations). Such a scenario may be dismissed as unfeasible in the present circumstances and with it the Government's unilateral 20 per cent reduction.

— *the uncertainties involved in emissions projections and the impact of policies in reducing emissions.*

The above scenario highlights the areas of uncertainty with regard to the contributions that might come from the electricity supply industry, viz the rate of growth of electricity demand, the extent to which gas will be allowed to grow in electricity energy supply both via CCGT and by CHP plant, the future viability and extent of renewable energy supplies (major network reinforcements and R&D work needs undertaking in this field) and whether nuclear energy will recover sufficient public acceptance for new build to be possible.

— *the mechanisms required to monitor the effectiveness of policies in reducing emissions;*

No comment

— *the extent to which "flexible mechanisms" should be used in achieving the legally binding target.*

The application of joint implementation and clean development mechanism within the UK might be complicated with a privatised electricity supply industry where much foreign ownership already exists. Japanese banks have already funded windfarms which use Japanese wind-turbines, for example. Presumably the credit for such projects would in future accrue to Japan's emissions account and, consequently, all renewable projects would be immediately more attractive for foreign investment and ownership.

Again the investment in new CCGT stations reduces emissions, particularly with the new gas turbines awaiting the lifting of the planning moratorium. These gas turbines allow CCGT stations to have an efficiency 60 per cent to replace coal stations with an efficiency of 36.5 per cent (DRAX) with 32–35 per cent being a European average. Again the question of foreign investment and ownership arises. Who gains the credit for the emission reduction? In reverse, British utilities own overseas utilities and are engaged in building power stations abroad, all of which points to an immediate need for a new account being drawn up containing these "flexible mechanism" debits and credits so as to clarify the UK position *vis-a-vis* the target emissions.

— *the economic and other costs of the options in the Climate Change Strategy.*

No comment

5 January 1999

Memorandum by The Royal Society for The Protection of Birds (CC 17)

THE UK CLIMATE CHANGE PROGRAMME

Introduction

The Royal Society for the Protection of Birds (RSPB) welcomes this opportunity to present evidence. The RSPB is Europe's largest wildlife charity with over one million members. We manage one of the largest conservation estates in the UK—147 nature reserves, covering more than 100,000 hectares.

We are concerned that unless there are significant cuts in greenhouse gas emissions birds, other wildlife and their habitats will be catastrophically affected by climate change. The Intergovernmental Panel on Climate Change (IPCC) estimates that global cuts of about 60 per cent below 1990 levels will be needed by the middle of the next century if dangerous anthropogenic interference with the climate system is to be avoided. Early and meaningful action is therefore vital both in the UK and around the world.

The format of this document mirrors that of the Committee's paper concerning matters that it will wish to examine in its inquiry into the Government's consultation paper on the UK Climate Change Programme.

Response to matters raised by the Committee

The desirability of the options contained in the UK Climate Change Strategy in the light of non-EU country commitments

This line of enquiry can relate to either one or both of the following:

(a) to the desirability of the EU, and the UK in particular, having a larger reduction target than most other Annex B (developed country) Parties to the Kyoto Protocol or;

(b) to the adverse economic effects that some allege might result from implementing policies outlined in the consultation.

We thus address both issues here.

On the former matter (a), *the RSPB believes that it is vitally important that at least some developed countries are seen to be taking a clear lead in reducing emissions.* The concept of "leadership" by developed countries is not only written into the Climate Convention but it is the key to future global participation in reducing emissions. According to the Intergovernmental Panel on Climate Change (IPCC), significant climate change will only be avoided if all countries take on large emission reductions, including the developing countries that do not currently have emission reduction targets.

In this context one should recall that the aim of developing countries is to develop. At present, the example that they are set by many developed countries is that being developed means having high *per capita* greenhouse gas emissions. Moreover, they are constantly told by some countries, notably the USA, that cutting emissions will be hard and that it may be necessary to offset emissions abroad. This is precisely the wrong message to send if one wishes to involve developing countries in a global effort to cut emissions.

At least some developed countries need to take the lead in reducing their emissions substantially in order to demonstrate to both developed and developing countries that low emission futures are not only possible but easily achievable and beneficial in both environmental and economic terms. The UK, with EU partners such as Austria, Denmark and Germany, is particularly well placed to take such a lead and should do so. This would not only help the global climate system and increase the prospects of global participation in reducing emissions but would also place the UK in a more competitive position than countries that had failed to take such action.

Indeed, regarding the second possible interpretation of the line of the Committee's enquiry (b), the *RSPB believes that the policy options outlined in the consultation are unlikely to either distort markets or result in lost competitiveness. We consider that most of the main policy instruments mentioned (increased use of renewables, increased use of CHP and increased car fuel economy) are likely to result in increased economic efficiency and competitiveness.* The new technologies involved should help to place the UK in a better economic position in the future.[1]

The role of the Climate Change Strategy as the first step towards greater reductions in emissions in the longer term, i.e., beyond 2010, with particular reference to the need for behavioural change

The RSPB considers that the strategy put forward by the Government should, if implemented, achieve its targets. However, we regret that a longer-term strategy is not mooted, at least in outline. We welcome some

[1] The only major policy mentioned in the consultation that will drive up prices is the vehicle fuel duty escalator. his will not, however, result in general price increases of an order that would adversely affect our international competitiveness. Moreover, its effect has been largely offset in recent years by falls in world oil prices, a disadvantage from an environmental perspective. In addition, it is not contentious from a party political point of view—having been introduced by the previous government and adopted by the current one.

statements in the consultation that imply a longer-term strategy, such as paragraph 128 which points out that the trend for road traffic growth needs to be reversed as opposed to merely reduced, as mentioned in the Integrated Transport White Paper. Nevertheless, comprehensive sets of options for longer-term emission reductions to 60 per cent or more below 1990 levels need to be set out now so that full consideration can be given to the behavioural and structural changes that will be needed.

Most of the policies given in the consultation can, in fact, be extended in the longer term to attain ever increasing emission reductions. For example, increasing employment of renewable forms of electricity generation and Combined Heat and Power (CHP) could play a very large part in achieving large, long-term emission reductions.[1]

However, it will not be possible simply to put in place ever increasing generating capacity based on these sources. Many forms of renewables, other than those based on burning, such as biomass, give a fluctuating or intermittent supply. Far more consideration thus needs to be given to electricity storage if generation from sources such as the wind or sun are to be used on a large scale. Also, some technologies with huge long-term potential, notably solar, are not widely implemented at present, largely because of the relatively high present cost of photovoltaics. Thought thus needs to be given as to how to overcome such problems. Similarly, it is not possible simply to continue to increase CHP capacity because, to be efficient, CHP plant needs to have its heat distribution network fairly nearby and this is not always possible.

The RSPB is also concerned about the implementation of any electricity generation and supply policy. All forms of generation can have adverse impacts on wildlife and their habitat if poorly implemented. We thus need to see in place well thought out rules and guidelines that take into account the impacts of any new generating plant or distribution systems.[2]

In addition to electricity generation and supply, much more consideration needs to be given to energy efficiency in both the short and long term. Although governments can help increase efficiency by various financial means, significant changes in public awareness and behaviour are also needed. Most of the domestic and business sectors are very energy-inefficient compared with many of our European neighbours.

The specific, quantified transport related policies outlined in the consultation are not suitable for the longer term even if they represent a good first step. *A major switch away from road and air travel is needed to have any significant effect on transport related emissions.* Incremental increases in fuel prices and vehicle efficiencies will help but will, by themselves, be insufficient.

The Government's timetable for producing and implementing its Climate Change Strategy

The timetable appears reasonable in light of the objectives. However, the policies need to be implemented rapidly without undue delay.

The role of different sectors of the economy in meeting the emission reduction targets and the merits of sectoral targets

The Government proposes taking action mainly in the Energy Supply and Transport sectors. Whilst this makes sense, and the Energy Supply sector overlaps with others, it would be better if it proposed specific policies and measures for a wider range of sectors. If the UK is to achieve longer term emission reduction objectives of about 60 per cent such action will be essential and outlining a few objectives now would help, as mentioned above.

Specifically, the Government need to focus more on energy efficiency measures in the Domestic and Business sectors, especially small and medium sized enterprises that tend not to be very energy intensive and thus see little financial need to save energy.

Much more attention should also be paid to emissions from transport. The Integrated Transport White Paper will help in limiting emissions from road transport, as will the policies outlined in the climate change consultation. More specific measures will, however, be needed to have a significant effect in the longer term. An area of especial concern is aviation because of the extremely rapid rate of growth in aviation-related emissions. *The Government should push hard for the resolution of the aviation emissions allocation question* in the Climate Convention's Subsidiary Body on Scientific and Technological Advice (SBSTA). It could then move to the abolition of the tax-free status of bunker fuels and the imposition of a levy on them.

The policies from the consultation paper on Climate Change Strategy which will be required to meet the UK's legally binding target for the basket of six greenhouse gases and the domestic target for carbon dioxide emissions

To be reasonably sure of reaching both its EU burden-sharing target of 12.5 per cent and its 20 per cent carbon dioxide target the Government needs to implement all of the policies outlined in the consultation. If this is done both targets should be fairly easy to attain.

[1] The RSPB gives its views on specific aspects of the consultation in detail and at greater length in our submission in response to the consultation. Our submission is available from John Lanchbery at the RSPB.

[2] The RSPB have its views on renewables and impact assessments at greater length in our submission to the Royal Commission for Environmental Pollution's study on energy and the environment. The submission is available from John Lanchbery at the RSPB.

It could be argued that the UK might then overshoot its targets but this should be the aim. To be sure of meeting its legal obligations it is clearly better to play safe. It would also be best, if anything, to overachieve its domestic target. This would send the right type of signals (outlined above) to both developed and developing countries. It would also put the UK in a better position to attain future targets and should increase our competitiveness.

The uncertainties involved in emission projections and the impact of policies on these projections

It is not clear from the consultation paper precisely where many of the more important projections originate. The details of the DTI Energy Model are, for example, not yet available and the basis of the transport related projections is not given. It is thus hard to given an accurate answer to this question.

On the basis of our own assumptions, we estimate that the projections are probably reasonable. (For details see the RSPB's submission to the Government, forthcoming.)

The mechanisms required to monitor the effectiveness of policies in reducing emissions

The basic mechanisms for monitoring the effectiveness of policies already exist. Both under its EU and Climate Convention obligations, the UK is required to report annually on its greenhouse gas emissions which are disaggregated in some detail, well below the sectoral level. It is thus possible to obtain a fairly good idea of trends in particular areas. Opening up the electricity supply market to competition should further enhance data availability and transparency in that sector. The extent to which particular policies influence particular trends is often less clear but is likely to remain so because of difficulties in unravelling the effects of different parameters. On a positive note, it should be stressed that under successive Governments, the UK's reports on the effectiveness of its policies, as communicated to the Climate Change Convention, have been the best in the world. Having said this, incremental improvements in monitoring could and should undoubtedly be achieved.

The extent to which "flexible mechanisms" should be used in achieving the legally binding target

The RSPB believes that initially emphasis should be on direct emissions reduction at home. For that reason we favour the early implementation of a domestic energy tax with a domestic, or perhaps EU-wide, emissions trading scheme being implemented later. Any domestic system of emissions trading would need to be compatible with any negotiated at the international level, which may take a long time. We are thus concerned that favouring trading rather than a tax would result in delays in attaining emission reductions at home.

We also consider that while flexible mechanisms do have a role to play, that role should be limited, probably by a cap along the lines proposed by the European Union. This is because *the environmental benefits of flexibility mechanisms at the international level are doubtful in a situation where emission reduction targets are inadequate.* Both the UK and EU acknowledge that the Kyoto targets are inadequate to achieve the aims of the Climate Convention. The UK should thus, presumably, aim to exceed its target in order to gain maximum environmental benefit. Transferring the emissions reductions in excess of its legal but inadequate target to another country in order to help that country NOT to meet its inadequate target is perverse from an environmental standpoint and will send the wrong message to developing countries. This is why domestic action is so important.

We have a number of more detailed reservations about the practibility of the flexibility mechanisms outlined in the Kyoto Protocol but might support them if sufficiently rigorous rules and guidelines for their operation can be negotiated.

Specific concerns about trading include a fundamental one about the way in which a trading regime would be established under the Protocol. For example, in any effective trading scheme the allocation of credits or permits really needs to be undertaken by an independent, authoritative body, with compliance being assessed by a similar body which also has the power to enforce compliance. (In the case of the effective US sulphur dioxide scheme, for example, these roles are played by the US Government.) In the Protocol, the targets, and hence "credits", as set by Parties themselves at different levels. Also, there is no international body with the power to enforce the compliance of, say, the USA, EU or China. It is thus questionable whether such a regime will be effective. It is, for example, doubtful whether the US SO_2 scheme would work well if the participating firms set their own targets and oversaw their own compliance—which is the likely outcome for an international regime under the auspices of the Kyoto Protocol.

A number of detailed questions concerning the uncertainty in estimates of emissions raise considerable doubt as to whether trading, joint implementation (JI) or clean development mechanism (CDM) projects could cover more than a fairly limited range of gases from specified sources. This is particularly the case for emissions trading at the international or domestic levels. For both JI and CDM projects it will be essential to lay down precise criteria for ascertaining "additionality", that is for establishing what Parties would have done in the absence of a particular project. Determining precisely what might have happened is always likely to be hard.

The economic and other cost options in the Climate Change Strategy

Here it is worth making a general point. *A feature of the Strategy, and indeed almost all analyses of the costs of climate change worldwide, is that they only identify climate change mitigation costs (the costs of reducing*

emissions) without offsetting them against the costs of adapting to climate change. Whilst it can be reasonably argued that adaptation costs are often hard to estimate and are, perhaps, out of place in the consultation document, their omission tends to give credence to the view that mitigation is costly. In all papers concerning climate change mitigation at least some indication should be given that adaptation cost are likely to be high. Otherwise, the reader is likely to have an unbalanced view of the relative costs of either doing something about climate change or doing nothing.

Quite apart from its general environmental concerns, the RSPB is extremely worried about the costs that it may have to meet as a result of climate change. We are responsible for a large number of nature reserves on which we conserve both common and rare species of birds and other wildlife. According to previous estimates published by the Department of the Environment, about half of the statutorily protected wildlife sites in the UK are likely to be affected by climate change by about 2020.[1] If there is significant climate change the continued existence of our reserves is thus threatened.

In particular, the RSPB has many reserves that are susceptible to inundation from sea level rise and increased storminess. We are thus extremely concerned about their future and the future of the birds and other creatures that depend upon them. The following example illustrates one of our many specific concerns.

The bittern is increasingly rare in the UK and is included in the priority species list of the UK Biodiversity Action Plan. There are only about 14 pairs of bitterns left, mostly on RSPB coastal reserves. In addition to the severe pressures that they are already under, their existence is thus further threatened by sea level rise caused by climate change.

To save bitterns and many other species, including migratory ones, alternative habitats to those threatened by the sea must be provided.[2] The RSPB is currently undertaking a number of habitat creation schemes but these are extremely costly, on the order of millions of pounds. *For the RSPB, and for many other organisations, the costs of adapting to climate change are thus extremely high both in monetary terms and in terms of species that are likely to be lost.*[3]

John Lanchbery

Energy, Transport and Climate Change Policy Officer

5 January 1999

Memorandum by the Road Haulage Association Ltd (RHA) (CC 18)

UK CLIMATE CHANGE PROGRAMME

INTRODUCTION

The Road Haulage Association (RHA) was formed in 1945 to look after the interests of haulage contractors in various areas of the country, in effect, amalgamating local organisations that had been established. The association has subsequently developed to become the primary trade association representing the hire-or-reward sector of the road transport industry. There are now some 10,000 companies in membership varying from major companies with over 5,000 vehicles down to owner-drivers.

Our response concentrates therefore on the primary measure introduced within the transport sector—i.e., the Government's fuel duty strategy—and the economic and other costs associated with that policy.

The Fuel Duty Strategy

The RHA accepts that there is a need for the Government to introduce measures to reduce emissions of greenhouse gases as part of its programme for tackling Climate Change. We also believe therefore that it is necessary to introduce measures aimed at encouraging greater awareness of fuel consumption and thus improve the fuel efficiency of vehicle movements.

At present the primary measure introduced in order to achieve this is the strategy of a minimum 6 per cent real price increase in fuel duty each year, otherwise known as the Fuel Duty Strategy. The Government believes that the strategy *"provides both vehicle manufacturers and drivers with a clear, long-term signal about the need to develop and purchase more efficient vehicles, invest in maintenance, and adopt a more efficient driving style".*

Whilst there is some obvious logic in this general approach, it is becoming clear that there are some very significant problems associated with it. Firstly, real questions are now being asked as to whether there is any

[1] Review of the Potential Effects of Climate Change in the United Kingdom, Department of the Environment, HMSO, March 1996.
[2] Many of the bird species that migrate to or via the UK spend their summer in the circumpolar regions. According to the IPCC, these are amongst the most susceptible to significant climate change. The extremely fragile habit in such regions is therefore likely to change considerably, threatening many of the UK's migratory bird species.
[3] The Environment Agency estimates that the costs of replacing freshwater and brackish habitat in SACs and SPAs threatened by sea level rise will alone be between £50 and £60 million at current prices.

real evidence that the policy has had an impact on behaviour. Even in relation to motor vehicles such evidence is scant. And secondly, some types of vehicle traffic are affected more directly than others.

Competitiveness of the UK haulage industry

The haulage industry is a prime example of where the fuel duty strategy falls down in practice. The main reason for this is that unlike private motorists, haulage companies do not have the same choice over how, where and when to make their journeys. These details are dictated by the customer and, by extension, by the consumer. Increasing the cost of fuel therefore does not affect the decision to make a journey—it simply increases the cost of that journey. This clearly has adverse implications for the UK economy, but it also places UK haulage companies at a competitive disadvantage relative to their European counterparts.

The UK has by far the highest duty rates for diesel in the whole of the EU to the extent of it being double that imposed by some Member States. Until 1998 it was arguable that this disparity between UK and European diesel fuel pricing had little practical impact on the haulage industry in that all hauliers shared the same cost base and therefore suffered no competitive disadvantage. There was of course, even under these circumstances, a consequence in terms of increased consumer prices given that the increases in the cost of fuel, which often represents up to 35 per cent of total haulage costs, were inevitably passed on through the supply chain—if only because operators in the industry are forced to work on extremely small margins.

However, in July of last year the remaining restrictions on cabotage were removed. As a result, foreign-based hauliers are permitted to compete for domestic services within the UK whilst purchasing their fuel and paying Vehicle Excise Duty (both at much lower rates) abroad. The competitive disadvantage that this creates therefore applies to the whole of the UK-based haulage industry.

The RHA commissioned research in 1998 to examine the implications of this problem. The research by the Centre for Economics and Business Research Ltd (CEBR), found that the relaxation of the cabotage rules combined with the ever increasing rates of diesel duty will lead to the loss of more than 26,000 jobs in the industry by 2002 with substantial knock-on effects for GDP (loss of nearly £1.5 billion in 2002) and for revenue to the Treasury from reduced fuel purchases (loss of £1 billion in 2002). A copy of the report is attached for reference.

If no action is taken to rectify the problem, the UK will find itself in the bizarre position of having just as many journeys made by road goods vehicles, with just as much fuel being consumed and just as much pollution being emitted in the UK but with none of the (economic) benefits since the journeys will all be made by foreign-based hauliers.

Prospects for "flagging out"

Concern about this issue is at such a level within the industry that increasing numbers of RHA members are seriously considering combating the massive disadvantage they suffer in relation to VED (more than £3,000 for a 38/40 tonne combination on 5 axles in the UK compared to less than £500 in France) by "flagging out" their businesses abroad—mirroring the situation that currently prevails in the UK owned merchant Shipping Fleet. The RHA is currently conducting thorough research into the practicalities of "flagging out" based on initial legal advice which suggests that such a practice is legally possible within the Single Market.

The widespread "migration" of the UK haulage industry would not only have serious economic implications (on top of those described above) but would also undoubtedly impact on road safety as the Government would lose at least some of the control it currently exercises (through the DETR's Traffic Commissioners) over the way in which the industry maintains standards.

The need for a different approach

The RHA believes that the Government must recognise that the UK haulage industry, like the aviation and shipping industries, can no longer be considered in isolation. The Government does not apply the fuel duty strategy to aviation fuel precisely because it accepts that the impact on competitiveness and on the economy would be huge. The haulage industry must be considered in the same vein.

Of course tackling the problem for haulage is not as simple as it is for aviation since diesel is also used by vehicles that are not involved in the haulage industry (i.e., private cars). However the RHA believes that there is a relatively simple solution to the problem which has the potential to bring significant advantages—the Essential User Rebate (EUR).

The principle of the scheme is similar to that of the Fuel Duty Rebate (FDR) for stage services provided by buses, although the EUR would be much simpler to administer than the FDR. Under the EUR, essential users would be able to claim a rebate on fuel used for all valid business journeys of 20.9 pence per litre. For the purposes of the scheme, "Essential users" would be defined as properly qualified, professional hauliers i.e., those currently falling within the Operator Licensing system.

The most significant benefit of the EUR is that it would create more of a "level playing field" for UK hauliers thus preventing the loss of jobs and the associated impact on GDP and revenue lost from fuel being purchased

abroad. However, the RHA believes there would also be significant road safety benefits since the opportunity to claim a rebate on fuel would act as an incentive to operators to comply with all relevant operating requirements.

It is important also to note that the scheme would have no net effect on the Government's climate change plans. As previously mentioned, the existence of the fuel duty strategy does not affect the demand for journeys by hauliers and it has no impact whatsoever on foreign-based hauliers since they do not purchase fuel in the UK. Thus if an EUR were to be introduced, the same number of journeys would be made in the UK with no more pollution (including carbon dioxide) being emitted, but with the Government in a position to prevent the loss of 26,000 jobs.

The same argument applies to the assertion that the rail freight market would be disadvantaged by a reduction in costs for road freight. Such a disadvantage will occur whether or not an EUR is introduced because foreign-based hauliers will be able to offer rates (for contracts) that neither the UK rail freight operators nor UK hauliers will be able to match.

Other measures

Whilst the RHA believes that the Fuel Duty Strategy is in practice irrelevant for the haulage industry, we do believe that there are other ways in which the industry is improving its environmental performance. Operators are paying increasing attention to ways in which they can improve the fuel efficiency of their businesses, not only because this is good for the environment but because it also makes sense commercially. Thus we are seeing companies utilising computer systems to reduce empty running and to plan journeys more effectively, investing in driver training because it reduces accidents (and therefore the amount of time the vehicle is out of action) and fuel consumption, and even co-operating with other companies on particular contracts.

With its business partner, Road Tech Computer Systems Ltd, the RHA is currently offering all members a year's free access (worth £365 + VAT per annum) to its Internet "Backload" service precisely to encourage more operators to improve profits whilst reducing empty running. It is worth noting that the availability of such technology in recent years has led to a decline in the percentage of vehicles running empty.

In addition the RHA welcomes the Government's efforts to encourage more freight to go by rail and water—although we do not believe that this will necessarily lead to a significant reduction over time in the amount of journeys made by road—and we welcome research into and measures to encourage alternative fuels.

CONCLUSIONS

Whilst the RHA supports the Government in its efforts to tackle climate change, it is important that the policies introduced are examined thoroughly and reviewed regularly to ensure that they do not have unforeseen adverse consequences. UK businesses rarely compete only with other UK businesses—increasingly they are involved in operations throughout the EU and beyond. Any action which increases the tax burden on UK companies relative to their foreign counterparts, will not only be damaging to the economy as a whole but may also—as in this case—actually add to the problem which the policy was originally designed to address, rather than reducing it.

January 1999

Memorandum by the Centre for Business and the Environment (CC 19)

UK CLIMATE CHANGE PROGRAMME

The first point in the Committee's Press Notice notes that the Committee will wish to examine "the desirability of the options contained in the UK Climate Change Strategy in the light of non-EU countries commitments". This memorandum concentrates on this issue.

