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THE RT HON JOHN WAKEHAM MP

Department of Energy
1 Palace Street
London SW1E 5HE
01 238 3290

Prime Minister

On the whole this is rather stodgy. It is worth looking at the summary (6.1-6.7) and the passages on "the market" (5.1-5.5) in particular.

CAS 13/10

Ms C E J Bush
PS/Secretary of State
Department of the Environment
2 Marsham Street
LONDON
SW1P 3EB

6 October 1989

Dear Kate

GOVERNMENT RESPONSE TO ENERGY SELECT COMMITTEE REPORT ON THE POLICY IMPLICATIONS OF THE GREENHOUSE EFFECT

You are aware that a response is due to the Energy Select Committee's report when Parliament returns. I attach a draft, an earlier version of which was circulated for comments to interested Departments, including your own. My Secretary of State has approved the broad thrust and tone of the draft, and would now be grateful for the views of colleagues.

We would welcome comments by Monday 16 October please, to allow us to submit the final version to the Committee by the middle of that week.

I am copying this to the Private Secretaries of Cabinet Colleagues and to Trevor Woolley.

Yours
David

DAVID MURPHY
Private Secretary

GOVERNMENT OBSERVATIONS ON THE SIXTH REPORT FROM THE HOUSE OF COMMONS ENERGY SELECT COMMITTEE (SESSION 1988-89) ON THE ENERGY POLICY IMPLICATIONS OF THE GREENHOUSE EFFECT.

INTRODUCTION

1. The Government welcomes the Select Committee's report as a valuable contribution both to raising the level of public awareness of the implications of global warming and to the national and international debate on the issue itself. The Government fully endorses the view that the threat of global warming and of consequent climate change is among the most important issues facing the world today. If the changes which some have predicted come about, no individual country or region will be untouched or able to isolate itself from other countries' problems. It represents, therefore, a truly global challenge, and one in which all countries will need to co-operate more than ever before.

2. The Committee's enquiry has illustrated that, although there is a good deal of agreement about the roots of the greenhouse problem and the way it could lead to significant climate change, there remains a wide range of uncertainty about the extent and timing of that change, and almost no real information about the detailed regional climate changes which might follow rises in average global temperature. Global warming may mean changes in sea levels, in the extent and distribution of rainfall, and consequently in patterns of land use, including agriculture. These changes could, at the worst, have devastating effects on the world's geography and ecosystems, and on human economic, social, and cultural life. No single solution seems likely to solve the problem of climate change: a mixture of responses - in energy supply, energy use, and the use of other resources, will in all probability be needed.

3. It is against that background, of major scientific uncertainties, and of the need for any response to have the support of nations all round the world, that the Government must frame its policies and consider the way forward. Action is needed in a variety of areas - scientific research to resolve the uncertainties; in the political arena, international agreement on the seriousness of the