I have followed the global warming debate for over 10 years, initially as an employee of British Coal, who were concerned about the impact on their future markets, and more lately for the Centre for Business and the Environment on behalf of clients in the UK electricity sector. I have attended most meetings of the Intergovernmental Panel on Climate Change since 1990 and of the UN Framework Convention on Climate Change since the First Conference of the Parties in Berlin in 1994. The meetings have brought me into contact with a wide cross section of delegates and observers from around the world. Based on discussions with these contacts, I consider that there is a distinct possibility that the American people (and hence their politicians) will balk at the thought either of giving Russia $10–50 billion/year to buy "hot air" (for no environmental gain) or of changing their own lifestyle sufficiently to meet their Kyoto target. (I read that US sales of small trucks, which are not subject to the same regulations as cars, now exceed car sales). Thus there is a distinct possibility that the Kyoto protocol will not be ratified by at least one of our major traditional competitors in addition to the

main provisions not applying to newer competitors like South Korea and China. This is essentially acknowledged in the first point of the Press Notice.

In the light of this, UK policy should seek to improve the efficiency and hence the competitiveness of British industry, and not to penalise it for necessary emissions. There is no environmental gain globally if carbon intensive UK industry is closed down and the capacity is replaced by competitors in the US, Korea or China. There can be no scope for a carbon or energy tax on industry, as Lord Marshall advocates, as this adds costs directly to UK companies, but not to many of our overseas competitors. Energy intensive industry would be the hardest hit, and where these are already operating efficiently, the scope for reducing emissions and the burden of the tax would be limited. The government has accepted the need not to damage competitiveness (paragraph 15 of the Consultation Paper on the UK Climate Change Programme). It should also accept that carbon or energy taxes on industry are not the way forward.

Paragraphs 94 and 95 of the Consultation Paper note that there is scope to extend the use of voluntary agreements by the business sector and this approach is to be commended at this time. The objectives should be firstly to oblige businesses to identify their emissions of the various greenhouse gases, secondly to oblige them to examine carefully what actions to reduce or to limit emissions can be undertaken at reasonable cost and within a reasonable timescale, and thirdly for businesses to offer an undertaking to reduce or to limit emissions within an agreed timescale. It would be up to businesses to argue their case with government, who would be expected to monitor the outcome. This approach would stimulate improvements in the efficiency and competitiveness of UK industry without burdening it with unnecessary costs.

Paragraphs 104–108 of the Consultation Paper discuss emissions trading and this could be one of the longer term mechanisms for reducing emissions assuming that the Kyoto Protocol is ratified and comes into force. It is clearly appropriate that the possibility of a trial system should be examined at this stage and for such a pilot scheme to go ahead quickly if the practical issues of design can be overcome (as paragraph 105 of the Consultation Paper discusses). The Consultation Paper notes the possibility of first mover advantage to UK firms including establishing the City of London as a centre for trading by the time the international scheme is launched. This is to be welcomed.

The international competitive issues discussed above do not arise with the domestic and, to a large extent, the transport sectors. A mixture of regulation and taxation would be appropriate here.

Finally, those of us who have participated in energy and emissions forecasting over the years know that they can be subject to a high margin of error. This would particularly apply to emissions from the transport sector which are dependent on the success of government policy, and it would be regrettable if failures in this sector required government to place additional burdens on the industrial sector.

Dr Ken Gregory

5 January 1999

Memorandum by Biffa Waste Services Limited (CC 20)

UK CLIMATE CHANGE PROGRAMME

Biffa is the third largest waste management company operating in the UK—it is the largest wholly British owned waste management company and can justifiably claim to be the most diverse in terms of its spread of interest in industrial/commercial and domestic collection, landfill, liquid waste stream and specialist hazardous waste management systems. The company has a turnover in the region of £250 million at a current annualised rate and is in the top three waste management companies operating in Belgium. We are a wholly owned subsidiary of Severn Trent Plc—ranked in the FT 100. As such we can claim to be a full environmental services management operation with experience in mainland Europe as well as the UK.

1. *The desirability of the options contained in the UK Climate Change Strategy in the light of non EU countries commitments*

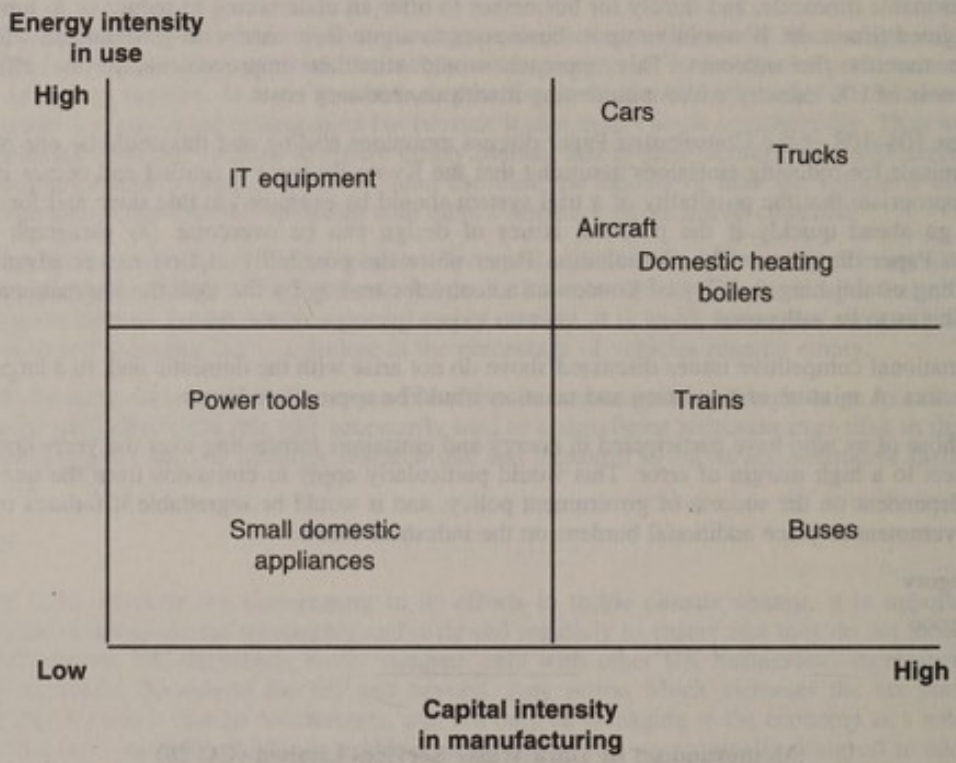
Given the growing evidence of the impact of carbon emissions to atmosphere and the uncertain impacts, reluctance on the part of UK Government to develop a suitable framework for dialogue with all stakeholders in society would be folly. Initiatives should be targeted on the same lines as the options outlined in the Climate Change Strategy document.

Britain has a high population density with an established infrastructure of logistics, academic excellence and stable political framework which—in combination with the right policies—could give *us a substantial competitive edge in the development of appropriate technologies, equipment and process systems* to anticipate the threats of global warming. The strategy should be sold on a positive rather than a reactive basis and provide a basis for future commercial prosperity.

2. *The role of the Climate Change Strategy as the first step towards greater reductions in emissions in the longer term, i.e., beyond 2010, with particular reference to the need for behavioural change*

Thus far much thinking in this area has been fragmented, localised and subject to lack of co-ordinated agreement on the technical and academic justification. In consequence much of the reaction has been negative or resulted in initiatives from industry to neutralise or negate piecemeal policies. There is an urgent need to move away from "end of pipe" strategies to more holistic, integrated frameworks involving substantive redevelopment of joint sectoral responses—a point we expand on in question 5.

The holistic decision is whether the best trigger for shifts in consumption behaviour—regardless of the fuel input decisions made—are best made by the retailer of energy or the retailer of the energy using device. A matrix approach could be adopted to assess the best methodology for specific products as exemplified. Thus . . .



From our experience with a wide range of waste generators (and their industry representatives) a fundamental shift in the paradigm of performance for CO_2 reductions will only come from a reassessment of process and technology redesign.

3. *The Government's timetable for producing and implementing a Climate Strategy*

By definition time tabling issues are very much a question for industry sector round-tabling. Reference to our response on question 5 *(q.v.)* emphasises that timing issues are strongly linked to existing pricing, profit, capital investment and cash flow issues in specific industry sectors on a national and international basis. The only common theme running through these challenges is that industry needs:

(i) As much warning as possible.

(ii) Involvement in the development of a timetable for action.

(iii) Concise agreement on final targets by defined dates.

(iv) Guarantees that successive *Government administrations (regardless of political complexion) will enforce* and apply previously agreed targets and take *strong action against freeloaders* (whether national or international competitors).

Environmental issues flow through a wide range of Government departmental areas of interest. *Closer integration is needed between the DETR, DTI and Treasury if their appropriate Ministers are to shape a more holistic approach* to climate change specifically and resource management end life issues in general. Suitable mechanisms are emerging in the form of the Foresight Programme and similar initiatives but their *ad hoc* nature is a limiting factor.

Key initiatives needed from such integration are:

(i) Prioritisation on carbon impacts in the context of whole life (as well as manufacturing impacts) for industrial and consumer capital goods.

(ii) The development of innovative round-tabling mechanisms involving the appropriate Government bodies (above) together with industry sectors, NGOs, local Government and waste management sector.

(iii) The emergence of integrated fiscal policies underpinned by the likelihood of cost neutrality in the short term as relevant industry sectors introduce efficiency measures to move from one environmental paradigm to a higher one.

(iv) Research and development programmes operating in conjunction with the academic and other sectors—with or without focused financial support—prioritised on the basis of CO_2 impacts in specific sectors.

(v) A combinantion of fiscal instruments and Tradeable Permit regimes developed in conjunction with a timetable acceptable to affected user segments.

(vi) An identified programme of revenue flow offsets to offer comfort to the Treasury that fiscal mechanisms will not impact on wider macro economic budgetary objectives.

4. *The role of different sectors of the economy in meeting emissions reductions targets and the merits of sectoral targets*

Environmental fiscal instruments—of which carbon taxation is an element—comprise a range of existing and potential economic instruments to influence behaviour. For the purposes of this submission these are considered in the following categories:

— "end of pipe" fiscal instruments;
— virgin input taxation;
— tradeable permits;
— Producer Responsibility for funding end of life material reclamation.

The mixture of these four broad instruments is vital in so far as the effect can be accelerated or blunted according to the following key factors present in a particular industry. For environmental purposes those distinctions can be built around the following broad issues:

(i) The need to scrap existing methods of operation and reinvest (or not) in new reclamation reprocessing and manufacturing equipment.

(ii) The environmental mass/toxicity impact of a particular sector. To explain this assertion the following examples are offered of industries requiring different mixtures of instruments:

CATEGORY A

—those with relatively low mass of material throughputs, low toxicity impacts but high energy implications.

The obvious examples are the glass and aluminium reprocessing sectors. These amount to around 2.1 million tonnes of output in the economy, are high consumers of energy when running on virgin inputs but—in terms of what they produce—are relatively low polluters in so far as the material is inert. The best combination of instruments for these areas are virgin input taxes (to encourage re-consumption of recovered materials), carbon taxation (to encourage lower energy inputs on reclaimed material) and—to a lesser degree—Landfill Taxes (in so far as they impose a disposal cost on users of the material). The important feature is that these products face marginal or zero capital investment implications in terms of switching their existing capacity to the reuse of reclaim material.

CATEGORY B

—industries with high forward investment costs for operating with reclaim material, low mass and low toxicity.

Examples include the plastics and electronics sector. Landfill Taxation is relatively useless in this area due to low mass. Producer Responsibility and tradeable permits are far more effective coupled to energy taxation

because of the high blocked in energy content in manufacture. Tradeable permits might apply for direct recovery and reuse and are more appropriate to encourage reinvestment in new reprocessing/remanufacturing systems by placing an economic cost on the failure to achieve target reclaim levels.

CATEGORY C

—sectors facing relatively high future reinvestment costs in new end life reprocessing plant with high mass but low toxicity of products.

The most appropriate example is fibreboard. Landfill Taxes are most appropriate given the high mass implications and the need to shift segregation and sortation behaviour in the user base to make available large quantities at low cost. Carbon taxes may be relevant but these will influence the process production techniques rather than investment decisions on new plant since energy efficiency is already a key factor. Producer Responsibility is frustrated by the diffused supply chain.

CATEGORY D

—sectors where forward investment to run on reclaimed rather than virgin inputs is probably negative (plant can be scrapped) but material streams are high mass and low toxicity.

The classic example here is the aggregates and construction sector where Landfill Taxes and virgin input taxes will have effects of far greater significance than tradeable permits or energy taxation, diverting waste from landfill into reuse applications.

CATEGORY E

—low mass high toxicity sector streams.

Examples embrace the household hazardous materials plus insecticides, pharmaceuticals etc., Landfill Taxes will be of marginal significance—Producer Responsibility and tradeable permits will accelerate action—not so much in reprocessing technology areas or energy use but rather in influencing a preparedness to invest in return logistics infrastructures (which have not been created thus far). Energy taxes in this area are unlikely to be of direct relevance given the low cost to turnover ratio and the sector round-tabling can thus be refocussed on retrieval rather than energy.

5. *The policies from the consultation on Climate Change Strategy required to meet the UK's legally binding target for the basket of six greenhouse gases and the domestic target for carbon dioxide emissions.*

The particular style and approach of so called carbon taxes needs to take account of the different types of instrument best suited to particular types of industry sector (see question 4). The key issues are:

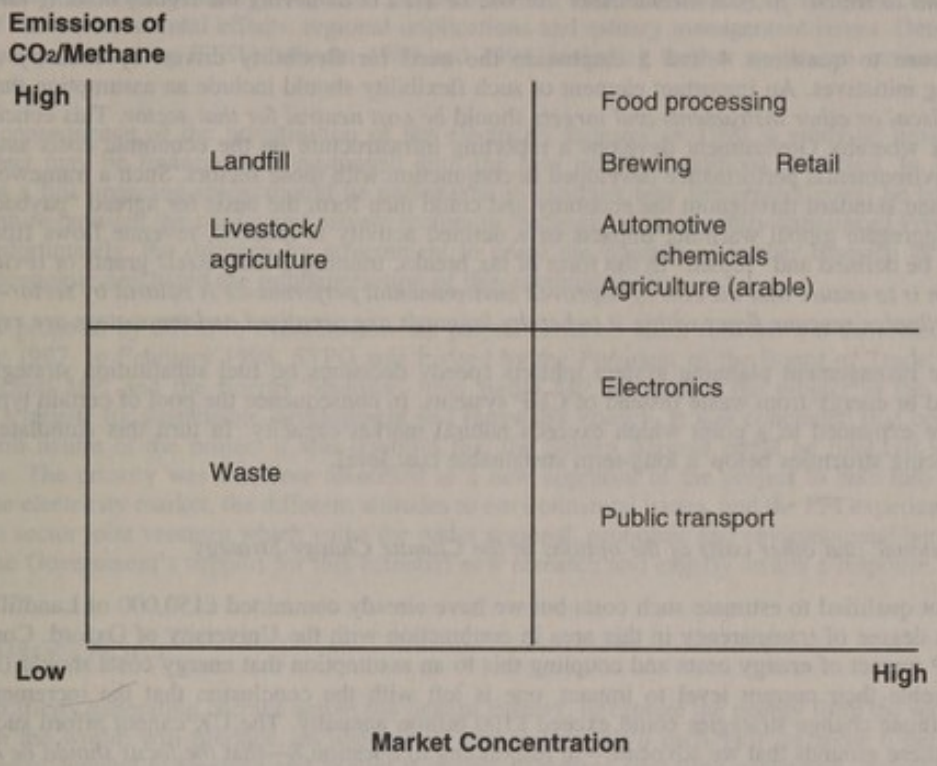
- future investment needs for shift in sustainability performance;
- labour intensity;
- the mass and toxicity impacts of an industry sector.

Provided time is spent on the development of adequate time scales (whereby targets are set in graduated reductions) industry will find it easier to cope. In an oligopolistic/highly competitive structure (automotives, chemicals, retail for example) such a period could be relatively short on the assumption that five major companies occupy 80 per cent of the market. In fragmented sectors where five top players occupy 40 per cent of less of the available market more warning would be required simply because information systems would take longer to develop. The use of sector based compliance schemes in the latter may assist clarity of targets.

This function of market concentration can be coupled to the target industry sectors responsible for high CO_2 emissions. The matrix suggests a methodology for identifying relevant sectors by way of example . . .

High emissions/high market concentration is a natural start point (top right).

An innovative approach could be exemplified by the need to achieve *fuel reduction through process redesign.* In the case of private fuel consumption this might be best achieved by making car manufacturers responsible specifically for the total tonnage of fuel inputs to their vehicles for private and commercial use. Thus Ford or General Motors would be given a tonnage allowance for fuel consumption by all models of their make of whatever age throughout a base year. (Such a figure might be based on the first year roll out sale of litreage by marque.)



The technology provider—in this case the car manufacturer—is in the best position to influence car fuel efficiency consumption. Data collection could be made the responsibility of the petrol retailers through adaptation of their software handling systems data management. Tradeable Permits can easily be adopted to encourage internalisation of externalities. Costs of this exercise—in terms of tradeable permits, administration, etc., would be passed to the consumer through the normal working of the market or one off rebate to retailers for costs of the exercise. Manufacturers are not limited to numbers sold in any way.

6. *The uncertainties involved in emissions projections and the impact of policies upon those projections*

Better measurement standards are key. Substantial sums of Government funding are committed to universities and research bodies each year—these need to be synchronized and co-ordinated between DTI/DETR and other funding bodies so that *overlaps are minimised.* We need defined centres of excellence for specific technology areas (power generation, consumer electronics, transport, etc.).

Such research initiatives should be targeted at defining target levels of performance for their appropriate sphere of excellence which then in turn form the basis of bench marking for target performance.

We have a particular interest in relation to methane impacts as an operator of 24 landfill sites accepting around 4 million tonnes of end life material inputs each year, of which around 50 per cent contribute to methane generation—which in our case amounts to 75,000 tonnes per annum. We would be more than happy to become involved in dialogue with Government as to how our sector specific contribution to reductions could be developed within an integrated framework of fiscal, budgetary and Tradeable Permit initiatives.

7. *The mechanisms required to monitor the effectiveness of policies in reducing emissions*

Measurement systems are woefully inadequate in this area—as is the case in many areas of environmental reporting. Our recent publication—"Great Britain plc: The Environmental Balance Sheet" (copy appended)—was produced to underline this point.

Such policies presume a consistent, comprehensive analysis of carbon arisings throughout the economy in all subset end use applications. Analysis needs to be taken down to industry sector level and built from the bottom up on the basis of self-assessment systems originating at the level of the firm—initially companies listed as significant plcs in the Times Top 1000. This is in accord with Michael Meacher's exhortation on environmental mass balance reporting, particularly in the area of CO_2 footprints. Once such a framework is established, policy development and communication can be secured within a transparent framework prioritised on the basis of informed fact rather than hunch using agreed standards defined by ACBE, etc. Product bench marking (question 6) reinforces this approach.

8. *The extent to which "flexible mechanisms" should be used in achieving the legally binding target*

Our response to questions 4 and 5 emphasize the need for flexibility driven by industry sector based round-tabling initiatives. An important element of such flexibility should include an assumption that *any mix of budgetary, fiscal or other instruments and targets* should *be cost neutral for that sector*. This concept presumes a framework whereby Government develops a reporting infrastructure on the economic costs associated with improved environmental performance developed in conjunction with those sectors. Such a framework should be transparent and standard throughout the economy and could then form the basis for agreed "paybacks" to those sectors. If aggregate global warming impacts of a defined activity is reduced, revenue flows from any fiscal "sticks" can be defined and "repaid" in the form of tax breaks, training grants, R&D grants or reviews of VAT. *The intention is to ensure that the cost of improved environmental performance is neutral by sector—but policies drive redistributive revenue flows within it (whereby laggards are penalised and innovators are rewarded).*

The waste management planning system inhibits speedy decisions on fuel substitution strategies—such as tyres for coal or energy from waste instead of CHP systems. In consequence the pool of certain types of energy provision are expanded to a point which exceeds natural market capacity. In turn this stimulates a move to marginal pricing structures below a long-term sustainable cost level.

9. *The economic and other costs of the options in the Climate Change Strategy*

We are not qualified to estimate such costs but we have already committed £150,000 of Landfill Tax money to achieve a degree of transparency in this area in conjunction with the University of Oxford. Considering the current GDP impact of energy costs and coupling this to an assumption that energy costs should (in theory) be double or treble their current level to impact, one is left with the conclusion that the incremental costs of improved climate change strategies could exceed £100 billion annually. The UK cannot afford such a figure—and it is on these grounds that we advocate—in responding to question 8—that *the focus should be on how these on-costs can be managed on a regional and sectoral basis.* The emphasis should be on developing a strategy for redistributive effects of these on-costs so that the inflationary *macro-economic impacts are kept to an absolute minimum. Such an approach needs to be holistic and driven by the existing known loadings by geography and sector of origin*, underpinned by an assumption that redistributive measures reward the carbon efficient or compensate the socially disadvantaged from such a process.

Government tax and pricing strategy in past years has been confusing and unfocused. Pricing issues have been nullified by concerns in the social costing arena. The latter areas should be dealt with on a discrete, focused basis by *more effective targeting of disadvantaged groups in society.* Such support may not take financial forms—the net yield of higher energy prices could be accounted for transparently by funding specific initiatives in free insulation and energy reduction technologies for affected households.

Peter T Jones

Director—Development and External Relations

5 January 1999

Memorandum by the Severn Tidal Power Group (CC 21)

THE UK CLIMATE CHANGE PROGRAMME

INTRODUCTION

1. The Severn Tidal Power Group (STPG) is a joint venture between six of the UK's leading power engineering and construction companies.[1] It was formed in 1984 following publication of the favourable report of the Severn Barrage Committee[2] which identified the viability of an electricity generating barrage in the Severn Estuary to capture the energy form the world's second highest tidal range. STPG has been entrusted with the development of the Severn Barrage project ever since.

2. The Severn Barrage Committee was set up by government following the oil price crisis of the late 1970's to examine the engineering options and technical feasibility for the project, its contribution to the security of electricity supplies and the wider regional benefits that would ensue. The miners' strike and the Chernobyl catastrophe raised further concerns in regard to security of UK electricity supplies, and in 1986 a definitive £4.2 million study of the Severn Barrage was commissioned by the Secretary of State for Energy, funded jointly by the Government, the CEGB and STPG.

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[1] Members of the Severn Tidal Power Group are: Sir Robert McAlpine Ltd. Balfour Beatty Major Projects Ltd. ALSTOM Hydro Ltd. Rolls Royce Power Engineering Ltd. Taylor Woodrow Construction Ltd. Tarmac Construction Ltd.

[2] "Tidal power from the Severn Estuary"—Volume 1: Energy Paper 46; HMSO 1981.

3. This study, reported in Energy Paper 57,[1] confirmed the technical feasibly of the project and included discussion of the environmental effects, regional implications and estuary management issues. Detailed reports have also been published by ETSU between 1989 and 1994, including further studies on environmental and regional issues.

4. As a consequence of the privatisation of the electricity industry in 1990, a study of how the Severn Barrage Project may be financed was postponed until the new market conditions stabilised. In 1993, STPG proposed that a full financing study should be undertaken to examine how the project could be taken forward as a joint venture between the public and private sectors in the spirit of the recently announced Private Finance Initiative. Unfortunately, the decision by government to cease the funding of further research as tidal power appeared uneconomic precluded the implementation of this essential study.

5. A new proposal by STPG to examine how the project could be taken forward was submitted to the DTI in September 1997. In February 1998, STPG was invited by the President of the Board of Trade, the Rt Hon Margaret Beckett MP, and the Energy Minister, John Battle MP, to discuss the project in the light of the Government's targets for sustainable development and renewable energy. It was concluded that because of the very long term nature of the project it was doubtful that the Severn Barrage could be financed solely in the private sector. The priority was therefore identified as a new appraisal of the project to take into account the changes in the electricity market, the different attitudes to environmental issues, and the PFI experience of public sector/private sector joint ventures which value the wider regional, economic and environmental benefits. STPG has sought the Government's support for this essential new research and eagerly awaits a response.

The Severn Barrage Project

6. An electricity generating barrage across the Severn Estuary, to capture the energy from the second highest tidal range in the world, will produce, on average, 17,000 million kWh each year, or some 6 per cent of the annual electricity demand of England and Wales. If it were to replace coal fired generation, it would enable the UK to reduce its total annual CO_2 emissions by 16 million tonnes, approximately 3 per cent of the UK's carbon emissions from all sources. If detailed development of the project is commenced now, power would be available from around 2012, throughout the next century, and beyond.

7. The Severn Barrage is therefore the largest single renewable energy project able to make a significant contribution to UK electricity supplies in a reasonable time scale. When fully commissioned it would make a major contribution towards the Government long-term targets for renewable energy and the reduction of emissions of greenhouse gases.

8. The project will cost some £10 billion and require 200,000 man years of employment, representing 35,000 jobs at peak, many of which will be away from the barrage site in the manufacturing regions of the UK. The project will also bring significant regional benefits through the more benign conditions that will be created in the basin above the barrage and from a fourth crossing of the estuary. Substantial growth is anticipated in the Severnside region with an estimated 40,000 jobs being created.

9. In the light of the recent discussions at the Kyoto and Buenos Aires conferences, pollution free electricity from the Severn Barrage will be a valuable asset in regard to internal emissions trading, particularly if new coal fired stations are to be considered.

10. Unlike most other renewables, tidal power is predictable and with reasonable maintenance the Severn Barrage will have virtually indefinite life. Its contribution can therefore be planned within a comprehensive long-term energy policy.

Response to issues identified in the ETRA Committee's press notice 82/97–98 (19 November 1998)

The desirability of the options contained in the UK Climate Change Strategy in the light of non EU countries' commitments

11. World population is predicted to grow such that by 2020 nearly 85 per cent will be in the emerging nations. These people will demand the services that energy can provide: heating; cooling; cooking; lighting; mobility and motive power.

12. The demand for energy is therefore expected to double by 2020 in comparison with 1990 levels requiring that, if greenhouse gas emissions are to be stabilised, either this increase in energy must come from non-fossil fuel sources, or that carbon sequestration techniques are developed in conjunction with fossil fuel energy conversion technologies.

13. Development of appropriate technologies and strategies to meet the UK's own targets will enable British industry to export these technologies in the growing world markets, especially those of the emerging nations.

[1] "The Severn Barrage Project: General Report": Energy Paper 57; HMSO 1989.

14. Significant reductions in the UK's own emissions will enable it to play a leading role in emissions trading.

The role of the climate change strategy as the first step towards greater reductions in the longer term, i.e., beyond 2010, with particular reference to behavioural change.

15. The three most important elements of the climate change strategy are:

— to place greater emphasis on energy saving through improved efficiency and better energy management;

— to introduce controls to reduce the use of energy for transport, particularly the use of fossil fuels;

— to place greater reliance on the use of renewable energy for electricity generation.

16. People will continue to demand the services that energy can provide and government should not seek to restrict or regulate access to these services. Government's aim should be to educate and encourage people to moderate the way they use the services energy provides and to avoid unnecessary use, using price differentials, where appropriate. The main drive, however, should be towards research to seek ways whereby the services can be provided more efficiently and without waste.

17. The climate change strategy has three apparent weaknesses.

18. Firstly, it places too great an emphasis on the contribution that combined heat and power (CHP) installations may make. CHP can only show greater efficiency in energy conversion compared with individual heat and electricity generation when the heat and electricity loads are matched. This state does not normally occur continuously throughout the diurnal cycle and CHP is much less efficient than individual generation when generating with one mode dominant.

19. Secondly, the climate change strategy does not recognize properly the significance of the development of fuel cells which make use of the hydrogen cycle. These are now well advanced and by 2010 should be able to make a real contribution, particularly in the transport sector. The economic production of hydrogen by electrolysis will increase the demand for carbon-free electricity either from the renewables or from nuclear power.

20. Thirdly, the climate change strategy does not address the time scale for replacing the UK's ageing generating capacity (coal, oil and nuclear) much of which will be reaching the end of its economic life post 2010. Realistically, the only technologies capable of replacing this plant, in addition to gas, are the large scale renewables (e.g., off-shore wind and tidal power from the Severn), nuclear and "clean" coal. All but gas require some 10 to 15 years for design development, the UK planning process, construction and commissioning.

21. Gas-fired generating plant will produce electricity at about half the cost of these other options, although for the Severn Barrage, the cost of electricity generated following payment of the development and construction debt will about half that of gas.

22. Insufficient certainty in market prices, and thus also in rate of return for these high capital cost projects, suggests that the private sector may be unwilling to make the necessary investment and that intervention by government in the market will therefore be required.

23. Replacing generating capacity also requires consideration of environmental questions other than lower emissions of the greenhouse gases. Unless existing power station sites are used, as would be possible with nuclear power or coal, substantial infrastructure development is necessary. Moving from the present sites would also lead to loss of jobs, although new jobs would be associated with new locations. In the case of the Severn Barrage, the regional development opportunities associated with the more benign conditions in the barrage basin are estimated as creating an additional 40,000 jobs.

The Government's timetable for producing and implementing the Climate Change Strategy

24. See comments in paragraph 20 above.

25. Further research to establish which renewables can realistically make a significant contribution, taking into account the wider social, economic and environmental effects, is essential for long term planning and to generate business confidence to ensure the necessary investment is made.

26. For example, we understand that a study is being undertaken by the University of Liverpool's Centre for Marine and Coastal Studies to compare the environmental impact of tidal power from a single site in the Severn Estuary with the impact from the 15 or so off-shore wind power station sites that would be necessary to provide an equivalent installed capacity.

The role of different sectors of the economy in meeting the emissions reductions targets and the merits of sectoral targets

27. Tidal power from the Severn Estuary could provide some 6 per cent of the annual electricity requirements of England and Wales with no emissions of greenhouse gases, thereby saving some 3 per cent of

the UK's annual carbon emissions from all sources by comparison with coal. It is the only predictable renewable energy source able to make a significant contribution to the Government's targets within a reasonable time scale.

The policies from the consultation paper on Climate Change Strategy which will be required to meet the UK's legally binding target for the basket of six greenhouse gases and the domestic target for carbon dioxide emissions

28. See comments in paragraph 15 above.

The uncertainties involved in emissions projections and the impact of policies upon those projections

29. No comment.

The mechanisms required to monitor the effectiveness of policies in reducing emissions

30. No comment.

The extent to which "flexible mechanisms" should be used in achieving the legally binding target

31. Internal emissions trading would allow the carbon free electricity from the Severn Barrage to be matched with re-planted coal-fired stations, thus enabling some 15 per cent of the UK's annual electricity requirements to be generated with a net saving in carbon emissions of 3 per cent. Similar trading between replacement nuclear power and coal/gas would ensure that the targets are no more onerous to achieve when existing nuclear stations reach the end of their economic lives.

The economic and other costs of the options in the Climate Change Strategy

32. In paragraph 22 we suggest that intervention by the Government in the electricity market may be necessary to ensure that the best investments are made in regard to a long-term electricity generating policy. The necessary data on which to base informed decisions does not exist for many of the renewables, in particular, how renewable energy may be traded in a liberalised market and what is the full environmental impact of conversion for different energy sources.

33. If the wider social, economic and environmental benefits are to be valued, mechanisms must be established which properly reflect the long-term nature of these benefits and the "value for money" that accrues from them.

34. In the case of the Severn Barrage Project, no proper financing studies have been undertaken to establish the nature and extent of the public sector support required to ensure the project can proceed. A new appraisal of the project is essential to separate the infrastructure and regional benefits, including coastal protection, from the power generation aspects of the project so that the cost of electricity can be properly compared with that from the other major UK energy sources.

S J Taylor

Chairman, Management Board

5 January 1999

Memorandum by BP Amoco (CC 22)

UK CLIMATE CHANGE PROGRAMME

INTRODUCTION

1. Discussion between industry and government is essential for the development and choice of sound environmental instruments. BP Amoco wishes to concentrate in this submission on our belief that emissions trading will form an increasingly important part in successful climate change programmes of the future.

2. Sir John Browne, BP Amoco's Group Chief Executive, has underlined on a number of occasions BP Amoco's determination to take the issue of climate change seriously, and BP Amoco's acceptance of the need for both action and solutions. As he said previously:

— To be absolutely clear, we must now focus on what can and what should be done, not because we can be certain climate change is happening, but because the possibility can't be ignored . . . The action is not for governments alone. It is for government, industry and consumers, working together

and in parallel. I believe we all have a responsibility to take constructive, precautionary action." (Extracts from speeches on 19 May and 30 September 1997)

BP Amoco therefore fully accepts that industry must play its full part in helping to achieve the targets which have been agreed internationally to reduce greenhouse gas emissions. We have also set ourselves clear goals as a company with the objective of reducing our own carbon and other greenhouse gas emissions, and we are undertaking a number of steps which will help contribute to emissions reduction.

3. It is important that this takes place consistently with the needs of sustainability. This means paying attention to the imperatives of business efficiency and social cohesion as well as to the needs of the environment. If the wrong economic instruments are chosen for an environmental purpose, they will not only fail to achieve their environmental objective; they will simultaneously exacerbate social tensions, particularly by threatening employment and investment levels and damaging UK competitiveness. That is why it is also important that industry's contribution to reaching the UK's target is assessed in the overall context of the Government's approach to climate change at a national level and as part of a global and EU process. There is little point in seeking to make marginal additional gains at high cost from the industrial sector when there exist many significant untapped emission reductions options in the domestic and transport sectors.

4. BP Amoco accepts the compelling environmental reasons for reducing greenhouse gas emissions from industrial processes and activities. But BP Amoco does not accept that energy should be perceived as a "bad" deserving to be taxed for its own sake. While accepting that energy consumption can produce harmful emissions in addition to greenhouse gases, it is difficult to exaggerate the positive contribution which energy *services* (such as heat, light and mobility) have made towards creating and spreading wealth, adding to human basic needs and comfort and towards fighting disease.

EMISSIONS TRADING

5. BP Amoco's basic assertion is that emissions trading offers the best way forward, and would deliver the required environmental outcomes with more certainty and at less economic cost than taxation. An allowance trading system provides Government with a guarantee that a specific abatement volume of emissions will be achieved, through the acceptance by industry of caps on emissions. This aligns precisely with the Government's obligations under the Kyoto Protocol. Indeed, from an *environmental* standpoint, the caps are what matters; trading is simply a mechanism to ensure that the caps are delivered at least cost. The certainty provided by emissions trading is in marked contrast from environmental taxes where the resultant levels of emissions are unknown. Ultimately, trading can be extended to all greenhouse gases.

6. There are further attractions of an emissions trading system. It goes with the grain of business activity, rather than works against it. It means that rather than regard emissions reduction as an irritating distraction from the pursuit of new business opportunities or as a financial cost, it actually becomes a commercial opportunity in its own right. It also provides the best available safeguard against damaging the competitiveness of the companies and industries concerned. To some extent, a decision by government to achieve higher emission reductions than other countries imposes an automatic competitive threat in terms of higher costs, whatever means is ultimately chosen to implement the decision. But this cost will be minimised by emissions trading, while the choice of either regulation or taxes involves greater risks to companies' ability to compete in global markets.

7. BP introduced its own Pilot Emissions System which was launched in September 1998. It is our belief that this will enhance our and others' experience and understanding of emissions trading. The experience so far has shown that:

— environmental outcomes are delivered—and at lower cost than through alternative systems;

— the accompanying monitoring and tracking systems are not burdensome;

— the system acts as a spur to innovation.

8. Several practical obstacles to BP Amoco's Emissions Trading System have been identified. We have already resolved many of them, and we are confident of overcoming others. The basis of the scheme is that each participating Business Unit is required to ensure that its emissions are covered by permits for each annual compliance period, plus or minus purchases or sales of rights. There will be a penalty (designed to have a real internal BP Amoco impact) for failure to comply. Business Units will be permitted to bank unused permits at the end of the year for future use, but borrowing against a future year's permits will not be allowed. Trading is in carbon dioxide equivalent units, and will be limited to CO_2 initially, although methane will be brought in as soon as practicable. OTI (BP Amoco's oil trading arm) is acting as the broker with whom all trades have to be registered. The system is subject to external audit. The system was developed in partnership with the Environmental Defense Fund, a respected United States NGO, and expert on the practice of emissions trading.

9. Emissions trading requires a system for monitoring and compliance. This need not be heavily bureaucratic—indeed, it should be much less burdensome than currently experienced in administering environmental regulation. And once in place, a properly operating Trading System offers potential certainty that the required emissions reductions will be achieved. Equally important, it provides an incentive to achieve more than the minimum, and it ensures that the easiest and cheapest options for reducing emissions are identified

first. *Our preliminary work suggests that there appear to be significant potential emissions reductions available and which are consistent with achieving good economic returns.*

10. BP Amoco does not deny that there are technical issues that would need to be resolved before a UK-wide trading scheme could be launched. We have already tackled some of them in the context of our own system; work has also been done under the auspices of the Association of Electricity Producers. We shall be engaging in discussions with Government in order to assist the speedy introduction of a UK scheme. We believe that BP Amoco's own reporting protocol could provide constructive guidance on formulating the common reporting protocol which would be necessary.

11. Voluntary Negotiated Agreements can prove a valuable and low cost adjunct to emissions trading, and it ought to be acceptable for certain sectors to volunteer to negotiate an emissions cap. This would be the equivalent to an allocation of emissions permits for the requisite amount but where allocation of the reductions is undertaken voluntarily within the sector. As emissions trading proves its value, sectors should see the benefits of trading and therefore wish themselves to convert their voluntary agreement into part of the trading scheme. But the fundamental attraction of both is the certainty that the emissions cap offers and the freedom for participants to find the least cost responses within the sector.

12. It is not only BP Amoco that is trying out emissions trading. Examples of emissions trading exist in the United States. Other jurisdictions are also experimenting with emissions trading: Canada has a pilot programme, New South Wales has a scheme for the electricity sector and Norway also has an embryonic trading system. Other countries such as New Zealand and Denmark have also indicated interest in the development of trading and trading systems. All this suggests that emissions trading will be an important component of the global response to Kyoto—and UK firms will suffer if they do not enjoy the same flexibilities and opportunities offered to their competitors.

13. Emissions trading in Greenhouse Gases could offer similar benefits. We welcome the fact that flexibilities which permit national emissions trades were included in the Kyoto Protocol, and believe that the UK can benefit from flexibilities at national level.

Conclusion

14. BP Amoco shares and applauds the environmental objective of reducing greenhouse gases and other emissions. We accept the principle of action on greenhouse gases by industrial and commercial energy users. We believe that the UK can achieve its objectives at the lowest cost through an emissions trading scheme for industry, supplemented in some cases by sectoral voluntary agreements. Such schemes should be an integral part of a national climate change policy where all sectors contribute on a comparable basis.

15. If wrong or inferior instruments are chosen to reduce greenhouse gas emissions, they will not only fail to achieve their environmental objective; they will run the risk of imposing unacceptable economic, commercial and social hardship at the same time. BP Amoco, for example, now assesses its overall performance against the yardstick of a "triple" bottom line—economic; environment; and social. Failure to perform in any of these categories militates against success in the other two. The same concept could also apply to meeting the UK's environmental targets. If the price of doing so is economic inefficiency and social hardship (for example, in terms of unemployment), then ultimately the nation's policy for meeting its environmental targets will become unsustainable. The same applies to a commercial company seeking to achieve its commercial targets at the expense of its economic and social responsibilities. This too leads to an unsustainable business.

16. We believe that the emphasis should be based on efficiency and flexibility. Measures should be designed on a least cost basis, and designed to affect competitiveness as little as possible. Moreover, any system for controlling and reducing emissions must not only provide disincentives to current behaviour, but also positive incentives for change. Measures should therefore include incentives for the development and use of renewable energies, and for the development of new, cleaner technologies.

17. BP Amoco is firmly of the view that Emissions Trading and Voluntary Agreements provide the most economic *and* the most effective route to reduce environmental industrial emissions. We believe they will deliver better results and greater volumes of reductions than any alternative because the focus is on a direct solution to the problem at hand: cutting total greenhouse gas emissions.

18. BP Amoco is convinced by its internal work (which exceeds anything undertaken by any other company) that the Pilot Trading System will confirm in practice the theoretical case for Emissions Trading and demonstrate

that significant reductions in greenhouse gas emissions can be achieved without damaging either corporate performance or competitiveness. It is an approach which the UK and EU should consider and adopt above all others.

6 January 1999

Memorandum by Greenpeace (CC 23)

UK CLIMATE CHANGE PROGRAMME

INTRODUCTION

Greenpeace welcomes the opportunity presented by this inquiry to examine some important issues omitted by the Government consultation paper.

This submission develops three themes.

1. WIDENING THE FRAME OF THE CLIMATE CONSULTATION DISCUSSION

Current international and UK policy processes on climate and energy policy are severely inadequate when viewed in terms of the planet's ecological limits. Greenpeace considers that the UK should actively seek means to ensure that international policy discussions are re-connected to and driven by ecological limits, rather than just political expediency, and should give a lead by adopting appropriate policies at home.

2. "GAIN NOT PAIN"

The Deputy Prime Minister is right to point out in the DETR consultation paper that its proposals "can bring gain not pain . . . and business opportunities in the important global environmental technology market." Greenpeace believes that renewable energy sources are striking examples of opportunities waiting to be gained (or missed) which the Committee should look at closely in their consideration of the economic implications of the Climate Change Programme.

3. HOW TO IMPLEMENT THE KYOTO PROTOCOL

The manner of implementation of the Kyoto Protocol will determine whether it is to be environmentally valuable or worthless. Greenpeace analyses are appended covering "flexible mechanisms" and other issues in detail.

1. *Widening the frame of the climate consultation discussion*

The Climate Consulation paper begins with dire warnings about what effects climate change may have if "no action were taken". But it then goes on to discuss emissions reduction targets without reference to whether or not these are sufficient to prevent such adverse impacts. This is, unfortunately, typical of the policy discussions stemming from the climate debate. The consequence is that policy actions are determined by the bounds of political acceptability rather than the ecological limits to "acceptable" environmental damage. In particular, energy policy remains largely outside the frame of climate policy debate.

The IPCC's forerunner, the Advisory Group on Greenhouse Gases, have allocated temperature figures to global ecological limits. They suggested that to avoid unacceptable risk, it is necessary to stay below 1 degree C long-term temperature rise above pre-industrial levels and 0.1 degree C per decade rate of temperature rise. It is then a comparatively straightforward exercise to use these limits as a basis to calculate the global carbon "budget" for how much carbon can be burnt and released into the atmosphere if these limits are not to be exceeded. Even under optimistic assumptions this is much less than the amount of fossil fuel reserves—let alone total resources.

The conclusion is that fossil fuels will not run out—they must be phased out over the next 30 to 40 years if the climate is to survive.

This conclusion must be the basis to form policy responses to climate change. In this context it is very appropriate that the present study by the Royal Commission on Environmental Pollution is an investigation of the implications of phasing out fossil fuels. It is also notable that the Advisory Committee on Business and the Environment (ACBE) have stated that there are "good grounds for confidence that the transition to a low carbon economy can be achieved within the next 20 or 30 years" (*Climate Change: A Strategic Issue for Business*, ACBE 1998). The Government should take heed.

The UK should seek to establish ecological limits as an "anchor" to international climate debate, and should align its energy policy with the inevitable conclusions that renewable energy must replace fossil fuels. It is quite clear that the timescale for infrastructural renewal is very long and that it is therefore necessary to put in place now the long-term policy framework to ensure that replacement of infrastructure will allow this energy transition. Renewable energy infrastructure is an obvious issue, but many other policy areas must also be framed in light of the need for an energy transition away from fossil fuel dependency, including transport infrastructure and standards for buildings.

This policy approach is not only essential to preserve the climate, but also in order to position the UK to give a credible international lead. Moreover, such an approach forms the ground for UK businesses to harvest the opportunities in new green technologies. David Davies, chairman of ACBE (and of Johnson Matthey), launching the ACBE Climate Change report cited above, stated that "there are substantial commercial opportunities available to the UK if we get our policy framework right" (ENDS Report 279 April 1998).

The next section develops this point in more detail in the specific context of renewable energy sources.

2. *Gain not Pain*

John Prescott, launching the climate consultation paper said "there could also be new jobs and new opportunities for UK firms in the emerging environmental technology market". This is certainly true, but more than ministerial rhetoric is required to make it reality. Despite a history of UK leadership in renewable energy research, it is other countries who—*right now*—are scooping the rapidly growing markets for power renewable resources like solar and wind.

Denmark, for example, has acquired two thirds of the fast-expanding global $1.5 billion market in wind power. The factors behind this Danish success are documented in the report Danish Wind Energy. But notably, it is the UK which has by far the biggest wind power resource in Europe, including its offshore potential. If the UK were to set itself the ambition of, say, matching the Danish target to produce 40 per cent electricity from offshore wind by 2030 it would create 36,000 jobs by 2010, and by that date entirely fulfil the Government's target for 10 per cent electricity from renewables by 2010, regardless of contribution from other renewable energy sources. The report by Border Wind shows that this programme of development for the UK offshore wind resource is entirely feasible. An indication of the size of the potential global market is given by scenarios in a recent report produced for the Forum for Energy and Development. These scenarios, developed under realist assumptions, show that wind energy may capture 10 per cent of the world electricity market by 2010 (*10 per cent of the World's Electricity Consumption from Wind Energy—Is That Target Achievable?*, BTM Consult ApS, October 1998, 58pp, report available if required).

The climate consultation couches its remarks on renewable energy in terms of the Government target for 10 per cent electricity by 2010, with particular reference to the review of renewable energy "looking at what would be necessary and practicable to deliver 10 per cent of UK electricity demand from renewables by 2010". The consultation document appears to assume that this target, along with more-of-the same non-fossil-fuel-obligation (NFFO) orders will sufficiently advance renewable energy. This is an inadequate starting point for serious discussion of how to develop renewable energy. Climate protection demands a much more ambitious target, as do economic and business considerations. The tranche-by-tranche-approach of NFFO, whilst much better than nothing, does in practice give stop-start signals to the renewables industry. Clear long-term governmental commitments are required, backed up with decade-by-decade targets such as those set by Denmark. If the UK does not act very soon, it will be left behind.

A further problem is that there are strong signs that even this unambitious 10 per cent by 2010 target appears to be too high to clear the hurdle presented by the Treasury, from which the renewable energy review is yet to emerge, despite periodic Ministerial statements from DTI that its publication is imminent. Renewable energy companies are awaiting the outcome of this review before committing themselves. BP solar, for example, is the biggest solar business in the UK, but due to the lack of appropriate incentive structure in its home country, its solar panels are built overseas. In a letter to Greenpeace (6 May 1998) BP Group Chief Executive John Browne remarked that "we are investing substantial amounts in the solar business and watching with great interest the Government's review of renewables. I hope that review will help to create the right patterns of incentives for companies to develop businesses in renewable energy".

In regard to solar power it is also worth noting that John Browne's estimation of solar, perceived by some as an "expensive" renewable energy source, is that "given the right support and incentives, it could be competitive in supplying peak load capacity within the next 10 to 15 years (speech to Anderson Consulting World Forum on Change 6 June 1997). This is an extremely significant timescale, falling as it does in the middle of the Kyoto commitment period for emissions reductions. If BP is correct that solar will by then be competitive, then it follows that it should be given far more major consideration as part of the means to meeting the UK Kyoto Protocol commitments.

With regard to renewable energy incentives, it is also noteworthy that Lord Marshall's recent report *Economic Instruments and the Business Use of Energy* recommends an industrial energy tax, designed so as to "increase

incentives for the take-up of renewable sources of energy" with revenues recycled to business e.g., "to promote low carbon technologies".

In summary, promotion of British renewable energy industry requires the Government to set a series of ambitious targets over an extended timescale, in line with the imperatives of climate protection. A number of specific mechanisms are available to meet these targets when set. Examples are:

- Price support for development (presently in the form of NFFO)
- Guaranteed markets (e.g., Government purchase arrangements)
- Long-term signals to commercial developers (e.g., intention to licence areas of sea bed for wave generation in the future)
- Extension and "showcase" programmes (e.g., solar roofs programmes)
- Preferential tax arrangements for and direct funding of renewable energy research and development
- Direct intervention in the electricity or energy markets (e.g., to oblige energy suppliers to take a minimum quantity of renewable energy).

Greenpeace is currently promoting opportunities for the UK to develop its renewable energy industry, including investigation of the possibilities for jobs drawing on existing skills in specific localities, economic modelling of the potential benefits, identification of sources of inward investment, and analysis of how renewable energy relates to other UK trends towards industrial modernisation. If the Committee is interested in discussing this ongoing work in further detail we would welcome the opportunity to present oral evidence.

3. *How to implement the Kyoto Protocol*

November's ministerial meeting at Buenos Aires was deeply disappointing in that it cut off the process to consider whether existing commitments to cut emissions are actually sufficient to protect the climate (see point 1 above). It did, however, succeed in agreeing a timetable for further work which will cover crucially important issues such as flexible mechanisms, technology transfer and sinks. If not dealt with properly, these and other issues hold the potential loopholes large enough to render Kyoto useless.

With regard to the Committee's question about flexible mechanisms, it is crucial to establish internationally agreed common rules and principles to ensure that all of these instruments (trading, joint implementation, clean development mechanism) are environmentally sound. This means:

- Domestic action must be the priority in overall implementation of the Protocol and hence limits must be set to ensure that action is substantively taken at home.
- Compliance regimes must be agreed and enter into force prior to the start-up of emission trading, joint implementation and use of certified emission reduction units from the clean development mechanism.
- Reaching prior agreement to market rules for exchange of emission units and an agreed legal framework.
- Establishing national accounting systems for transfers as a pre-requisite for participation in the mechanisms.
- Obtaining agreement by parties engaged in use of flexible mechanisms to in-depth review by expert independent teams.

Greenpeace's more detailed analysis of these and various of the other issues raised in the Committee's notice of enquiry are contained in published papers comprising specific policy recommendations on implementation of the Kyoto Protocol and the Clean Development Mechanism plus a more extended analysis of the Kyoto protocol.[4-7]

LIST OF FOOTNOTES

Footnote 1

Nature's Bottom Line, Climate Protection and the Carbon Logic, Greenpeace UK, 1998 4pp (80pp carbon logic full technical analysis available on request).

Footnote 2

Danish Wind Energy, An Industrial Success Story Greenpeace International 1998.

Footnote 3

Offshore Wind Energy, Building a New Industry for Britain A report for Greenpeace UK by Border Wind, 1998, 25pp.

Footnote 4

Implementing the Kyoto Protocol Greenpeace Position Paper for Fourth Conference of the Parties to the United Nations Framework Convention on Climate Change, 2–13 November, 1998, Buenos Aires, Argentina, Greenpeace International, 11pp. Comprising: policy recommendations to COP4.

Footnote 5

Making the Clean Development Mechanism Clean and Green Greenpeace Position Paper for Fourth Conference of the Parties to the United Nations Framework Convention on Climate Change, 2–13 November, 1998, Buenos Aires, Argentina, Greenpeace International, 10pp. Comprising: policy recommendations to COP4 specific to the Clean Development Mechanism.

Footnote 6

Analysis of the Kyoto Protocol Greenpeace International 1998, executive summary 4pp + full technical summary 54pp. Comprising: in-depth technical analysis of measures required to make the Kyoto Protocol environmentally effective.

Footnote 7

Economics Take Over Climate Talks Greenpeace International press release following Buenos Aires.

Memorandum by The Society of Motor Manufacturers and Traders (CC 24)

THE UK CLIMATE CHANGE PROGRAMME

The Society of Motor Manufacturers and Traders (SMMT) welcomes the Environment, Transport and Regional Affairs Committee's inquiry into the UK climate change programme. The Society is currently reviewing with its members the details contained in the Government's consultation paper and will be submitting a considered response to the issues that it raises.

The UK Motor Industry takes its environmental responsibilities very seriously. It has been working in partnership with governments at a European and national level to reduce the environmental impact of its processes and products. This has seen the successive tightening of emissions regulation. As a result a new car produces less than 5 per cent of the regulated emissions of one built in 1970.

These improvements have also meant that, despite increasing car ownership, total tailpipe emissions from motor vehicles have declined by 25 per cent since 1990. This progress is set to continue. Towards the end of 1998 the European Commission confirmed new emission standards to be introduced in 2000 and 2005. These were developed under the Auto/Oil Programme, a collaborative research programme involving the European Commission, the motor industry and the oil industry.

REDUCING GREENHOUSE GASES

The Kyoto Conference at the end of 1997 focused world attention on the need to reduce greenhouse gas emissions. The motor industry has taken a leading role in seeking to meet the challenge implied by the legally binding reduction targets agreed by the European Union and the UK Government.

In a unique and groundbreaking voluntary agreement the European motor industry has agreed to improve the average fuel efficiency of new passenger cars by 25 per cent by 2008. The European Commission regards this agreement as a model that they hope will be replicated by other sectors. To date the European motor industry is the only industry to have made an agreement of this sort.

The agreement includes commitments from the motor industry that:

- new passenger vehicles emitting 120g/km CO_2 or less will be introduced by 2000;
- a target of an average of 140g/km CO_2 by 2008 for new passenger car sales within the EU;
- a review at 2003 to evaluate the opportunities for additional reductions towards the EU target of 120g/km CO_2 by 2012;
- the establishment of a joint ACEA/Commission group to monitor and review the progress of the voluntary agreement.

The commitments made in the voluntary agreement represent a very significant technological challenge. It will require all motor manufacturers to undertake further substantial investment in research and development. Across Europe the industry is already investing more than £2 billion and worldwide budgets run into 10s of billions. In the US, the major automobile manufacturers and the Federal government are involved in a partnership for a new generation of vehicles. This $400 million per annum programme is looking at breakthrough technologies like fuel cells, which have the potential to significantly reduce carbon dioxide emissions.

Other greenhouse gases

With regard to other greenhouse gases, the industry is a signatory to the UK Automotive Air Conditioning Industry Declaration of Intent on the Use of HFCs (hydrofluorocarbons). This commits the industry to follow the SMMT guidelines within the document, investigate alternative refrigerants of lower global warming potential (GWP), and to use HFCs with short atmospheric lifetimes and low GWPs. A report is prepared annually for DETR on the use of HFCs in vehicle air conditioning equipment in the UK, "making best efforts to estimate emissions".

Vehicle user awareness

The majority (83 per cent) of carbon dioxide emissions from a vehicle during its life cycle are the result of its use. This makes the choice of vehicle, the way it is used and its maintenance crucial in determining environmental impact. The SMMT and the motor industry have taken a number of initiatives to promote a responsible attitude to car ownership and use.

Driver education

Driver behaviour and vehicle maintenance are important. The SMMT, in conjunction with motoring organisations, driving schools and supermarkets, published "The Greener Motoring Guide", which gives practical advice to drivers on the measures they can take to reduce their environmental impact. The guide was launched by the Deputy Prime Minister, John Prescott, at the meeting of the EU Environment Ministers in Chester, in April 1998, and to date nearly 1 million have been distributed.

The industry has also worked with the DETR Greener Vehicle Campaign which is aimed at persuading motorists and vehicle operators "to keep a more watchful eye on the environmental performance of their vehicles". Free emission checks and a limited degree of free tuning was made available in seven target areas within the UK involved in roadside emission testing.

Labelling

In addition to involvement with the proposed EU Directive on fuel economy labelling, there have been developments within the United Kingdom under the Government/Industry Cleaner Vehicles Task Force (CVTF) initiative. A group has also been established within the SMMT to consider these issues, and a programme of research has been commissioned jointly by SMMT and DETR.

Climate change programme

The motor industry has demonstrated that it is prepared to participate fully in developing policies and measures that reduce the risks associated with climate change. In developing the UK programme it is essential that Government recognise the need to protect and promote the competitiveness of UK industry. Meeting the challenge of reducing greenhouse gases will require substantial investment, which can only be sustained by successful businesses.

The SMMT believes that the Government should identify the most cost-effective methods for reducing greenhouse gas emissions across the whole of the economy. This would provide an appropriate basis for prioritising action. There is a danger that a sectoral approach outlined in the consultation document will lead to the introduction of measures based on their ease of implementation rather than their impact on greenhouse gas emissions.

The recently published consultation document on the reform of vehicle excise duty suggested that the reforms would help achieve air quality improvements and reductions in carbon dioxide emissions. The Treasury has been unable to provide any detailed analysis of the likely scale of these benefits. In its climate change programme, DETR estimate that the EU/ACEA Environmental Agreement will yield a carbon saving of 5–8

MtC (million tonnes carbon equivalent), with the fuel duty escalator expected to deliver between 2–5 MtC. These are substantial savings. It will be important to ensure that further measures introduced in the transport sector are subject to a thorough environmental and economic assessment.

Roger King

Acting Chief Executive

6 January 1999

Memorandum by the Confederation of British industry (CC 25)

THE UK CLIMATE CHANGE PROGRAMME

Introduction

1. The CBI welcomes the opportunity to respond to the Select Committee's enquiry into the UK Climate Change Programme. The CBI believes that scrutiny of the Climate Change Programme at every stage is vital. Whilst new technologies and improved energy efficiency do present opportunities for business, implementing expensive policies now could have serious consequences for UK competitiveness, investment and jobs without significant environmental benefit.

2. The CBI has taken a proactive approach to the development of climate change policy for many years and represents a wide range of business views from across the sectors. Whilst the CBI is still finalising its full response to the Government's consultation paper on the UK Climate Change Programme, this submission summarises business views to date. The CBI would welcome the opportunity to submit supplementary evidence when our response is completed.

3. We now summarise business views on the issues that the Select committee is examining, highlighting the underlying principles and approach that the UK programme should adopt. The CBI's response to the DETR consultation paper will include more detail on the policies and measures that we believe should form the priorities for the UK climate change programme. At this stage we have outlined some of these measures in Annex I (page 4).

Principles

4. Business wants to participate fully in developing response policies and measures that both reduce the concerns associated with climate change, maximise potential market opportunities and account fully for the need to protect and promote UK competitiveness in an increasingly global economy. These three aims are by no means incompatible and should underpin the new UK Climate Change Programme.

Targets

5. The Government's priority must be to meet the legally binding Kyoto target of reducing emissions of six greenhouse gases by 12.5 per cent over their 1990 levels by 2008–12. We recognise that incorporating some element of "headroom" can help ensure we meet our international obligations, as long as that element is set realistically, transparently and based on some reasonable assumptions about the margins for error in forecasting emissions. We would also underline that the international negotiating process is the appropriate mechanism for developing further targets and the UK should not implement expensive policies alone.

6. Analysis of the figures in the DETR consultation paper suggests that the UK will come close to achieving its Kyoto target on the basis of policies and measures already planned. While effort will be needed to address a shortfall of some 5 MtC per annum by 2010, it should be possible to achieve this without the need to implement expensive policies, such as energy taxes, that will damage UK competitiveness.

7. The CBI is not convinced that the Government's target of reducing CO_2 emissions by 20 per cent below 1990 levels by 2010 is consistent in that timescale with maintaining UK competitiveness. Nearly all the emissions savings up to 2010 identified in the consultation paper are due to come from non-CO_2 gases, making a 20 per cent CO_2 only target very difficult to achieve by 2010. Furthermore, the necessary measures which include unlocking the energy efficiency potential that exists in the smaller business sector and domestic sector, will take time to take effect. The investment needed to deliver energy efficiency savings as well as developing clean technology and alternative transport systems will bring business benefit, but these changes will need to develop over the longer term and in line with business investment cycles, as well as the capacity of public finance.

8. Climate change is also a global issue requiring global action. While developed countries should take the lead, British business competitiveness will be threatened if the UK and the EU implement expensive policies alone.

9. While the priority must be to meet the Kyoto target, we believe it is sensible for the Government to begin identifying where preparatory action is needed now (for example, on negotiated agreements and emissions trading) to help us meet, cost-effectively, future targets which will replace those established under the Kyoto Protocol. Such targets are likely to be harder to achieve and identifying measures that might need to be taken in future can help minimise disruption to the economy. But while the CBI is supportive of further cost-effective energy efficiency savings that can be identified and delivered, future UK measures must not lead to business relocating operations to countries without climate change commitments.

Emissions forecasts

10. Further detailed quantitative analysis and published information on GHG savings expected from new and existing policies as well as a more thorough cost/benefit evaluation is vital before policy decisions are made. Whilst the CBI acknowledges that quantifying emissions savings from individual measures is not easy and many uncertainties surround energy forecasts, the basis for the figures quoted in the consultation paper could be made plainer. For example:

- It is not clearly stated which policies are already included in the baseline forecasts on page 8, making it difficult to judge the best policies needed to deliver the necessary emissions reductions, if we are unsure which policy effects are already included in the projections.
- The national total for greenhouse gas emissions in 1990 does not equal the totals from each sector. After accounting for emissions from the electricity supply sector being incorporated into the totals for end use sectors a difference of 8 MtC remains which is not accounted for in the consultation paper.
- The aggregation of the Energy Supply Industry into end use sectors is confusing and makes analysis difficult.
- Questions remain about the robustness of the CO_2 projections from transport. Key assumptions underpinning these figures include the recent National Road Traffic Forecasts. These revised forecasts envisage a lower amount of traffic than before, based partly on the restraint effects of increasing road congestion: yet it is precisely in conditions of worsening congestion that one would expect emissions to increase. There is also significant uncertainty over the potential impact on emissions forecasts of measures aimed at reducing congestion such as new technology, traffic calming, clean fuels and congestion charging.

11. The CBI urges the Government to publish the DTI energy projections EP67 (update of EP65) and the assumptions behind the analysis on this and on the transport emissions as soon as possible. Sharing up to date information with stakeholders is crucial to the consultation process and the development of an informed debate.

Sectors and cost-effectiveness

12. While a range of policies will be needed across all sectors, we are deeply concerned about the sectoral approach adopted in the consultation paper. There is little evidence that the Government has been able to identify the most cost-effective measures which might be adopted, irrespective of sector, and to prioritise action accordingly. We believe such analysis is vital if the UK is to adopt a package of measures which both supports British business competitiveness and maximises our contribution to international efforts to counter climate change.

13. It is also important to look at the costs and benefits of alternative options to mitigation. Sequestration and adaptation could offer cost-effective solutions across the economy as a whole, when compared to some policies to reduce emissions especially in the longer term.

14. Action has already been under way in many of the areas identified in the consultation paper to help deliver the identified reductions. However, substantially more information is needed on how far policies and measures have been effective to date, and on the costs and benefits of the further action needed, before an accurate picture can be established of the most cost-effective climate change programme for the UK.

15. The general approach for the business sector adopted within the consultation paper give several causes for concern. Analysis of the possible further measures identified within the business sector suggests that these would yield substantial additional emissions savings (c 7MtC) compared with other sectors (e.g., 2MtC for transport and 3.5 MtC for domestic): yet there is very little quantification of the impacts or cost-effectiveness of pursuing these additional options in the business sector.

16. The paper also underplays the fact that business, as both a user and provider of services, will be impacted by action taken in other sectors. For example, measures to reduce transport CO_2 emissions will affect business as both users and providers of transport. Such overlaps are not transparent in the consultation paper. There is a danger therefore that the changes in business practices may be more significant than is recognised in the consultation paper.

17. The consultation paper equally understates the fact that business use of energy is not homogeneous and fails to make sufficiently clear the distinction between heavy industry and smaller users of energy. Larger users

of energy already have commercial incentives to save energy and have made significant gains in efficiency (though it is becoming increasingly expensive for some businesses to sustain the pace). But a large proportion of business emissions comes from smaller users of energy who have not seen efficiency as a priority due to the small impact on the bottom line. There is considerable scope to improve energy efficiency amongst smaller business energy users as well as in the domestic sector. The question is how to overcome the barriers (such as resource constraints, landlord-tenant relationships and a lack of information) to unlock the potential and what timescale is needed to deliver the savings cost-effectively. The incentives required to stimulate energy efficiency vary substantially between industry and commerce and a range of measures will be needed to prompt further action, some of which are highlighted below in Annex 1.

18. It is important that companies taking voluntary early action to reduce emissions should get recognition and credit for it. It is also vital that double jeopardy is avoided, so that, for example, companies participating in negotiated agreements and/or emission trading should not also be subject to strict regulation or energy taxes. Neither should products be impacted twice, for example, a tax on fuel inputs for electricity generation and a tax on electricity.

Timetable for the UK Programme

19. After receiving the responses to the consultation paper, it is essential that the Government hold further rounds of consultations on drafts of the UK Climate Change Programme in order to address the concerns that we have highlighted above. The UK is well ahead of most other Annex I countries in developing domestic policies and should not rush into decisions on a new UK Programme before adequate emissions forecasts have been published and further consultation has been undertaken. The UK's policies and measures should also be framed with an eye to the commitments undertaken by other Annex I countries.

Graham Mason

Director of Business Environment

6 January 1999

ANNEX I

Recommended policy instruments

Voluntary Approach

(i) *Negotiated agreements (NAs).* There is significant scope for NAs in well-organised sectors with a small number of large users. NAs (as opposed to voluntary agreements) should include a strong incentive for the sector to deliver through the negotiation of penalties for failure. NAs with teeth should include reciprocal commitments from Government (e.g., help with energy audits or exemption from other measures).

(ii) *The European Commission* should investigate a voluntary approach when developing proposals to reduce GHG emissions (e.g., the EU voluntary agreement on CO_2 from cars) and should also allow for voluntary agreements as an implementation vehicle for European Directives focusing on GHG emissions.

Market Instruments

(i) *Liberalisation of energy markets coupled with incentives to improve energy management.* Incentives to improve energy management can to an extent be developed through the market place as energy suppliers attempt to differentiate their services to customers in an increasingly competitive market by providing energy management services and renewable energy contracts.

(ii) *Market incentives.* Incentives to encourage energy saving investments by smaller users, for example providing energy audits/investment grants funded through a recycled levy on relevant users (subject to analysis of the possible impact of a levy on competitiveness) may have a modest role to play and are likely to be more effective in changing behaviour than an energy tax. An energy tax is a blunt instrument that would not deliver certainty in terms of emissions reductions and we do not believe that it would incentivise business to reduce emissions as effectively as other instruments such as negotiated agreements, emissions trading and in some instances well targeted regulation (see examples below). We believe that developing these other instruments should be given priority. Furthermore, the CBI is concerned that the Government is willing to consider the possibility of energy taxes for business whilst ruling out any new taxes on the domestic consumption of fuel and power.

(iii) *Reform of the fiscal regime for transport.* Shifting the balance of road user taxation away from fixed charges towards accurately targeted user charges, such as motorway tolls and urban congestion charging together with ringfencing of revenue from charges to finance transport improvements.

(iv) *Focused market incentives may be effective in encouraging the use of alternative transport fuels and fleet conversion to cleaner vehicles.*

(v) *Tackling market distortions.* Equalising VAT on energy efficiency products and domestic fuel. The Association for the Conservation of Energy estimates that equalisation at the 5 per cent level would increase the total additional investment in energy efficiency required to meet the Kyoto target.

(vi) *Flexible mechanisms.* The CBI supports the development of flexible mechanisms as outlined in the Kyoto Protocol (emissions trading, Joint Implementation and the Clean Development Mechanism). Consulting business now on the details of these policies that may help the cost-effective delivery of future internationally agreed targets is vital. The CBI is supportive of and involved in discussions on how a dry run UK emissions trading scheme might be taken forward.

Well targeted regulation

(i) *Standards of Performance Schemes.* The SoP scheme has been successful to date and future schemes should build on it by giving it greater focus to smaller businesses.

(ii) *Flexible implementation of IPPC.* The energy efficiency requirement of IPPC should be implemented in a flexible manner to allow the bubble approach for companies/sectors participating in negotiated agreements or an emissions trading scheme. CO_2 is a global not a local pollutant making the site specific approach less efficient and less relevant (environmentally) in many circumstances.

(iii) *Energy efficiency requirements in building regulations.* The current regulations could be extended to cover more renovation work and trigger improvements at particular times such as when tenants are changing over or the property changes hands. Measures to increase the individual energy billing of tenants would also provide a greater incentive.

Other measures

(i) *The promotion of clean/alternative technology.* The Government should encourage research, development and dissemination of technologies that are compatible with environmental objectives such as CHP, renewables and clean coal technology.

(ii) *Greater promotion of Government best practice schemes.* The Energy Efficiency and Technology Best Practice Schemes and the work of the Energy Saving Trust should be given a higher public profile. Better targeting and marketing of the services and grants available to smaller businesses and households would increase awareness of the help that is on offer.

Memorandum by the Global Environmental Change Research Programme (CC 26)

UK CLIMATE CHANGE PROGRAMME

Introduction

This document forms the Global Environmental Change Research Programme's submission to the inquiry on the UK Climate Change Programme being conducted by the House of Commons Environment, Transport and Regional Affairs Committee. It brings together evidence from a range of recent economic and social research on the issues.

The Economic and Social Research Council established the Global Environmental Change Programme in 1991 to investigate: the social and economic drivers of environmental change; the impacts of environmental change on society; and policies and measures to address environmental problems. Projects have investigated many issues relevant to the inquiry, including the viability of environmental taxes; the effectiveness of environmental education; and the potential to address environmental issues through innovation. CSERGE, the Centre for Social and Economic Research on the Global Environment at UEA and UCL, is an integral part of the Global Environmental Change programme.

How this submission was developed

This response synthesises the findings from recent economic and social research. We have attempted to assemble evidence-based research findings that cast light on the issues in the inquiry's call for evidence.

A number of recent activities within the Programme have been relevant to the inquiry. This document calls on all of the following:

- the Programme's evidence to the Royal Commission on Environmental Pollution's current study on energy and the environment;
- the Programme submission to the Government's consultation on sustainable development;
- separate submissions by the Programme and CSERGE to the *Government Task Force on the Industrial Use of Energy*;
- a Special Briefing that assessed the options for substantial cuts in emissions in the UK. Prepared at the time of the Kyoto Conference, this brought together research insights on renewable energy, green taxes, the construction industry and others;
- a Special Briefing that brought together the insights of several research projects on the effectiveness of environmental education;
- evidence from researchers within the Programme, summarised on the basis of existing publications. A full list of those whose work is called upon is given at the end.

The focus of this submission

This response takes into account the following factors:

- the limited length of submissions;
- the large number and scope of questions addressed;
- the great amount of evidence that could be submitted;
- the comparative advantage of the Global Environmental Change Programme.

Bearing these factors in mind, this submission focuses on the question of *achieving long-term behavioural change*. This is a topic on which substantial research has been conducted within the Programme, and on which other witnesses might not wish or be able to comment.

Achieving behavioural change to bring about long term emission reductions

The UK will reduce greenhouse gas emissions by about 10 per cent during the 1990s. Carbon dioxide emissions will fall by 4–8 per cent. Much of this achievement will be due not to reductions in energy demand but to the restructuring of the electricity industry, involving a massive switch from coal to relatively clean gas-fired power stations. This has been driven by the removal of coal subsidies and commercial logic rather than by environmental motivations. During the same period, the nuclear industry raised its performance, displacing further quantities of coal.

These trends cannot simply be extrapolated forward. The UK target for a 20 per cent CO_2 reduction by 2010 cannot be achieved without policies whose primary goal is to reduce emissions. If economic growth is to take place at the projected rate, meeting the target means that the ratio of CO_2 emissions to gross domestic product must fall by 3.5 per cent annually. This type of improvement was almost achieved between 1973 and 1983 when energy prices were high. Future reductions must be pursued against a background of ample fossil fuel supplies and lower energy prices. But governments have ceded control over their economies through privatisation and dismantling trade barriers. The Government therefore needs to inspire and orchestrate, rather than mandate, the climate friendly economic and social changes needed in every sector of society.

A Programme Special Briefing brings together insights on the climate policies needed in a range of sectors in order to reach the Kyoto targets. This is attached as more in-depth background material.

Significant longer term reductions in emissions will require new policies targeted specifically at climate protection. Environmental considerations need to be integrated into all major policy areas as part of a strategy that combines:

- the encouragement of climate friendly innovation, in both technical and managerial terms;
- the use of economic signals to alter patterns of energy use; and
- a genuine attempt to involve people in all sectors.

A climate of innovation

Net carbon emission from energy use could in theory be reduced to zero through the use of existing, emerging and new innovations. There are many examples of managerial and technical innovations that have reduced certain types of pollution in the past by up to 100 per cent. Renewable energy and energy efficiency have the potential to achieve this for greenhouse gases. Costs are often initially high, but with research, development and demonstration (R,D&D), investment and operational experience, substantial improvements can be achieved.

However, studies of environmental policy options have often ignored the issue of innovation. Analyses are often "static" in that they assume for the purposes of their cost calculations that all possible technical options already exist and have clearly-defined costs. The result of this assumption is that the studies tend to under-estimate the potential for innovation to bring not only lower costs in the existing clearer technologies, but also completely unforeseen technologies. Support for R,D&D is vital, particularly in the early phases of climate policy. Innovation could be promoted by using revenue from environmental taxes. A "carbon" tax of as little as £1/tonne—equivalent to about 0.1 pence per litre of oil—would raise £150 million per year, sufficient to fund an ambitious programme of R,D&D. Modest taxes, introduced early, may avoid the need for more stringent measures later if innovative new technologies are induced.

The UK needs a strategy to encourage renewable energy. Experiences both in the UK and in other countries point to the importance of a number of elements in such a strategy:

— competitive prices and efficiency in electricity supply, including recognition for the benefits of "embedded generation" and net metering to encourage small renewable energy schemes;
— investment incentives to encourage wider deployment, linked to capital costs rather than tariffs;
— support for R,D&D both in industry and public research facilities;
— demonstration projects in schools, universities and installations in public buildings/land.

These issues were more fully addressed in a recent submission to the Royal Commission on Environmental Pollution's study on energy and the environment and phasing out fossil fuels. This document is attached by way of further background briefing.

Economic principles and environmental taxes

One of the most fundamental insights in economics is that prices are both an essential indicator of scarcity and the principal generator of incentives. Economists argue that environmental problems arise where producers and consumers are not paying the full social costs associated with their resource use. The key policy to address such problems is to charge those using energy according to the pollution associated with different forms of fuel. In the case of energy use and climate change, carbon dioxide is implicated as the main "greenhouse gas". Economists have therefore proposed a "carbon-energy tax" which, by imposing an extra charge on energy users according to the carbon content of the fuel being used, would begin to "internalise" the full social costs of such energy use.

Clearly, renewable energy technologies such as wind power use little or no carbon fuels in their operation. The use of a carbon-energy tax would act in favour of renewable energy technologies by improving their costs relative to fossil fuel energy sources. Green taxes would have both downstream and upstream benefits: downstream in that externalities would be reduced, upstream in that the full benefits of renewable energy technologies would become apparent through price signals.

There are significant economic benefits to environmental taxes. Taxes can minimise the cost of reaching a target because all the cheapest options for abatement are likely to be implemented first. Moreover, taxes give incentives for continuous improvement. And because they affect prices, they are felt throughout the economy. Even small taxes can have significant effects, and some welcome surprises can emerge from the use of green taxes. For example, the Swedish tax on nitrogen oxides was the main cause of a 35 per cent emissions reduction in a single year.

The design of green taxes is important, both in terms of the types and scope of any taxes used and the ways in which the resulting revenues are spent. For example, whereas an electricity tax would merely encourage the efficient use of electricity, a wider carbon-energy tax would encourage producers and consumers to switch between fuels, and would be likely to benefit renewables more.

The impact of green taxes depend crucially on what is done with the revenues. If they are balanced by reducing other taxes through "revenue recycling", research suggests that green taxes could even result in an overall economic improvement. For example, if revenue were used to reduce labour costs, such as via a reduction in employers' National Insurance Contributions, research has found that the effects on competitiveness would be negligible or even positive. The fuel duty escalator, implemented in the 1993 budget, was shown to improve competitiveness as the small increases in commercial road transport costs are more than offset by substantial reductions in labour costs.

The issue of the business aspects of energy policy were more fully addressed in a submission to the Marshall Task Force in Industrial Energy Use. This submission is attached by way of further background briefing.

Secondary or indirect benefits of greenhouse gas reduction policies are substantial and provide further support for such policies. These secondary benefits are the reductions in other environmental damage, for example from reduced emissions of sulphur dioxide, that result from measures to reduce emissions of greenhouse gases. These large secondary benefits are frequently ignored by analysts estimating the costs of emission reduction policies.

It should not be forgotten that major fuels including coal and nuclear power have for many years received substantial public subsidies in many countries. These subsidies have been calculated as several hundred billion dollars per year. The removal of these subsidies is essential to encourage renewables and reduce pollution.

Green taxes have become an increasingly recognised part of environmental policy in many countries, and can play a useful role in encouraging renewable energy technologies. Environmental policy cannot rely exclusively on environmental taxes. However, policies that ignore price signals and the market are unlikely to be successful. Climate policy should include carbon or energy taxes that make the use of fossil fuels systematically more expensive over time and renewables more competitive.

Involving people in all sectors

Patterns of consumption and the resulting environmental effects are more than the sum of people's individual choices. Choices are framed by social, economic, cultural and geographical factors. Wider networks and infrastructures define the range of possibilities within which choice can be exercised. Sometimes these factors are sufficiently constraining that the reality at the individual level is one of "no choice". There is a double challenge in promoting sustainable consumption. First, individuals must be motivated to exercise choice in more sustainable ways. Second, the wider conditions that frame individual choices must be addressed. The latter challenge will engage policymakers, planners and producers as well as organisations representing consumers.

At the individual level, information has an important role to play in influencing choice. The key questions are: what information is needed; how should it be presented; and when should it be provided. Information should be targeted, relevant and effective. It should enable individuals to understand the consequences of their choices in terms of impacts on quality of life for themselves, their family and the larger community. Information must also be available about alternative goods or services which will allow people to meet similar aspirations.

Information will be effective if it is used to guide "non-habitual" consumption decisions. In taking major purchase decisions about homes, cars and appliances, people exercise more thought and can take account of a wider range of factors. Information could come through environmental audits by home loan lenders, vehicle advertising and appliance labelling.

Changing "habitual" patterns of consumption that are closely tied to lifestyle is an even bigger challenge. Effective information provision for children and young adults who have yet to establish fixed patterns of behaviour is a priority which could yield longer-term benefits. However, it would be wrong to rely on school-based environmental education to deliver an "enlightened" generation that will solve environmental problems in the future. While schools can play a significant role, they can only do so as part of a broader strategy: over-emphasising the importance of environmental education on its own can be misguided or even distracting for several reasons.

First, many influences determine people's actions, not simply education. Examples include peer pressure, access to finance and the availability of more environmentally friendly ways of doing things. Second, other policies are needed to show that governments are serious about the environment and to persuade individuals that their actions, however small they may seem, do make a difference within a coherent strategy. Third, schools cannot do everything, especially given the low priority attached to environmental education.

More broadly, public support is widely seen as a key to the success of sustainable development initiatives. While people are generally unfamiliar with the idea of "sustainability" in its environmental sense, once they understand it, they can relate it to a good "quality of life" and also use it for talking about the "long-term". People recognise that current ways of life are creating environmental problems, especially for the future, and support the idea that economic activities should be held within environmental limits.

However, while people feel little power to change things themselves, they are sceptical as to whether government and business can be trusted to promote sustainability. Government and business are widely seen as being part of the "system" that is creating environmental problems, driven by self-interest and short-term goals. Government attempts to encourage individual behaviour change by providing environmental information such as "sustainability indicators" will suffer from the widespread lack of trust in public institutions.

Environmental education programmes are more likely to be effective as partnerships inside communities. Abstract exhortations need to be "earthed" by real projects aimed at bringing about change. For instance, urging parents and schoolchildren to use environmentally friendly forms of transport should be combined with action to improve provision for pedestrians and cyclists such as installing secure bike racks in town centres. The Global Environmental Change Programme has supported a range of research on environmental education. The insights from this research are brought together in the attached Special Briefing *Learning to be Green*, which formed part of the Programme's evidence submitted to the Holland Panel on Education for Sustainable Development.

Consumers have a limited capacity to absorb detailed environmental information about goods at the point of sale. Manufacturers have long recognised the strength of "brand values" and the importance of building trust between consumers and producers in influencing consumption behaviour. This approach could be built upon, perhaps by encouraging manufacturers to bring sustainability into brand image, providing clearer guidelines on sustainability criteria or by continuing to promote credible eco-labelling.

Information, however well targeted, is not sufficient by itself to change consumption patterns. Before they act on information, people need to feel that they are making a difference. The propensity of individuals to change their consumption patterns will be greatly enhanced if they believe that they are part of a larger societal effort

involving government, regulators, planners and companies. These groups help to define the context within which individual choices are exercised.

Public and private bodies can influence consumer choice in a variety of ways: incorporating sustainability into brand values; taking planning decisions that do not lock people into unnecessary car journeys; and promoting products with smaller ecological footprints. The market transformation approach outlined in the government's consultation on sustainable development is very promising and would be supported by the insights of social science research. It represents an "integrated" approach that takes account of the need to influence individual choice while changing the wider context. It could work well for "non-habitual" consumption decisions relating to homes, cars and appliances. It would be vital to bring consumer groups into such exercises and to ensure that individual initiatives address well-defined product markets. In that sense, a business sector approach would be most appropriate.

Finally, there is continuing need to integrate sustainability concerns into all policy areas. Too often, policies put in place for good reasons of their own have unanticipated, negative environmental consequences. If sustainability concerns are addressed from the start, it may be possible to mitigate negative impacts. For example, decisions relating to educational choice have resulted in children travelling farther to school with a consequent increase in car use. Not only does this have negative environmental consequences in the short-term, it is building up car dependency in a new generation. If sustainability concerns had been addressed from the start, increased choice could have been linked to the provision of more sustainable transport alternatives.

ESRC

Global Environmental Change Programme

January 1999

Memorandum by Eastern Group plc (CC 27)

UK CLIMATE CHANGE PROGRAMME

Thank you for the opportunity to submit a memorandum to the Environment, Transport and Regional Affairs Committee, which is holding an enquiry into the UK Climate Change Programme.

Eastern Group is an integrated energy company which comprises a number of separate energy businesses that have particular priorities and objectives in relation both to environmental and energy efficient issues. Eastern believes its wide-ranging nature of interests provides a strong position from which to comment on these proposals. Eastern has adopted an overall environmental policy and performance statement and I attach a copy of our most recent publication as background to this consultation. A description of the relevant individual businesses is given in Annex A.

Eastern intends to submit a full and detailed response to the UK Climate Change Programme consultation paper by the deadline of 12 February. The following points provides Eastern's general response to the specific issues raised in the press notice (82/97–98) dated 19 November 1998:

— All steps taken by the UK government to address climate change should seek to minimise any adverse effects on industrial competitiveness for UK and/or EU companies. The UK, both at national and international level should actively seek to encourage non-EU countries to adopt the principles of the Kyoto Protocol. In particular, the US must be seen to play a leading role. Emissions trading, in particular international emissions trading, is seen as potentially providing the least cost and most effective solution to GHG reductions. It is however recognised that with smaller scale emitters, e.g., individual transport, fiscal measures may be more appropriate.

Eastern, along with several other major energy companies, supports the use of flexible mechanisms, which will deliver predetermined levels of emissions at least cost. Any final scheme, either domestic or international, should have as wide a participation as practicable. This should minimise the overall cost of emissions reduction and enhance liquidity in the permit trading market. With an efficient permit trading market, the concept of targets becomes moot; the key consideration is limiting the number of applicable permits in circulation to the "target" value, and allocation of the permits. Eastern believes that any trading scheme should be based upon real emissions rather than energy usage.

— Influencing behavioural change is vital to the implementation of a successful climate change strategy to minimise personal and commercial use of energy, particularly in the transport sector. In addition, both the UK Government and Industry need to continue to educate and encourage users in mitigating measures, for example, energy efficiency, waste minimisation and the adoption of "smarter" techniques such as teleworking. The implementation of the IPPC Directive will result in reduced emissions from the 6,000 industrial installations it covers. However, approximately a third of business energy consumption is excluded from the scope of the IPPC Directive. Consequently the use of best available techniques not exceeding excessive cost (BATNEEC) needs to be encouraged to reduce energy consumption and emissions from this sector.

- The timetable for implementation of the UK's Climate Change strategy must be consistent with other international schemes. For example by developing a trading pilot scheme, as encouraged by Lord Marshall, the UK can gain invaluable experience ahead of international implementation. This will then establish the UK as a leading entity in the field of flexible mechanism development and will allow the UK to influence the development of an international solution. Eastern would welcome the early development of a pilot trading scheme. However while the UK should be seen as a driving force behind climate change initiatives, it should not be leading in isolation. In implementing policy, sufficient time must be allowed for industry to respond as many technical solutions may require a significant lead-time. In this respect, the UK strategy, including a timetable and ultimate goals, needs to be clearly defined from the outset.
- All sectors should make an appropriate contribution to GHG reduction. Specific measures should be aimed at specific sectors, but credit should be given for recent reductions. In particular, greater emphasis should be focused on those sectors that are increasing their emissions. Sectoral targets or trading-related permit allocations should not unduly favour or disadvantage any one sector.
- The policies arising from the Climate Change consultation process need to be clearly defined, realistic and focus on achieving agreement from stakeholders. Without stakeholder support targets will be more difficult to achieve.
- The uncertainties involved in emissions projections imply that a structured review and refinement process must be incorporated into the strategic framework. In particular the impact of energy taxation cannot be accurately predicted because taxation does not guarantee the achievement of lower emissions, unlike trading.
- In general, excessive bureaucracy must be avoided, especially when adopting monitoring policies. Standard approaches should be defined, adopted and adhered to. Within the electricity sector, accurate mechanisms to monitor emissions are already in place.
- Reduction in GHGs will have inevitable economic consequences. Therefore, policy should endeavour to seek least cost solutions.

Please contact me if you require any clarification of the above points or further information. Meanwhile Eastern will be pleased to attend the oral evidence sessions, planned for February, if invited.

Edward Hyams

Managing Director, Generation and Director with responsibility for Environmental Issues

31 December 1998

ANNEX A

DESCRIPTION OF RELEVANT INDIVIDUAL BUSINESSES IN EASTERN GROUP

Eastern Generation Ltd (EGL)

Eastern is now the UK's fourth largest generator and operates 6,000 MW of coal fired plants in the Midlands together with two combined cycle gas fired stations at Peterborough and Kings Lynn. EGL is planning significant investment to install flue gas desulphurisation equipment at its 2,000 MW West Burton power station and is committed to producing 10 per cent of its generation from renewable and a further 10 per cent from CHP resources by 2010. Consequently EGL is developing a number of renewable projects including the operational wind farm at Slievenahanaghan (Northern Ireland) and several proposed windfarms supported by the NFFO. Eastern also owns 75 per cent of Nedalo (UK) a small scale CHP company with around 55 MWe at 300 sites, has recently received approval to construct a 215 MW CHP plant at Shotton and has recently acquired BG's CHP portfolio (45 MW).

Eastern networks

Eastern has the largest distribution network in England and Wales and a strong track record on system performance and reliability as demonstrated by OFFER's latest System Performance Report for 1997–98.

Easter Energy Retail

This function comprises Eastern Electricity, providing first tier supplies to our franchise area and second tier supplies to larger customers; Eastern Energy which provides second tier supplies to domestic and small business customers; and Eastern Natural Gas, the largest independent gas supplier (900,000 customers) nationwide. Eastern has a strong track record in relation to operating the current energy efficiency Standards of Performance Schemes, exceeding our 1994–98 target of GWh saved by 17 per cent, and operates a dedicated team providing energy efficiency services to customers.

In October 1997, Eastern Electricity launched "EcoPower", a scheme whereby customers may volunteer to pay a supplement on their electricity bill. These additional contributions are matched pound for pound by Eastern Electricity up to £1,000,000 over the next two years. The funds are placed in an independent charitable trust and used to support electricity generation projects such as wind, wave and solar power. A brochure detailing the scheme is enclosed.

Easter Power and Energy Trading (EPET)

EPET is responsible for managing the Group's energy portfolio as well as providing risk management services to other customers, trading physical assets and a range of financial instruments and "paper" options. EPET is responsible for the commercial operation of Eastern's power stations within emission constraints and aims to become a founder member of the International Emissions Trading Association (IETA).

Memorandum by the Association for the Conservation of Energy (CC 28)

UK CLIMATE CHANGE PROGRAMME

1. General comments

This submission concerns energy efficiency improvements and their relevance to the Climate Change Programme. It does not cover emissions of gases other than carbon dioxide, nor does it consider the role of combined heat and power or renewable energy sources.These omissions are not intended to suggest any differing levels of importance of the various strands within the strategy, they simply reflect the boundaries of the expertise within the Association for the Conservation of Energy.

2. Desirability of options contained in the climate change strategy

The strategy consultation paper stresses the need to ensure that options deliver cost-effective emissions reductions. Assuming that this happens, the commitments made by other countries should have little overall impact on the desirability of the actions taken within the UK.

3. The strategy as a first step

The need for all sectors to play a role in the strategy is recognised in the consultation paper. This sharing of responsibility is an essential component of any longer term emissions reduction strategy as, for more stringent targets to be met, all sectors will need to progress towards sustainability.

Many of the policy options outlined in the paper concentrate on ensuring the development and uptake of energy efficient technologies; fewer address more fundamental behavioural changes, with the possible exception of additional policies aimed at the transport sector.

Perceptions of continually falling energy prices will not assist longer-term moves towards sustainability, as they will tend to encourage increasingly less energy-efficient behaviour. This point is implicitly recognised in the use of the fuel duty escalator for road transport fuels.

The recommendations of the Marshall report on the business use of energy[1] are particularly important in this context, and are discussed further in the section on policies, below.

For the domestic sector, the problem has been worsened by the Government's decision to reduce VAT on fuel to 5 per cent. Their refusal to consider any form of additional taxation on domestic fuel is reiterated in the consultation paper (paragraph 182), despite the fact that social equity concerns could be overcome if the revenues from such taxes were recycled into energy efficiency improvements for fuel poor households. Given the present situation, a significant level of additional effort to promote the benefits of energy efficiency for the domestic sector will be needed, and a mix of fiscal incentives and regulatory action will be required to ensure that target emissions reductions are achieved.

4. The Government's timetable

The foreword to the consultation paper states that "after this consultation is complete, we will develop and consult further on a new climate change programme for the UK".

There is no indication of the timetable for this second stage, nor of any targets for bringing into force any new legislation which may be required to implement the strategy.

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[1] Economic instruments and the business use of energy, Lord Marshall, November 1998.

The present consultation was initially scheduled for the spring of 1998, but was delayed until October. There is no clear reason for this delay.

Taken together, these two issues are cause for concern. A gradual introduction of a programme to deliver long-lasting changes to our energy use systems is needed: if the process of consultation and policy development is allowed to extend much further, there is a risk that a less than optimal course of action will be needed, simply to ensure that short term targets are achieved within the time remaining.

5. The role of different sectors and the merits of sectoral targets

As previously stated, all sectors must play a role if the country is to progress to a long-term sustainable path. The Government's approach: assessing the potential for each sector and, following consultation, setting sectoral targets, seems a sensible way to proceed.

Sectoral targets will be most acceptable if the assumptions on which they are based are clear, and they can be demonstrated to be "fair". Many of the assumptions made in identifying the potential for each sector are not clear from the information given in the consultation paper.

The DETR has begun a process of consultation on more detailed background papers, which provide more of the information behind the results in the main paper, and this process is to be welcomed. However, there still remain many areas which require clarification. In particular, the detailed baseline scenario for energy use, together with its underlying assumptions, should be made public as soon as possible as without this an assessment of the reasonableness of estimates of the additional emissions reduction potential for each sector is simply not possible.

The (perceived) fairness of targets for each sector will depend on the cost and benefits of the required action within the sector. This issue is discussed further in the later section on economic and other costs.

The usefulness of sectoral targets will be maximised if they are open to regular review and adjustment, to compensate for uncertainties in baseline projections and estimates of policy effectiveness, in addition to unforseen technical and social changes.

6. Policies

A wide range of policy options will be needed if all the cost-effective potential for energy efficiency improvement is to be accessed. Therefore it is likely that the vast majority of the approaches summarised in the consultation paper will have a role to play in the final strategy. The comments below are restricted to issues which we feel deserve particular attention.

The energy supply industry

The development of energy services is mentioned, but policy options to support this are not described. This is an important area, and deserves further consideration. It is unclear which (if any) of the potential options is even under consideration. Without new policy initiatives in this area, it is unlikely that significant progress will be made.

Business

The implementation of the IPPC Directive does provide a mechanism to encourage energy efficiency in a small number of major energy users. It is important that the focus of other policy activity is therefore turned on the 60 per cent of carbon dioxide emissions from business which are not covered by the Directive. In particular the commercial sector, which spends annually almost as much as the industrial sector on energy use,[1] yet has historically received far less attention, needs to be addressed.

In commercial buildings, one of the largest barriers to energy efficiency is posed by the high proportion of rented property (90 per cent of total office space). There is little incentive for landlords to invest in measures which will benefit their tenants unless such investment can be reflected in the rental value of the property: energy certification of office buildings would assist here. A regulatory approach requiring minimum efficiency standards is also needed, and options under consideration at the present time include extending the present building regulations to cover more renovation work and also to require improvement work at key trigger points which might include a change of tenant.[2]

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[1] *Op cit*, p. 82, footnote 1, table C3.

[2] The ongoing DETR consultation process on the future of the building regulations is already considering such an expansion. Initial ideas are contained in *A review of the energy efficiency requirements in the building regulations. Interim Paper*, prepared by Oscar Faber for the DETR, June 1998.

In tenanted office buildings, the cost of energy is often included in a fixed charge together with rent. In this situation, the potential financial benefits of energy efficient use of the office space are not available to the tenant, nor indeed is the opportunity for a landlord to use energy efficiency as a selling point. An increase in individual billing of tenants is needed to overcome this problem, and indeed is required by the 1993 EC SAVE Directive.[1] A regulatory approach, or alternatively voluntary agreements with the major finance houses which own much of the larger commercial sector stock, could be explored.

All regulatory and informational policies in this sector could be enhanced by market signals which would be sent by the introduction of an energy tax, an option recommended by the recent report of the Marshall Task Force.[2] This would help to overcome the negative impact of falling basic energy prices. Note that the full impact of the tax would only be achieved if the individual billing described above were in place.

The consultation paper suggests a targeted approach for small businesses (SMEs). We would support this proposal, since progress in this sub-sector will be difficult. The impact of a tax on smaller businesses is an issue of concern, because many of the barriers existing in the domestic sector would also reduce the possibilities for action by SMEs. Lord Marshall recommends a recycling of tax revenues supported by the provision of energy audits for such firms. The level of investment in energy efficiency could be maximised if a proportion of the tax revenue were recycled into a fund specifically for such investments. This option is supported in the Marshall report.[3]

Transport

Fundamental changes to current practices are needed if the transport sector is to play its part in a climate change strategy. For these to occur, the role of local authority transport plans will be crucial. Not only can local measures contribute significantly to carbon dioxide emissions reductions, but also there are a wide range of local social, economic and environmental benefits which will be realised.

These are recognised in the transport white paper.[4] However, these changes can only be realised gradually, and therefore the Government needs to begin the process of implementing the suggestions contained in the White Paper as soon as possible, if the sector is to contribute towards achieving the international and domestic carbon dioxide emissions reduction targets by 2010.

The issue of emissions from international air transport is raised in the consultation paper. Trends in this sector are towards ever-increasing unsustainability, and whilst it is true that these emissions are not included in the national inventories and targets agreed under the Kyoto protocol, they will have to be considered soon. Early national action to encourage more sustainable forms of international travel and communication, particularly within the European Union, is therefore to be encouraged.

Domestic

As stated earlier, the absence of a fiscal mechanism to compensate for falling fuel prices means that significant additional policy action will be needed in this sector. A regulatory approach to improved efficiency is already central for new buildings, and extension to cover the existing stock would be one of the most effective ways to avoid the barriers which exist.[5] Encouraging investment in the stock other than through the building regulations will require increased understanding of the benefits of the investments and a mechanism for using energy efficiency as a selling point when a property changes ownership. The use of "energy labels" for dwellings would assist in both these areas.

Development of energy service provision may be another way to overcome the domestic consumers' reluctance to invest in energy efficiency, but for these smaller consumers it may be a difficult task. A few energy companies are beginning activity in this area by identifying large groups of such customers (for example, local authority tenants). Pilot work supported by DETR funding and administered by the Energy Saving Trust will provide useful insights into the feasibility of various approaches in this area.

However, there remain many individual smaller consumers with little opportunity to participate in a developing market for energy services. Alternative methods of encouraging energy utilities to provide a more integrated service for these customers must be employed.

In the recent consultation on the future of utility regulation, the Government confirmed its intention to issue statutory guidance to energy regulators on their social and environmental objectives[6]. Prompt and collective

[1] European Council, 1993, *Council Directive 93/76/EEC of 13 September 1993 to limit carbon dioxide emissions by improving energy efficiency (SAVE)*, OJ L237/28.
[2] *Op cit*, p. 82, footnote 1.
[3] *Ibid*, para 155.
[4] DETR, 1998, *A new deal for transport: better for everyone. The Government's White Paper on the future of transport.*
[5] *Op cit*, p. 82, footnote 2.
[6] DTI, 1998. *A Fair Deal for Consumers. Modernising the Framework for Utility Regulation. The Response to Consultation*, Conclusion 2.1.

action by Government is needed to issue such guidance, and any required legislation where significant financial implications are involved, as this will complete the shape of the framework within which utilities operate.

Such guidance should result in obligations for energy suppliers to meet energy use reduction targets. These could be similar to the currently operating, and very successful, Energy Efficiency Standards of Performance (SoP) scheme which applies to Public Electricity Suppliers and their franchise customers. Future schemes could build on the success of SoP, but should apply equally to all electricity and gas suppliers and cover all smaller customers.

An expansion of the present scheme, to a level some ten times greater than at present, will be needed if a significant proportion of the available cost-effective potential for efficiency improvement is to be accessed through this route. Options for future schemes are presently being considered by the DETR. The timing of the introduction of a new scheme is a cause for concern: any proposed scheme would probably not become operational for a number of years, as time is needed for the introduction of the required legislation, yet the present scheme ends in March 2000. Guidance for the Regulator, to enable an interim scheme which maintains the expertise within the PESs and brings other energy suppliers into the programme, is urgently needed.

A final point to note about the energy markets is the present tax system favours spending by domestic consumers on energy (with VAT levied at 5 per cent) over investment in energy efficiency (with VAT levied at 17.5 per cent). The limited action taken to date to remove this distortion from investments carried out as part of Government funded programmes will have a negligible impact on emissions of carbon dioxide.[1] Further Government action to rectify this market distortion is needed.

Public sector

The public sector should be used as an exemplar for other commercial sector organisations, through the publication of energy efficiency improvement targets and progress reports. Public procurement policy can also include energy efficiency requirements: as a major purchaser of office equipment, such a policy would act as a significant driver to pull the market for IT equipment towards more energy efficient options.

7. Uncertainties in projections

The consultation paper recognises the issues raised by the inherent uncertainties in projecting future scenarios. The use of a worst case scenario, to allow room for greater than expected baseline emissions, or lower than anticipated policy effectiveness, is a prudent course of action.

However, these uncertainties do point to a need for regular progress reviews and programme updates. Information from the Government on plans for such a process would be useful.

8. Monitoring effectiveness

Most policies will be aimed at sub-sections of different economic sectors. At present, many UK energy use statistics, other than for the domestic sector, are collected only in a very aggregate form, and will not facilitate tracking of policy effectiveness. A system for the collection of more detailed sample data for energy end-use is needed. The English House Condition Survey possibly provides the basis for a template for other sectors, although energy use data must be reported regularly and promptly.[2] Other options include an expansion of the reporting requirements of the Home Energy Conservation Act.[3]

It is important that regular public reporting of progress occurs, to allow independent comment on issues which arise. Publication of the more detailed data is therefore an essential component of any monitoring strategy.

9. Flexible mechanisms

The extent to which flexible mechanisms can form part of strategy will be constrained in two ways. Firstly, they should not be used in place of cost-effective action within the UK: the social and economic benefits of such action are too great to be lost as a result of short-term gain through "easier" actions in other countries. Secondly, many issues such as uncertainties in baseline energy use estimates and monitoring of programme effectiveness are increased in the case where action is taken outside the country funding the measure: therefore it will be more difficult to ensure that genuine, verifiable emissions reductions occur as a result of many such schemes.

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[1] Environmental Audit Committee, first Report, Session 1997–98, *Pre-Budget Report*, para 42.
[2] The energy report from the English House Condition Survey of 1991 was not published until September 1996.
[3] Local Authorities are requested to report annually on progress towards a 30 per cent improvement in the energy efficiency of housing in their region.

10. ECONOMIC AND OTHER COSTS OF OPTIONS

The consultation paper makes a first attempt to quantify some of the costs and benefits of the options considered. Much more work is needed in this area, both to quantify the costs and benefits of options which are as yet uncertain, and also to clarify exactly which costs and benefits have been included in the estimates which are being presented. The more detailed consultations on background papers, mentioned above, should contribute to this process.

January 1999

Memorandum by Dr Chris Hope (CC 29)

UK CLIMATE CHANGE PROGRAMME

This short note is submitted to draw the committee's attention to an Integrated Assessment model of climate change, developed in the UK over the last eight years, with funding from the European Commission.

The techniques of Integrated Assessment combine methods from several disciplines to provide insights into some of the more intractable environmental problems facing decision makers. To date they have been used most intensively in the energy and climate change area.

The model is called PAGE for (Policy Analysis of the Greenhouse Effect), and the latest version is PAGE95.

THE PAGE95 MODEL

The PAGE95 model gives the possibility of calculating the difference in costs and impacts between climate change options.

PAGE95 contains equations that model:

- Emissions of the primary greenhouse gases,
- the greenhouse effect,
- cooling from sulphate aerosols,
- regional temperature effects,
- non-linearity in the damage caused by global warming,
- regional economic growth, and
- adaptation to climate change.

As all aspects of climate change are subject to profound uncertainty, PAGE95 represents more than 70 key input parameters by probability distributions, and expresses outputs in the same way. PAGE95 is described in more detail in Plambeck and Hope (1996), with model equations and details of key input parameters given in Plambeck et al (1995), Palmbeck and Hope (1995) and Plambeck et al (1997).

RESULTS FROM PAGE95

The model was used in Plambeck and Hope (1996) to calculate the marginal impact per tonne of carbon dioxide emissions. The 90 per cent range for the marginal impacts, US$ 10–48 per tonne of carbon, is large compared to other estimates in the literature. New scientific and economic knowledge, in particular about sulphate aerosols and non-linearity in damages as a function of temperature rise, suggests that climate-human interactions are even more complex and difficult to predict than was previously thought. This increase in uncertainty is reflected in the results of the study.

The model is capable of many further applications, including:

- testing out a broader range of adaptive policies which vary both in the effectiveness of the measures taken, and the timescale over which they are introduced;
- varying growth assumptions and discount rates applied to the valuation of costs and impacts;
- describing more fully the effects if certain regions of the world decide to take unilateral action, or refuse to co-operate with policies that are adopted elsewhere.

If the committee would be interested in further information about the model, its particular strengths, and the ways it can be used, I would be happy to provide them.

Judge Institute of Management Studies

University of Cambridge

December 1998

REFERENCES

Plambeck E L and Hope C W (1995), *Validation and initial results for the updated PAGE model,* University of Cambridge Research Papers in Management Studies, 1994–95 No. 15.

Plambeck E L, Hope C W and Anderson J (1995), *Updating PAGE: Policy Analysis for the Greenhouse Effect,* University of Cambridge Research Papers in Management Studies, 1994–95 No. 14.

Plambeck E L and Hope C W (1996), PAGE95. An updated valuation of the impacts of global warming, *Energy Policy, 24, 9,* 783–794.

Plambeck E L, Hope C W and Anderson J (1997), The PAGE95 model: Integrating the science and economics of global warming, *Energy Economics, 19,* 77–101.

Memorandum by the Department of the Environment, Transport and the Regions (CC 30)

UK CLIMATE CHANGE PROGRAMME

INTRODUCTION

1. The Government is fully committed to tackling climate change. In 1992, under the UN Framework Convention on Climate Change, the UK and other developed countries agreed to take on a voluntary target of returning their greenhouse gas emissions to 1990 levels by the year 2000. At Kyoto in December 1997 a Protocol to the Convention was agreed. Developed countries agreed to take on legally binding targets, which will reduce their overall emissions of a basket of six greenhouse gases to 5.2 per cent below 1990 levels over the period 2008–2012.

2. The Member States of the European Union agreed jointly to take on a target of reducing their emissions by 8 per cent over this period. In June 1998, under the UK Presidency, agreement was reached on sharing out this target between Member States. Under the terms of this agreement, the UK's legally binding target is to reduce its emissions by 12.5 per cent.

3. Achieving this legally binding target is the Government's priority. However, it is prepared to do more, and has set a separate domestic goal of reducing emissions of carbon dioxide, the most important greenhouse gas, to 20 per cent below 1990 levels by 2010.

Climate change consultation paper

4. The Government issued a consultation paper[1] on a new climate change programme for the UK in October 1998. The paper is designed to launch a national debate on how the UK can meet its climate change targets. It builds on the existing framework of Government policy; sets out a wide range of policy options in all sectors for reducing greenhouse gas emissions; and, where possible, gives estimates of the level of carbon savings policies might deliver and what the costs and benefits might be. It asks for views on both the overall balance of the programme and individual policy options.

5. The consultation paper outlines the Government's intention to develop a balanced and equitable climate change programme. It will not introduce measures which would damage UK competitiveness or have unacceptable social costs. It will look at the practicality, cost effectiveness and distributional implications of individual measures and develop a new programme based on thorough analysis of costs and benefits. The paper emphasises that measures to tackle climate change can bring "gain not pain", generating economic benefits and improvements to our quality of life.

6. The Government has set out its initial views on the development of a new UK climate change programme in the consultation paper, as well as asking some detailed questions on the way forward. This memorandum does not cover that ground again. Nor does it set out any conclusions on issues which are left open in the consultation paper. The Government will develop its position on such issues in the light of the responses to the

[1] "UK Climate Change Programme: consultation paper", Department of the Environment, Transport and the Regions; Department of the Environment for Northern Ireland; The Scottish Office; The Welsh Office.

consultation paper, further internal analysis, and the recommendations of the Environment, Transport and Regional Affairs Committee and similar bodies. The rest of this memorandum deals with the detailed questions posed by the Committee as far as these constraints allow.

The desirability of the options contained in the consultation paper in the light of non EU countries' commitments

7. All developed countries have agreed to take on legally binding targets under the Kyoto Protocol. How they achieve those targets is a matter for individual countries. We would expect most countries to be aiming to promote energy efficiency and renewable energy and to stem the forecast growth in emissions from the transport sector, although the package of measures used will vary. Developed countries will also be able to use the flexible mechanisms agreed at Kyoto (emissions trading, joint implementation, and the clean development mechanism) to enable them to deliver emission reductions as cost effectively as possible.

8. The Government will consider a range of issues when assessing individual policy options and formulating an overall climate change programme for the UK. The impact on UK competitiveness will be an important factor in this analysis. The commitments of non-EU countries, such as the United States, relative to the UK's targets will be relevant in this context, but the Government will also need to consider the position of UK firms relative to those in developing countries which have not taken on commitments under the Kyoto Protocol.

9. The Government will assess the cost to Business and others of individual policy options. For example, Lord Marshall's report to the Chancellor[1] sets out some initial conclusions on the effect that an energy tax would have on the competitiveness of different industrial sectors. But well targeted action to reduce UK greenhouse gas emissions would also improve the position of UK firms relative to competitors in other countries by stimulating more efficient use of energy and the development of cleaner technologies.

The role of the climate change strategy as the first step towards greater emissions reductions in the longer term

10. The Government recognises that the emission reductions agreed at Kyoto can only be a first step. Greater emission reductions will need to be made after the 2008–12 commitment period. This is recognised in the Kyoto Protocol which requires that consideration of targets for subsequent periods shall begin by 2005 at the latest.

11. This long term challenge will be high on the Government's agenda in developing a climate change programme for the UK. Its challenging domestic goal of a 20 per cent cut in carbon dioxide emissions will increase the need for measures that will stimulate more fundamental changes in the way we use and generate energy and help position the UK to meet more demanding international targets in the future. Action to improve consumer awareness of the link between their personal use of energy and their effect on the environment, and to persuade them to change their behaviour, is one example of a measure with a longer term effect. Measures to increase generation from renewable energy sources, some of which may not be commercially viable in the shorter term, will also be a good investment for the future.

The Government's timetable for producing and implementing its climate change strategy

12. The consultation period lasts until 12 February 1999. The Government will then draw up a proposed climate change programme during 1999 and consult on that. The objective is to have a new programme in place in 2000. This would be in good time for UK ratification of the Kyoto Protocol, which might take place from around 2000–01.

13. UK action to meet its targets has already started through initiatives such as the Transport White Paper, the increase in the fuel duty escalator, an agreement reached at European level to reduce carbon dioxide emissions from new cars and the expansion of energy efficiency programmes as a result of the Comprehensive Spending Review. The climate change programme will build on these initiatives and provide a framework for UK action.

The role of different sectors of the economy in meeting emission reduction targets and the merits of sectoral targets

14. The Government has made clear that it wants to put in place a balanced climate change programme, with all sectors playing their part. It will not allow one sector to pick up a disproportionate share. The consultation paper looks at options for reducing emissions from all sectors and identifies where there is most scope for change. It does not discuss the option of sectoral targets, focusing instead on the impact and effectiveness of individual policy options. However, firms participating in emissions trading would need to be given targets.

[1] "Economic Instruments and the Business Use of Energy", November 1998.

The policies required to meet the UK's international and domestic targets

15. The consultation paper demonstrates that there is scope to achieve both the UK's legally binding target and its domestic goal through the measures quantified. This wide range of measures, and the success of the UK's climate change programme to date, gives the Government considerable flexibility in putting together a new strategy. For illustrative purposes, the table on page 9 of the consultation paper attributes savings from particular sectors towards a 12.5 per cent and 20 per cent reduction, but it would be possible to construct such a table in a number of different ways. The Government will decide which policies to include in the programme in the light of the responses to the consultation paper and further analysis of the costs and benefits of the different policy options.

16. In developing this programme, the Government will need to bear in mind the need for certainty in delivering a legally binding target. It will need to consider a number of "worst case" scenarios which could lead to emissions significantly higher than projected. It will also need to take account of uncertainties attached to projected carbon savings from different policies. Some options are well tried and controllable by Government and could safely be counted towards a legally binding target; others are more innovative, or less certain, and more conservative estimates of carbon savings my need to be used. These and other factors will need to be considered as the Government decides which policies should form the core of the programme to ensure delivery of the legally binding target and which should be used to move beyond that towards the 20 per cent goal.

The uncertainties involved in emissions projections and the impact of policies upon those projections.

17. A major uncertainty is the state of the UK economy in 2010. The Government estimates that the uncertainty in 2010 associated with the main background economic assumptions used corresponds to ±5 per cent around the central estimate of emissions weighted for their global warming potential. This range includes uncertainties in the total impact of policies on UK emissions. The actual uncertainty is likely to be greater than this because it is impossible to foresee all future developments in energy markets and other parts of the economy. In addition, there is considerable uncertainty associated with the parameters of the models themselves, which has not been estimated. Further uncertainty in projections of up to ±5 per cent may arise because changes in inventory methodology may affect projected and historic emissions.

18. The uncertainty in the impact of particular policies can be ±20 per cent or more because it can be difficult to distinguish between the effects of the policy and the background trend. In some cases (for example increased renewable energy capacity) it may be possible to say more accurately what effect the policy has had in retrospect, but the uncertainties will be greater at the outset because of difficulties in predicting the behaviour of the sector involved.

The mechanisms required to monitor the effectiveness of policies in reducing emissions

19. In line with the reporting requirements agreed under the UN Framework Convention on Climate Change, the UK's Second National Communication under the Convention identifies intermediate indicators of progress for the policies listed. In some cases (for example fuel switching in the electricity supply industry, increased nuclear output, or greater use of renewable energy and CHP) the policies can be monitored using national energy statistics. In other cases (notably measures involving taxation) economic analysis is required. Monitoring energy efficiency programmes requires market surveys or direct knowledge of patterns of investment in industry. Policies involving pollution control legislation are monitored by direct measurement of emissions.

The extent to which "flexible mechanisms" should be used in achieving the legally binding target

20. The UK supports the development of international emissions trading, joint implementation and the clean development mechanism. The Government anticipates that Business will want to participate in these schemes. However, at this stage it is not possible to give a clear view on the extent to which they can be used to achieve the legally binding target.

21. Some sectors of Business are already expressing interest in use of the flexible mechanisms, particularly emissions trading. A trading scheme was one of the leading options considered by Lord Marshall. He recommended that, as a first step, the Government seriously consider a dry-run pilot with interested players as soon as possible, as a means of learning lessons for the participation of industry in an international scheme. The Government has already started discussions with Business on taking this forward.

22. The rules for the use of the flexible mechanisms will also be relevant. The Kyoto Protocol states that such mechanisms should be supplemental to action taken domestically, and the European Union is arguing internationally for a ceiling to be placed on the use of these mechanisms. The Government agrees that action taken in the UK should be central to a new climate change programme because of the importance of starting to transform the way energy is used and generated, and because there can be economic and social benefits from measures to reduce emissions.

The economic and other costs of the options in the climate change strategy

23. The Government's estimates of the costs of different policy options are outlined in the consultation paper.

Global Atmosphere Division

6 January 1999

Memorandum by WWF-UK (CC 31)

THE UK CLIMATE CHANGE PROGRAMME

1. INTRODUCTION

1.1 WWF-UK (the World Wide Fund for Nature) welcomes the opportunity to submit written evidence to the Environment, Transport and Regional Affairs Committee's inquiry into the UK Climate Change Programme and commends the Committee for holding this inquiry during the Government's consultation period.

1.2 WWF-UK is one of Britain's leading environment organisations, working on a wide range of environmental issues in the UK and around the world. WWF's philosophy is to conserve nature—wild species and wild places—by promoting the sustainable use of natural resources to meet the needs of current and future generations. WWF considers climate change one of the greatest potential threats to biodiversity and believes that fundamental changes are needed in the energy sector in particular, to change unsustainable patterns of production and use.

1.3 The confirmation of 1998 as the hottest year on record after 1997 and 1995 provides yet another warning that we are seeing significant changes to the world's climate. Extreme weather events such as Hurricane Mitch and the widespread damage caused by the 1997–1998 El Niño episode serve as stark reminders of our vulnerability to climatic events. Over the course of 1998, yet more scientific studies established strong links between recent climatic changes and rising anthropogenic greenhouse gas emissions. There can be little doubt that the need for substantial greenhouse gas emission reductions is real and urgent. WWF is particularly concerned about the likely impacts of climate change on vulnerable habitats and species worldwide.

1.4 Under the Kyoto Protocol and the EU burden-sharing agreement, the UK has accepted the obligation to reduce greenhouse gas emissions by 12.5 per cent by 2008 to 2012. As the ratification of the Protocol is far from assured at present due to political opposition in the US, early and effective action in the EU is of utmost importance for keeping the United Nations Framework Convention On Climate Change (UNFCCC) process on track. The UK, as the EU's second largest emitter of Co_2, is clearly a key country for achieving the overall EU reduction commitment. The UK's emissions record since 1990 is also better than that of any other member state except Germany, with CO_2 reductions of around 7 per cent and its domestic CO_2 commitment for 2010 is one of the strongest in the EU. The UK is thus well placed to play a leadership role both within the EU and in the UN process.

1.5 WWF welcomes the publication of the Government's Climate Change Programme consultation paper which supports WWF's long held argument that climate change policy provides enormous environmental, economic and social opportunities. However, WWF is concerned that the paper, while good on the broad framework of action, is thin on specific policy measures in a number of areas. In some cases this is due to other ongoing reviews which are awaiting completion. It seems unlikely that the programme will be finalised until late 1999, meaning that many measures will not be implemented until after 2000. In the meantime, valuable time will be lost as consumers and businesses continue to receive the wrong signals, in particular as a result of low energy prices.

RESPONSE TO MATTERS RAISED BY THE COMMITTEE

2. *The desirability of the options contained in the UK Climate Change Strategy in the light of non-EU country commitments*

2.1 This point raises a number of different issues. Firstly, one needs to consider the scale of the UK's reduction commitments in comparison with both non-EU developed countries and developing countries. Secondly, the choice of specific policy options compared with what will be implemented in non-EU countries is of relevance.

2.2 The UK has a larger emission reduction commitment under the Kyoto Protocol than non-EU, developed countries (so-called Annex 1 countries), such as the US, Canada and Japan. These countries have been holding back progress in the UN negotiations and are insisting on the unrestricted use of the flexibility mechanisms. In WWF's view, it will be impossible to achieve the substantial emission reductions required in the long-term without a more progressive attitude from the main parties to the Kyoto Protocol. Leadership through more

ambitious targets from big emitters such as the UK are crucial for achieving the ultimate objective of the UNFCCC, namely the stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. WWF thus welcomes the Government's domestic CO_2 target of a 20 per cent reduction by 2010.

2.3 Developing countries have no reduction obligations under the Kyoto Protocol. The UNFCCC enshrined the principle of differentiated responsibilities, on the basis different emission levels and stages of development. Obviously, in the long term emissions need to be limited in all countries but in the near term developing countries insist on action from industrialised countries before entering into any commitments themselves. To date, developed countries have failed to establish a good precedent with most countries failing to meet their obligations under the UNFCCC, namely the stabilisation of CO_2 emissions by 2000. Effective action from the larger emitters is critical for keeping developing countries involved in the Convention process and voluntary commitments such as the UK's 20 per cent CO_2 reduction target are therefore helpful politically.

2.4 The third issue to consider in this context relates to the implications of the specific options considered by the Government for economic competitiveness *vis-a-vis* non-EU (mainly developed) countries. The Kyoto Protocol, under Article 2, outlines a list of policies and measures which all parties with reduction commitments should implement. However, the article does mention national circumstances and hence allows parties flexibility. Nevertheless, it is likely that many countries will consider similar options for emission reductions, namely improvements in energy efficiency, an increase in renewable energy capacity and other low CO_2 options. Even if some countries opt for a substantial use of the flexibility mechanisms, technological changes will have to take place. A growing global market in various emission reduction technologies will offer great economic opportunities for "first mover" countries.

2.5 WWF believes that most of the policy instruments outlined (in particular those promoting renewables, combined heat and power (CHP), energy efficiency) will result in greater economic efficiency, job creation and better economic competitiveness. There are for example great opportunities for the development of a competitive UK renewables industry (for example in offshore wind turbines). The options outlined in the consultation paper are thus both necessary and desirable.

3. *The role of the Climate Change Strategy as the first step towards greater reductions in emissions in the longer term, ie., beyond 2010, with particular reference to the need for behavioural change*

3.1 The Intergovernmental Panel on Climate Change has stated that to avoid long-term dangerous climate change substantial global emission reductions of 60 to 70 per cent will be required by the year 2050. Considering that developed countries will need to be given some space for emissions growth, this could mean emission reductions of 80 per cent or more for developed nations such as the UK. In relation to this, the UK's 20 per cent CO_2 reduction commitment should be welcomed as an important step towards such long term targets. However, the Climate Change Strategy lacks a longer term outlook to ensure that the reductions achieved by 2010–12 will be permanent and lead towards greater reductions in subsequent years.

3.2 In the long-term, the UK needs to move away from fossil fuels both in energy and the transport sector. Some of the options outlined in the consultation paper will set in motion such a move. Of particular importance is the further development of renewable energy sources. While WWF welcomes the government's commitment to promoting renewable energies, we would also like to see some clear principles which ensure that such the most environmentally benign, and not simply the cheapest, options are chosen. There is also a need for enhanced research and development support for options such as wave energy which are currently a long way from commercial viability.

3.3 Energy efficiency has to be the cornerstone of a long-term emission reductions strategy. If one takes for example the housing sector, the turnover of the housing stock is extremely slow and changes now will have a significant impact over the next 50 to 100 years. The consultation paper sets no clear vision for the housing sector, instead referring to the review of the energy efficiency aspects of the building regulations. Action is needed urgently to improve building standards, in particular as currently there is a fast growth in new housing developments.

3.4 Behavioral change has to be an important component of a long-term strategy to reduce greenhouse gas emissions. A major problem is that while there is widespread public concern about the issue of climate change, few people make the connection with domestic energy consumption and use.[1] While during the oil price shocks of the 1970s and 80s, energy conservation was a widely understood concept, this is no longer the case. Currently, consumers are not very interested in energy efficiency as energy prices have been on a downward trend both due to liberalisation and the reduction of VAT on domestic fuel. WWF believes that it will be difficult to achieve behavioural change in the domestic sector without appropriate price signals. Additionally, the Government needs to look at the educational aspects of climate change and find ways of building it into the national curriculum.

[1] In a survey carried out for WWF, while 86 per cent of respondents pronounced concern about climate change and global warming, only 22 per cent correctly identified energy use in the home as one of the main contributors. MORI (1998) *Climate Change: A survey of Public Opinion*, Research study conducted for WWF-UK, MORI, London.

3.5 Environmental organisations can be a valuable partner for the government in the promotion of behavioural change. WWF in partnership with the Global Action Plan are currently running the "Action at Home" Programme. This programme encourages and guides individuals to take practical, personal action in their homes and communities, for the good of the environment by reducing unnecessary waste of resources, and also for themselves, by subsequently saving money. Currently, 20,000 homes are participating in this scheme.

3.6 Overall, WWF believes that the Government should identify and implement a number of options which are particularly significant for emission reductions in the long-term, such as tight building standards, enhanced new and renewable energy research and development, and education programmes.

4. *The Government's timetable for producing and implementing its Climate Change Strategy*

4.1 While the timetable for both the UK's Kyoto commitment (2008 to 2012) and domestic CO_2 commitment (2010) appears to allow plenty of time for measures to be taken, WWF would nevertheless like to see the demonstration of greater urgency by the Government, in particular as far as the implementation of measures is concerned. For example, WWF is concerned that the liberalisation of the domestic electricity sector is progressing without adequate provision for energy efficiency measures. Meanwhile, consumers are getting the wrong signal with confusing offers for lowering their fuel bills. Valuable time and opportunities are currently being wasted. WWF-UK would thus urge the Government to speed up the introduction of key measures, in particular on energy efficiency.

5. *The role of different sectors of the economy in meeting the emission reduction targets and the merits of sectoral targets*

5.1 Broadly speaking, greenhouse gas emissions originate from most human activities. For UK CO_2 emissions, in terms of end-users, the contributions of the three broad emission sectors (transport, domestic, industrial and commercial) are roughly equal. In terms of source categories, power stations are the largest contributor with almost 30 per cent, followed by industry (including iron and steel and refineries) with 24 per cent and road transport with 20 per cent. In terms of future reductions, economic and technical potentials exist for reductions in all sectors, although to varying degrees.

5.2 The transport sector will be particularly crucial in meeting the targets as emissions growth is continuing at a high level in this sector. The UK has been lagging behind many EU countries in terms of public transport investment and there are good opportunities for a significant modal shift. Greater fuel efficiency in cars also offers substantial emission reduction. In both the domestic and industrial/commercial sectors, there is great scope for energy efficiency improvements. New measures are needed in particular to promote energy efficiency in the domestic sector and small and medium sized enterprises, where there are currently few incentives to invest in energy efficiency.

5.3 Sectoral CO_2 reduction targets are being employed by a number of other EU countries (for example Germany and the Netherlands), with targets agreed jointly between the government and specific industrial sectors. The advantage of such sectoral targets is that various branches of industry know exactly what kind of reductions are expected from them. They can also help focus policy and help monitor progress. A disadvantage might be that fixed sectoral targets could detract from the most economically efficient reduction opportunities in other sectors. It is thus important to review sectoral targets on a regular basis in the light of new technological developments. Overall, WWF believes that some positive experiences has been gained with sectoral targets.

6. *The policies from the consultation paper on Climate Change Strategy which will be required to meet the UK's legally binding target for the basket of six greenhouse gases and the domestic target for carbon dioxide emissions*

6.1 The achievement of the 12.5 per cent Kyoto target should be relatively easy. The projections in the consultation paper for the basket for six greenhouse gases suggest that a 12.5 per cent reduction will already have been realised by 2000. A slight increase is expected between 2000 and 2010, leading to a 10.2 per cent reduction by 2010. Hence, only a few additional measures would be needed to achieve a 12.5 per cent reduction. However, as the consultation paper rightly points out, a number of "worst case" scenarios need to be considered, such as higher economic growth than projected. There is thus a need for a safety margin, even if only the Kyoto target was to be achieved.

6.2 WWF believes that the Government should endeavour to implement all the policies and measures necessary to achieve the 20 per cent domestic CO_2 target, which would mean complying with the Kyoto target in the process. Effective measures in all sectors will be required to maintain the emissions trend of the 1990s. According to the consultation paper, business-as-usual projections (including currently planned policies and measures) will only result in a 3 per cent reduction in CO_2 emissions by 2010.

6.3 In recent years, CO_2 emissions have fallen considerably due to the switch from coal to gas in electricity generation. This switch is already slowing down considerably and is likely to continue doing so, in particular

while the Government is attempting to support the coal industry. To achieve further reductions in the electricity sector will require a substantial effort and measures which promote both CHP and renewable energies. WWF believes that additional measures are needed to achieve the Government's renewable energy target, such as changes to the planning system, special support for small-scale, community projects and an enhanced renewable energy obligation. CHP also needs to be given additional incentives.

6.4 WWF considers low energy prices a particular obstacle to an effective climate change policy and believes that some form of energy taxation is needed to encourage reductions in energy use and a switch to renewables and CHP. WWF has thus supported a carbon tax in its submission to the Marshall task force. For the industrial and commercial sector such a tax would promote greater innovation, produce low cost reductions and would be flexible and administratively simple. WWF also believes that a large amount of cost-effective energy savings could be stimulated in the domestic sector through a carbon tax, without disadvantaging low income and vulnerable groups.

7. *The uncertainties involved in emissions projections and the impact of policies on these projections*

7.1 There is always a degree of uncertainty associated with emissions projections. Greenhouse gas emissions, especially those of CO_2, are closely related to economic performance. While there has been some degree of decoupling between economic growth and CO_2 emissions growth over past decades, on balance fast economic growth is associated with increasing emissions, while an economic downturn implies a fall in emissions. The UK's economy is much influenced by developments in the global economy which is notoriously fickle. Additionally, technological progress could result in certain reduction technologies becoming available at low prices. While emissions projections assume a certain level of technological innovation, they cannot predict a major technological breakthrough which could significantly change emissions trends.

7.2 The emissions projections used in the consultation document employ a number of assumptions about key economic indicators which are subject to change. However, the consultation paper does not provide details of these assumptions, hence it is difficult to assess how reasonable they are. In terms of the assumed savings related to the planned policies and measures, not enough detail is provided to make an assessment. The DTI is currently preparing new energy demand projections which should allow a better assessment. Regular updates of emissions projections have to be important component of the Climate Change Strategy.

8. *The mechanisms required to monitor the effectiveness of policies in reducing emissions*

8.1 The UK is already required under the UNFCCC to report annually on greenhouse gas emissions and has to submit regular reports to the Secretariat on its policies and measures. However, the lack of sectoral targets makes it difficult to chart progress in certain areas. Additionally, it will remain difficult to distinguish between the effects of certain policies and measures and external effects. On balance, WWF considers the current monitoring mechanism as effective.

9. *The extent to which "flexible mechanisms" should be used in achieving the legally binding target*

9.1 Under the Kyoto Protocol the term "flexible mechanisms" refers to the use of instruments such as emissions trading, joint implementation (JI) and the Clean Development Mechanism (CDM). WWF has argued both at Kyoto and at Fourth Conference of the Parties in Buenos Aires that the use of these flexibility instruments needs to be capped and that most reductions need to occur through domestic action. Domestic action is imperative for demonstrating how serious developed countries are about emission reductions. Domestic action will also facilitate the maximum benefits in terms of job creation and economic benefits through emission reductions. In the context of emissions trading, the Kyoto Protocol specifically states that trading shall be supplemental to domestic action (Article 16 bis).

9.2 A cap on flexibility would reduce the environmental impact of so-called "hot-air", in particular from Russia and Ukraine. According to the Protocol, their emissions are to be stabilised at 1990 levels by 2008–12. However, as the actual emissions are currently 20–35 per cent below that level, and unlikely to rise significantly over the next decade, these countries could potentially trade the difference, or "hot air". This means that emissions that were avoided are simply traded back into the atmosphere, with no actual emission reduction taking place. For this reason, only "real" emissions reductions should be allowed to be traded.

9.3 The Kyoto targets were limited not by technical possibilities or environmental need, but by countries' estimates of the speed with which they could introduce greenhouse gas emissions cuts without large economic and political costs. To avoid the same issues of transition costs preventing tougher—more environmentally meaningful—targets in the second budget period, it is vital that all Annex 1 economies begin to change investment patterns and develop new technologies now. Given the low Kyoto targets and large amount of so-called "no-regrets" abatement options available in all countries, this will only happen if the overwhelming majority of abatement is achieved domestically.

9.4 WWF does not believe that the UK needs to use the flexible instruments as a means of achieving its legally binding target. Currently, greenhouse gas emissions are already some 8 per cent below the 1990 level and the achievement of the 12.5 per cent target by 2012 offers plenty of economic benefits. Furthermore, if the government wants to achieve its 20 per cent domestic target for CO_2 it cannot avoid taking sufficient action at home. However, investment in a limited number of CDM and/or JI projects might be acceptable, if only to gain experience with such instruments and to facilitate clean development in other countries.

10. *The economic and other cost of the options in the Climate Change Strategy*

10.1 There have been a number of studies demonstrating that the UK can achieve substantial emission reductions at low, zero or even negative cost. The consultation paper itself estimates costs and benefits of carbon savings in the case of some measures but attempts no comprehensive assessment. Such assessments can be very inaccurate as they are based on economic models and various assumptions but still provide a useful background tool for policy decisions. It would have been useful to include some aggregate cost estimates in the consultation paper.

10.2 It is misleading to only consider the costs of climate change mitigation option without a simultaneous assessment of the damage costs. The impacts of climate change are likely to have significant costs in the UK, such as those associated with the loss of coastal land or property damage due to weather extremes. At the same time, emission reduction measures can have a number of benefits, such as the reduction of congestion and respiratory diseases resulting from reduced traffic levels. A comprehensive cost-benefit analysis is thus enormously complex in the case of climate change policy. At the same time, policy decisions must not be based on the economic costs of mitigation measures alone.

10.3 Good policy must weigh up the risks associated with both action and inaction, assessing which one is likely to give the best outcome over all possible futures. Mitigation must go beyond so called no-regrets measures, otherwise we will be under-insuring the planet and storing up costs for the future.

10.4 WWF believes that the Kyoto target can easily be achieved through no-regrets measures, considering that much of the needed reduction has already taken place. Reaching the 20 per cent CO_2 target clearly will be more challenging but offers many direct and indirect benefits, both economic and social. Enormous amounts of money are wasted each year in all sector through energy inefficiency. For example, the Energy Saving Trust calculated in 1997 that UK households waste £6.5 billion every years due to inefficient housing. Meanwhile, the welfare losses caused by badly insulated housing are clearly unacceptable.

10.5 Economic policies tend to create winners and losers and climate change policy is no exception. While there will be some economic costs for some firms or individuals, the overall societal and economic benefits of a 20 per cent strategy are likely to be positive, with many potential winners and a good job creation potential.

6 January 1999

Memorandum by the UK Offshore Operators Association (CC 32)

ENVIRONMENT, TRANSPORT AND REGIONAL AFFAIRS SELECT COMMITTEE INQUIRY INTO THE UK CLIMATE CHANGE PROGRAMME

The UK Offshore Operators Association (UKOOA) is the representative organisation for the UK's Offshore Oil and Gas industry. Its membership consists of companies that are licensed by the Government to explore for and produce oil and gas from the waters of the UK Continental Shelf (UKCS).

BACKGROUND

- Since 1965 the British oil and gas industry has invested over £150 billion in the development of the North Sea (1996 money). Annual investment has consistently accounted for almost a fifth of the UK's total industrial investment. Since 1965, UKOOA members have paid taxes of over £150 billion (in 1996 money).
- UKOOA member companies directly employ approximately 30,000 people, largely in skilled, high technology jobs and the commercial activities of UKOOA member companies support a further 350,000 jobs in the supply and support chain. Many of these jobs are also skilled and are spread across the UK with specific concentrations located in areas with a history of industrial decline such as North East England, Humberside, Central Scotland and the Grampian region.
- The UKOOA membership includes some of the largest and technically sophisticated companies in the world. The technology developed for use in the North Sea has been successfully adapted for other industrial sectors. UKOOA members support a significant percentage of the UK's industrial research and development and provide direct financial support for the science, engineering and other related faculties at many centres of Higher Education across the UK.

— The experience base in offshore oil and gas exploration that the UK now possesses, together with the standards it has set in environmental best practice and on safety issues, leaves it well placed to become a world leader in what is widely expected to become the mainstay of the global oil and gas industry—offshore development.

— Exploration and operating costs in the UKCS are amongst the highest anywhere in the world. Since the UK must compete with other oil and gas-producing countries for the investment capital of the oil companies, it is particularly vulnerable to any increase in costs and any corresponding decline in profitability. This vulnerability is particularly acute during the current period of low oil price.

— UKOOA's response to any initiative that might increase costs is governed by the commercially possible, the corporately responsible and by the need to preserve the competitiveness of the UKCS, the jobs and investment it represents and the commercial activity it underpins.

1. *The desirability of the options contained in the UK Climate Change Strategy in the light of non-EU countries commitments.*

— The overwhelming majority of the countries competing for the same investment as the UK oil and gas industry are non-EU and many are also not within the Kyoto Annex B list.

— As a general principle, the more flexible the implementation mechanism, the lower the cost impact and the more easily it can be planned into future development. As the Consultation Paper makes clear, the investment required will be considerable. A "no-cost" option to conform to the recommended targets does not exist. Unless Government is prepared to consider assistance in such a form as subsidies for the development and installation of new technology, costs will inevitably increase at the expense of competitiveness.

2. *The role of the Climate Change Strategy as the first step towards greater reductions in emissions in the longer term i.e., beyond 2010, with particular reference to the need for behavioural change.*

— As far as the UK oil and gas industry is concerned, behavioural change is at an advanced stage. In the North Sea, developments are subject to an environmental impact assessment. The technological sophistication of new plant, where environmental concerns have been an active part of the design process, is a measure of what can be achieved in reducing emissions. There is also increasing evidence that a strong commercial case can be made alongside the environmental case for such development. We would point out however that, for some of the older installations, the achievement of such standards would be at a prohibitive cost and, if insisted upon, would lead to premature decommissioning and a commensurate loss of jobs. It has been argued that the process of decommissioning would, in fact, be an overall employment booster. This argument effectively equates economic success with an increase in the number of official receivers.

— Behavioural change in our industry is best encouraged by allowing our members the flexibility to adopt the lowest cost solution.

— We believe that, in terms of both energy efficiency and cost, emphasis and resources are best directed at current and future developments and that the proposed method of reducing emissions should be an integral part of any future field development submission to Government.

3. *The Government's timetable for producing and implementing its climate Change Strategy.*

— It is important for the UK and for the success of any global emissions reduction strategy that other countries play their part, The UK effort and timetable should reflect that of our competitors.

— Any programme should be properly thought through and introduced in a measured fashion. There are serious implications for competitiveness and long term development should the implementation be rushed or founded on misconceptions.

4. *The role of different sectors of the economy in meeting the emissions reductions targets and the merits of sectoral targets*

— The specific contribution of certain sectors to the overall well-being of the British economy should be taken into consideration when allocating targets and, in the event of such a scheme being introduced, in the allocation of permits in a trading system. The criteria applied could include capital investment per individual, skill levels of jobs provided, contributions to the development of the technology base of the UK, the contribution to the UK's balance of payments and the importance of any given sector to regional economies and social cohesion.

— The Government's special consideration of the coal community, as outlined by the Deputy Prime Minister, John Prescott, at the National Coalfields Conference on 1 December 1998, is an example of some of these factors coming into play.

— Political consideration not withstanding, there are considerable gains to be made in energy efficiency and emissions reductions by getting the domestic sector to play a part in the UK's reduction strategy.

— Industry should not be required to meet a disproportionate share of the target and it is important that some form of cost/benefit analysis is carried out across sectors.

5. *The policies from the consultation paper on Climate Change Strategy which will be required to meet the UK's legally binding target for the basket of six greenhouse gases and the domestic target for carbon emissions.*

— We agree with the findings of Lord Marshall that the UK will have to meet its targets using a combination of measures.

— As outlined earlier, the greater the flexibility permitted to industry, the lower will be the cost.

— As a general principle, we would be sceptical of any suggestion that an energy or carbon tax is anything other than a blunt instrument unsuited to the delicate task of delivering environmental desirables whilst preserving competitiveness:

(a) Advocates of such a tax have argued that punitive levels are required to be effective and to signal the need for a change in behaviour. This is not in line with the consultation paper's stated aim of preserving the competitiveness of the UK.

(b) The UKCS is already heavily taxed with rates of up to 69 per cent. With oil prices at their current levels, the industry is struggling to maintain activity levels. Additional taxation would impact directly on employment and investment.

(c) The Norwegians introduced a tax on these lines and the effect upon their relatively protected oil and gas industry was such that it is now being reviewed.

6. *The uncertainties involved in emissions projections and the impact of policies upon those projections*

— An international and enforceable definition of an emission and how to measure it is an absolute necessity if a global emissions strategy is to succeed and if valid emissions projections are to be produced.

— Future emissions predictions for the oil and gas industry are complicated by the possible variances caused by geological unknowns such as oil and gas reservoir behaviour. Amendments to the Large Combustion Plant Directive have recognised possible fluctuations and are now seeking to exempt offshore gas turbines. Additionally, it is generally true to say that emissions increase with the life of the field and that this may, in some instances, offset any technological innovations.

— With the high degree of uncertainty, it is only possible to give confident predictions for existing fields. Current industry-wide predictions could be invalidated by the future discovery of large fields, for example in the West of Britain area.

— With the possibility of future developments, targets for emissions should be aimed at achieving a limit per unit of production as opposed to applying an absolute, industry-wide, cap. Such a principle has been applied in the Chemical Industries Association Voluntary Agreement.

7. *The mechanisms required to monitor the effectiveness of policies in reducing emissions.*

— A uniform and accepted set of assessment criteria must be established and some thought should be given to measuring improvements in the domestic sector.

— An independent and respected arbiter should measure compliance and progress and a set of mechanisms to address instances of non-compliance must be developed.

— The assessment criteria adopted should be as international as possible to allow a fair assessment of progress being made and to ensure that compliance is not at the expense of competitiveness.

— Some mechanism for returns should be established. There will be an additional administrative burden on companies.

8. *The extent to which "flexible mechanisms" should be used in achieving the legally binding target*

— Flexible mechanisms are the key to achieving lowest cost emissions reductions for our sector.

— The UK oil and gas industry has consistently demonstrated its ability to innovate in both the development and utilisation of new technologies and in its business mechanisms and initiatives to reduce costs through such concepts as "partnering". The greater the freedom allowed to use this ability, the more likely it is that the twin objectives of compliance and commercial viability will be achieved. An increased tax burden would affect competitiveness and reduce, or eliminate completely, the ability of our member companies to invest in the development and installation of new technology. Investment currently earmarked for the UK would be rapidly switched to other areas of the world that offer a higher return.

— The Climate Change consultation paper holds up the voluntary agreement of the Chemical Industries Association as a successful example of such an approach. A voluntary agreement for our sector is a possibility.

9. *The economic and other costs of the options in the Climate Change Strategy*

— Compliance with Government emissions targets will carry a cost for the UK oil and gas industry. Business should not be expected to bear the entire burden of the Government's Climate Change Strategy.

— The threat to competitiveness means that it is important that the implementation of any option is at least co-ordinated within the EU and on a wider stage if possible.

— The cost will depend upon the degree of flexibility permitted to the British oil and gas industry and the fairness of the targets it is set.

SUMMARY

The UK oil and gas industry expects decisions and initiatives to be guided by a policy of "no regrets" on the basis of "sound science". The industry needs to strike a delicate balance to preserve its competitiveness. This balance must be preserved if jobs and investment are to be protected and we expect Government to ensure that the industry's willingness to participate does not place it at a competitive disadvantage with the rest of the world.

6 January 1999

Memorandum by the Energy Saving Trust (CC 33)

THE CLIMATE CHANGE PROGRAMME

This is the response of the Energy Saving Trust to the Committee's Inquiry into the UK Climate Change Programme, begun in November 1998. This response should not be taken as representing the views of individual members of the Trust.

EXECUTIVE SUMMARY

The Trust welcomes this Inquiry by the Environmental Select Committee into the UK Climate Change programme. We are pleased that the Government has decided to consult on the way forward for a climate change strategy, and that it intends to launch a revised Climate Change Programme in 1999.

The Trust will limit its comments to the domestic sector. There are many opportunities for energy efficiency in this sector, and the Trust feels domestic energy efficiency can play a key role in achieving the UK's CO_2 emissions reduction targets. In fact, the Trust believes that carbon emissions resulting from domestic energy consumption could be reduced by around 5MtC/yr, or 13 per cent, as compared with the current baseline projections for 2010, via cost-effective energy efficiency measures. This is a little more than the estimates suggested by the climate change consultation paper, but broadly consistent with the upper end of the range. The Trust believes a corresponding emphasis should be placed on domestic energy efficiency policy and funding.

Energy efficiency has benefits other than those of emissions reductions. These include social benefits, especially for the fuel poor, and economic benefits for the nation as a whole. The Energy Efficiency Standards of Performance mechanism for example, has delivered net economic benefits to the nation amounting to £250 million, and a benefit to householders of £4.7 for every £1 spent by the electricity companies. Sixty per cent of spend went to low-income households. Clearly, energy efficiency as an emissions reduction measure is compatible with the wider agenda of sustainable development.

The Trust therefore considers it vital that energy efficiency is given the resources and the policy backing to achieve its environmental, social, and economic aims. The EESoP mechanism is a proven means of delivering domestic energy efficiency cost-effectively. Rolled out on a larger scale and extended to gas, it would be capable of achieving most of the domestic emissions reductions required to 2010. It is of concern then that, while the Government has stated its commitment to issue statutory guidance to the new energy regulator on energy efficiency, legislation to allow this to happen is unlikely to be in place until 2001 at the earliest. As the current EESoP obligations expire in 2000, the EESoP initiative may lose momentum in the intervening period. Further more, opportunities to introduce a similar obligation on gas suppliers may also be lost. The Trust would like the Government to issue guidance to the energy regulator in the short-term, concerning the continuation of the Energy Efficiency Standards of Performance for electricity and to authorise an extension of the regulator's power to set EESoP on gas. In the long-term, the Trust would like the Government to legislate, requiring the regulator to extend and expand EESoP for both the electricity and the gas industries.

The Trust is pleased that the climate change consultation has specifically identified the National Home Energy Efficiency Partnership. The aim of NHEEP is to provide a long-term framework for the activities and programmes needed to address home energy efficiency, and it is intended to lead to better co-ordination of energy efficiency programmes. The Trust feels that NHEEP has a major role to play in improving the coherence and effectiveness of the Government's climate change and fuel poverty strategies in the domestic sector.

Domestic energy efficiency: Achievable potential by 2010[1] (EST)

Measure	Achievable potential by 2010 Households (millions)	Average annual energy savings kWh/year per household	Total investment cost £ million 1999–2010	Annual carbon savings MtC/year in 2010
Building Fabric				
Loft insulation	6.0	1,227	1,200	0.46
Cavity wall insulation	5.4	5,032	2,430	1.75
Double glazing	8.5	1,223	1,450	0.68
Low emissivity glass	9.7	459	340	0.29
Tank/pipe insulation	6.0	917	210	0.35
Heating				
Condensing boilers	4.4	3,892	1,320	0.86
Controls	3.0	2,085	890	0.35
Lighting				
Low energy lights	[2]35.2	85	420	0.23
Appliances				
Appliances	Various	Various	[3]1,060	1.72
Newbuild				
Newbuild	2.1	Various	520	0.52
Total	—	—	9,840	7.21

[1] Baseline of 1998 emissions.
[2] The lighting potential number is bulbs rather than households.
[3] Investment in efficient refrigeration appliances only.

Introduction

The Energy Saving Trust was established as part of the Government's action plan in response to the 1992 Earth Summit in Rio de Janeiro, which addressed world-wide concerns on sustainable development issues. The Trust is the UK's leading organisation working through partnerships towards the sustainable and efficient use of energy. The membership of the Trust includes the Secretary of State for Environment, Transport and the Regions, The Secretaries of State for Scotland, Northern Ireland and Wales, and many of the UK's energy companies.

The objective of this evidence is to address those issues relevant to the Environmental Select Committee's Inquiry into the UK Climate Change Programme, which fall within the remit and expertise of the Trust—principally energy efficiency in the domestic sector. The structure of the evidence follows the list of issues raised in the press notice for the Inquiry. It is, of course, impossible in a short paper to address all the issues and questions which the Committee may wish to consider, and the Trust will be happy to provide further evidence orally or in writing if the Committee wishes.

International commitments

The UK has set itself one of the highest emissions reduction targets of all countries, at 12½ per cent of greenhouse gas emissions and 20 per cent of CO_2 emissions by 2010. The Trust feels that this does not compromise the position of UK business, nor the living standards of the UK public. On the contrary, we believe that, by reducing emissions via energy efficiency measures, the UK can only benefit. Energy efficiency in the domestic sector not only reduces environmentally harmful emissions; it also allows the fuel poor to heat their homes properly; it increases the disposable income of households; and it leads to job creation in the energy efficiency industries.

The first step towards a long-term strategy

The Trust believes the first step towards emissions reductions in the domestic sector has already been taken, by the setting up of a number of mechanisms that can deliver energy efficiency, and consequent emissions reductions, on a large scale. These include Energy Efficiency Standards of Performance (EESoP) on electricity suppliers, the "Energy Efficiency" brand, and the National Home Energy Efficiency Partnership, as well as a fuel poverty programme (which is currently being reviewed). The Trust believes that local authorities have also

begun to play a vital role, through the Housing Investment Programme (HIP) and Capital Receipts Initiative (CRI), in improving the efficiency of the UK housing stock.

EESoP is an obligation on public electricity suppliers, set by the regulator, to make energy savings via domestic energy efficiency measures. The associated mechanisms for delivering energy efficiency to households has worked well. However, the current EESoP obligation is due to expire in 2000. While the Government has stated its commitment to issue statutory guidance to the new energy regulator on energy efficiency, legislation to allow this to happen is unlikely to be in place until 2001 at the earliest. There is a danger, therefore, that this proven mechanism for delivering energy efficiency will lose momentum in the intervening period. Furthermore, opportunities to introduce a similar obligation on gas suppliers may also be lost. In order for an EESoP type obligation to make a significant contribution to emissions reductions, it is important that the mechanism is extended to gas and rolled out on a large scale for both electricity and gas. This requires clarification by ministers of the role of the regulator. In particular, the Trust would like the Government to issue guidance to the energy regulator in the short-term, concerning the continuation of the Energy Efficiency Standards of Performance for electricity, although we recognise that the ultimate decision is currently a mater of discretion for the regulator. In the case of gas, however, the Secretary of State for Trade and Industry needs to authorise a two-year extension of the regulator's power to set EESoP on gas. In the long-term, the Trust would like the Government to legislate, requiring the regulator to extend and expand EESoP for both the electricity and the gas industries.

The Trust's "Energy Efficiency" campaign is a long-term campaign intended to raise awareness among consumers of the relevance of energy efficiency to them, and to motivate industry to incorporate energy efficiency as a selling feature in consumer products. "Energy Efficiency" is therefore effecting a *long-term, sustainable* change in customer attitudes, not by requiring a major change in behaviour, but by offering customers the *choice* of opting for an energy efficient service or product, the benefits of which have been explained to them. The Trust believes that we can start to tackle climate change without compromising the living standards of today.

The success of the "Energy Efficiency" campaign, at a level of 40 per cent recognition in its second year, highlights the need for a long-term, consistent strategy. It is hoped that the UK climate change programme will build on this concept, rather than introducing a number of disparate initiatives. The Trust is pleased that the climate change consultation has specifically identified the National Home Energy Efficiency Partnership, which is being facilitated by the Trust on behalf of the DETR. The aim of NHEEP is to provide a long-term framework for the activities and programmes needed to address home energy efficiency, and it is intended to lead to better co-ordination of energy efficiency programmes. The Trust feels that NHEEP has a major role to play in improving the coherence and effectiveness of the Government's climate change and fuel poverty strategies.

Mechanisms such as those described above seem to be appropriate for achieving emissions reductions not only in the medium term (to 2010), but also beyond. The full potential for cost-effective energy efficiency improvements in the UK housing stock is around 30 per cent according to DETR HECA guidance to local authorities, and EESoP, "Energy Efficiency" and NHEEP should be considered as mechanisms for harnessing all of this potential as part of a long-term climate change strategy.

Timetable for implementation

The Trust believes it is right for the Government to consider all credible options for meeting its climate change objectives. We are pleased to have been consulted on the strategy for sustainable development, on the revision of the Building Regulations (Part L: energy efficiency), on consumer products and the environment, and on the review of utility regulation. It is important for policies arising from each of these areas to be integrated. In this context, the launch of a co-ordinated climate change programme in autumn 1999 seems to be appropriately timed.

However, the Trust believes it would be wrong to lose the momentum of existing initiatives in the meantime. The Standards of Performance obligation on both the electricity and the gas industry is a case in point, for the reasons outlined above. We would like the Government to legislate to extend and expand EESoP as soon as parliamentary time is available.

Sectoral contributions

The Trust believes it is useful to set emissions reduction targets for each sector of the economy. This allows policies and actions to be assessed against these targets, and it also ensures that no sector is neglected.

The setting of sectoral targets also recognises that policies need to be tailored to address the particular characteristics of individual sectors. For instance, behaviour and purchasing patterns in the domestic sector are less predictable, and less easily influenced, than in other sectors; a simple energy tax, while it might work for business, would not be appropriate for the domestic sector.

Under NHEEP, we hope that the domestic policies can be discussed; the domestic sector target further broken down, and sub-sector targets agreed upon with the relevant parties, to ensure fairness and maximum cost-effectiveness.

In the setting of targets, we believe it is important to have consistency and transparency in approach, with assumptions clearly laid out. This is particularly important when making comparisons between "bottom-up" projections and econometric projections. The Trust estimates that around 7MtC could be saved on current (1998) emissions levels by 2010, amounting to a saving of around 5MtC on business-as-usual emissions projections for 2010. This compares with the DETR's estimates of 1.4–4.0MtC. Without knowing the DETR baseline assumptions, it is difficult to compare these estimates. However, the figures do amount to savings on business-as-usual emissions, of 11 per cent and 13 per cent respectively. These correspond to a total reduction of over 20 per cent on 1990 emissions levels (including the effect of changes in the generation mix), showing that the domestic sector can deliver its pro-rata share of the UK's 20 per cent CO_2 reduction target through fuel switching in generation and through energy efficiency improvements.

It is worth noting that, while the climate change consultation anticipates about a 50 : 50 split, up to the year 2000, between the contribution of gas-fired generation and the contribution of energy efficiency measures to emissions reductions from the domestic sector, energy efficiency has a number of social and economic benefits that do not pertain to fuel switching. The Energy Efficiency Standards of Performance mechanism for example, has delivered net economic benefits to the nation amounting to £250 million, and a benefit to householders of £4.7 for every £1 spent by the electricity companies. Sixty per cent of spend went to low-income households. Domestic energy efficiency, then, as an emissions reduction measure, is compatible with the wider agenda of sustainable development.

Policies for CO_2 reductions

The Trust believes that the UK is likely to meet its legally binding target of a $12\frac{1}{2}$ per cent reduction in emissions of a basket of gases without major policy changes. However, in order to achieve the Government's manifesto commitment of a 20 per cent reduction in CO_2 emissions, we believe a strategic programme of energy efficiency is required.

This strategic approach should include a long-term and consistent campaign, with sectoral targets and public monitoring of these. NHEEP is in a position to carry out much of this work for the domestic sector. In order for NHEEP to have a credible and effective contribution, it requires full and consistent Government support.

The Trust believes that, to complement more stringent regulations, strategically targeted programmes will be required to raise consumer awareness and effect market transformation in new products. At the same time, well-resourced "mass measure" programmes for basic building fabric and heating system improvements are required to overcome consumer apathy and make it simple (and financially possible) for consumers to carry out these measures.

Regulations are required to underpin such activity. In particular, the Trust believes that the stringency of the Building Regulations (Part L: energy efficiency) should be increased. Given that, by virtue of numbers, the greatest potential for energy efficiency improvements is in housing refurbishment rather than new housing, we advocate the application of the Regulations, as much as is practicable, to improvements in the existing housing stock. Promising proposals include energy efficiency ratings and improvements upon change of ownership of a property.

The Trust also advocates a robust programme of more stringent appliance standards set at EU level; consistent labelling with effective enforcement of the mandatory Energy Label; and a comprehensive consumer awareness campaign. We would point out that the messages put out to the public should be well-targeted, and relevant to them. This means that, given the differences between national market characteristics, actual marketing campaigns should for the moment be run on a national basis, although underpinned by EU standards.

In terms of funding, the Trust appreciates that the Comprehensive Spending Review has already allocated additional funds to energy efficiency. This will increase explicit expenditure on domestic energy efficiency from around £100 million per annum to around £200 million per annum, including funding for the Trust, fuel poverty funding, the current level of EEsoP expenditure, and local authority housing programmes (HIP, the Capital Receipts Initiative and the New Deal). This expenditure is, however, already included in the business-as-usual scenario. We think additional funding, rising to around £200 million per annum by the early part of the next decade, is necessary to stimulate (and part-subsidise, where appropriate) the £800 million per annum investment in actual measures required.

The Trust feels the following funding policies are also required to meet the targets in the climate change paper:

- EESoP obligation on fuel suppliers or distributors.
- VAT reduction on energy efficiency products.
- Explicit guidance to local authorities regarding the use of their Housing Investment Programme funds and CRI, to carry out energy efficiency improvements.

Uncertainties in projections

Clearly, there are large uncertainties in the emissions and energy efficiency projections to 2010. The domestic sector is particularly difficult in this regard, given the number of players and the unpredictable nature of

purchasing patterns. Nevertheless, the Trust's estimates are based on experience in running a large variety of programmes, and an understanding of the barriers to take-up of energy efficiency measures. It is worth mentioning that the shorter the timescale, the more expensive it is to effect changes, and it is therefore not in the UK's interests to delay implementation of the required policies.

Monitoring of effectiveness

The Trust believes that a key requirement of a monitoring mechanism is clearly defined targets. Progress against these can then be checked, in terms of MtC and percentage of the target. These targets will be most effective if they are negotiated and agreed upon with the relevant sectors. In the domestic sector, NHEEP is well-placed to act as a forum for these discussions.

The Trust believes that the Environmental Audit Committee has a key role to play in monitoring the effectiveness of policies in reducing emissions, and is pleased that a consultation on the coherence and effectiveness of energy efficiency policies is already underway. We believe such feedback should be sought on a regular basis, possibly annually. Again, in the domestic sector, NHEEP should be well-placed for providing feedback on progress in all sub-sectors.

Finally, an annual report on sustainable development, produced by a Governmental interdepartmental working group, should summarise progress under the climate change strategy. Such a report was produced by the Government in 1996. This would provide an opportunity for more detailed public scrutiny.

Flexible mechanisms

The Trust believes that flexibility is important for ensuring that the most cost-effective and innovative solutions are adopted to reduce emissions. A key principle, however, is that there must, ultimately, be a net reduction in emissions.

The main relevance to the domestic sector of the issue of flexibility is in the context of an EESoP type mechanisms. The Trust discusses in detail the pros and cons of tradable obligations, and the potential role of third parties, in its response to the DETR's consultation on "EESoP in the New Framework of Utility Regulation." Essentially, we advocate the setting of an obligation on energy companies to achieve energy savings. This obligation could then be discharged wholly or in part to third parties or other suppliers, ensuring that the most cost-effective solutions, and the most competent agents, are used for delivering energy efficiency.

Costs and benefits

The Trust believes that energy efficiency is a particularly effective measure for combating climate change, because it can be cost-effective. We estimate the full cost of stimulating a 5MtC reduction in domestic sector emissions to be just under £6,500 million, at current levels of VAT (17.5 per cent) and today's prices for low-volume activity—i.e.: a worst-case scenario. Despite these pessimistic assumptions, by 2010 the financial benefits (excluding VAT) would amount to £1,040 million per annum. We are currently revising our cost estimates, in the light of the lower bulk-purchase prices quoted in the Government's climate change consultation technical support paper.

It is also worth reiterating that the spend quoted is purely on low-cost, cost-effective measures. Higher cost (but still cost-effective) measures could achieve yet more energy savings, and might be considered for a longer term strategy. The DETR's HECA guidance to local authorities suggests that there is a 30 per cent potential for cost-effective energy efficiency improvements.

Eoin Lees

Chief Executive

6 January 1999

Memorandum by Mrs Angela Kelly (CC 34)

UK CLIMATE CHANGE PROGRAMME

I submit this evidence to explain why I believe that investing in commercial wind power according to the Government's policy to reduce CO_2 emissions is misguided and ineffective.

1. *Windpower makes an insignificant reduction in CO_2 emissions and it wastes taxpayers' money that should be invested in research to find realistic solutions to reducing polluting emissions.*

2. Conservation of energy coupled with restraint in use should be the first priority. It is the logical and commonsense answer to our energy problems, along with improving the technology to clean up our fossil fuelled power stations.

3. I believe it is unacceptable to cover our "un-renewable landscapes" with gigantic industrial machines which are little more than symbols, or a salve to the "green" and essentially urban conscience of those who feel powerless to control the many excesses of our wasteful, polluting and ostentatious society. I share those concerns but despair at the way they are exploited by those who are able to manipulate public sympathies. Apart from a minute amount of uncontrollable, intermittent electricity, these rotating money-spinners merely generate subsidized income for the turbine manufacturers, developers and a very few landowners.

4. Of course we all prefer clean energy but we must not be stampeded into irreversibly ruining what remains of our precious countryside by erecting inefficient, commercial wind "farms" which are no solution to the pollution caused by fossil fuels.

Good planning is about balance—the irreparable ecological damage, loss of amenity and the distressing divisions within previously harmonious communities caused by commercial wind "farms" far outweigh any benefit they purport to bring.

5. After six years investigating the issue from every point of view I am in no doubt that on balance the typical commercial wind "farms" as subsidized and stimulated by the NFFO regime are one of the most destructive things ever to appear on the horizons of the UK. My investigations have included numerous visits to sites and discussions with those people who have these wind factories forced on them against their will. Many times I have heard the noise made by these industrial machines. It is quite unacceptable that people have to live with this. Only a few weeks ago a man living within sound of a wind "farm" said that they were "just wondering how to keep sane for the next 20 years".

6. *It is the impact of these installations and their side-effects that I oppose, not wind energy per se.*

Wind power can be a really useful method of electricity generation.

Installations may be acceptable if they:

(a) *are sensitively and safely sited.*

(b) *do not destroy the scale and character of the local environment.*

(c) *do not create deep divisions within the community*

(d) *supply direct to the consumer*

7. I am not a "NIMBY" ("Not In My Backyard") in the sense as used by the advocates of of commercial wind "farms". The stigma carried by such a label (implying self-interest above all else) is a very effective and frequently used technique for suppressing questions from people anxious to know why gigantic industrial structures are suddenly appearing all over the land and in their "back yards". Many of us consider the whole country as our 'back yard' and even the whole world.

"Scare" tactics are used by the developers such as "you must accept these to save the planet" etc., etc. They seek to induce a sense of guilt in those who, only too reasonably, question the need for such developments. The developers avoid reasoned debate because it quickly becomes evident to people that the true statistics and facts about wind "farms" cannot justify the sacrifice necessary for their implementation.

8. The present politically correct "scare" is "GLOBAL WARMING". Less than 20 years before that "scare" (not long in the life of the planet!) at the beginning of this decade, the politically correct "scare" was

"GLOBAL COOLING"

Just a few quotations to illustrate the point:

1. *"a new ice age must now stand alongside nuclear war as a likely source of wholesale death and misery" (International Wildlife, July 1975).*

2. *"the world's climatologists are agreed" that we "prepare for the next ice age" (Science Digest, February 1973).*

3. *"the North Atlantic is cooling down about as fast as an ocean can cool" glaciers "have begun to advance" and "growing seasons in England and Scandinavia are getting shorter" (The Christian Science Monitor, 27 August 1974).*

4. *"many signs pointing to the possibility that the Earth may be heading for another ice age" (New York Times, August 14 1975).*

5. *"continued rapid cooling of the Earth" (Global Ecology, 1971).*

6. *"the approach of a full-blown 10,000-year ice age" (Science, March 1 1975).*

I do not know the answer but one thing is quite certain—there is no consensus on the matter among *all* the world's *leading* scientists. The IPPC was formed by a group of scientists who were virtually told to reach a consensus on the matter. Many of the world's leading independent scientists say that there is insufficient evidence to prove that man-made CO_2 emissions are the main cause of global warming. Most of them maintain that what is happening to our climate is just in the natural, cyclical order of things—i.e:

> *"Climate will continue to change catastrophically, gradually and unpredictably, whatever happens at the Kyoto conference. We fool ourselves by thinking that we can "halt" climate change by fiddling with one or two politically selected variables"*[1]

9. The wind will always be unpredictable, uncontrollable and unreliable so how can it possibly be an "alternative"? What happens when the wind is not blowing? What happens when the wind is not blowing at the correct speed? Can you switch your light on? No.

10. Repeatedly, one hears the phrase that wind energy is "better than nuclear" from people who are well-motivated but either uninformed or misinformed—and, of course, from the developers! The idea that weather-dependent wind farms' could cause the closure of huge nuclear power stations is a myth which is fostered by the proponents of commercial wind "farms" in order to discredit their opponents. Of course, wind power does not *replace* nuclear or conventional power stations: it merely *displaces* their power for those periods when the wind *happens* to be blowing between the cut-in and cut-out speeds of approximately 11mph and 55mph respectively.

11. It has recently been calculated that the world's current total output of wind energy is *less than* 5 per cent of the UK's requirement for electricity.[2]

— *So even if all the tens of thousands of wind turbines in the world (over 30,000) could somehow be crammed on to the UK we would still have to back up their unreliable output (less than 5 per cent) with an equal amount of conventional, reliable power.*

12. The following statistics are based on "best" performance of the 24-turbine wind "farm" at Cemaes (1995)—i.e., 25 per cent capacity. This represents a total of *1.8MW (less than 2MW!) of an unreliable output* of energy towards an average need for over *40,000MW* of *reliable* electricity. In 1997 demand peaked at *57,000MW!*

The *six 400KW* wind turbines proposed for the Cemaes "B" extension would produce an intermittent, unreliable *5,256,000KW hours (units) per annum* Drax power station can produce a reliable *4,000,000 units in one hour.* Therefore Drax could produce the *annual output* of the Cemaes "B" extension in *less than one and half hours.*

The total 25-year life output of the Cemaes "B" extension could be produced by Drax in about one and a half days.

13. *Recent statistics, based on ETSU figures, show that the average capacity of output of all the wind "farms" in Wales for the year ending March 1998 was a mere 23.3 per cent—less than a quarter of their installed capacity. This is a totally uncontrollable output which is delivered for much of the time (especially at night) when it is not even needed. However, the electricity companies are forced to buy every unit, whether they want it or not, at a fixed, subsidised price. Is it any wonder that the developers are trying to persuade the government to change the planning system and deprive the public of their democratic right to refuse to have these gigantic industrial machines invading and spoiling the countryside and their lives.*

During the same period the average capacity of output for the whole of the UK was 25.7 per cent.

Wind "farms" have been around for some time now so the public are more aware of the reality. This is bound to lead to increasing opposition.

14. Professor Littlechild has recently stated that it could cost an extra £1 billion per annum for 10 per cent of renewables by the year 2010 and questioned whether it was worth the price.

On a recent TV programme he said that it could mean an extra £20 per annum on electricity bills—just to cover the extra 10 per cent from renewables. That makes it very expensive electricity indeed. Ironically the Government has reduced VAT on electricity bills which surely encourages greater consumption. The Government has also put a moratorium on gas-fired power stations so that more coal can be burnt and produce more CO_2. Well, at least coal produces a significant amount of reliable energy which is more than can be claimed for wind power. The cleaner gas-fired plants have already enabled the UK to beat its own target for the reduction of fossil fuels by the year 2000.

As long ago as 1994 the Public Accounts Committee criticised the Conservative government for not realising much sooner that money was being wasted on "wind and hot rocks".

How much better to invest £15 billion into proper research to solve the nuclear waste problem and finding a realistic solution to the creation of clean energy.

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[1] Letter to Teletext, 8 December 1997 from Phillip Stott, Professor of Biogeography, University of London. web site: http://ourworld.compuserve.com/homepages/stott2.

[2] Professor Ian Fells, Newcastle University, House of Commons Trade and Industry Committee, Energy Policy, June 1998.

15. Tony Blair, on his recent trip to China with Heseltine, clinched a deal for Britain to build a hugh coal-fired power station which will burn tens of thousands of tons of Chinese coal in the next decades and winds carrying its pollution will spread over the globe. This makes even less sense for hardware to be dumped all over our countryside in the form of massive wind turbines which will offset the emissions by near zero.

How does this square with the Government's commitment to reducing CO_2 emissions?

Are we to understand that our un-renewable landscapes are to be desecrated for very short-term gain just so that turbine manufacturers and developers can benefit from this falsely created market?

16. In 1997, in a nationwide press release, the Wind Energy Industry proclaimed that in 1996 a "record" 505 million units of electricity were produced from over 550 wind turbines. To put this apparently impressive figure into perspective I should explain that this was 0.15 per cent of the UK's total supply for 1996. Moreover, the average annual increase of supply in electricity from 1992–97 (and since the advent of wind "farms") has been 2.4 per cent.

So, just to meet the average annual increase would necessitate a 16-fold rise in wind power!

17. The Anglesey Aluminium Metal Ltd needs *220MW* of constant, uninterrupted, reliable power.

The unreliable, average output of *22 wind "farms" of the size of Carno*, Wales (the largest one in Europe) would merely *match* the needs of Aluminium Metal Ltd. Owing to the unpredictable, intermittent nature of the wind it *can never replace the reliable, constant 220MW* of conventional power necessary for the functioning of the factory. Deprived of electricity for over six hours the plant would be damaged to such an extent that it would be uneconomic to re-open it. The factory supports *630 jobs* and about twice that number in associated jobs.

18. Over four million new houses are to be built during the next 15 years. Their construction will require even more energy and a subsequent rise in consumption by householders. This means that the proportion of renewable energy from commercial windpower will also have to rise in accordance with the Government's policy. So 6 per cent of energy from windpower by the year 2010 will need to be much higher than at present as the consumption of electricity will be much greater. Are there predicted figures for that year?

19. *In Germany over 90 eminent scientists, lecturers and writers have supported the "Darmstadt Manifesto" published in Bonn on 1 September 1998. This document illustrates how commercial wind "farms" are an environmental disaster and no solution to our pollution problems.*

20. The Government Inspector, David Lavender, recently dismissed National Wind Power's Appeal to put the largest wind "farm" in England on Barningham High Moor. Summing up he said: *"it seems to me that the individual contribution to energy generation needs from High Moor would be insignificant and unreliable, and that pollution savings would be both correspondingly small and uncertain."* He concluded that he could find *"nothing to persuade me that the desirability of exploiting a clean, renewable energy resource at this prominent skyline site outweighs other important policy considerations, which include avoiding damage to attractive areas of landscape."*

21. *Government figures for windpower up to the end of June 1998 show an average output of capacity at 26.7 per cent of a total 318 MW of installed capacity (UK) which is about 85MW. This would not even be enough to run the QE2 at maximum power. The QE2 generates 90MW when running at maximum power—sufficient to light up the whole of Southampton!*

22. To shift an Inter City electric train out of the sidings would require 16 600KW wind turbines.

23. *"It would take two to three wind turbines (600KW each) to compensate for the emissions of one 15-ton heavy goods vehicle."*[1]

24. Commercial land-based wind "farms" are the cheapest, quickest "fix" to be seen to be "green" but in reality are environmentally disastrous red herrings.

It surely must be a political aberration that "in order to save the country it is necessary to destroy it"

5 January 1999

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[1] Questions and Answers regarding the Use of Wind Energy in Germany, by Professors Imboden, Binswanger and Wolfrum.

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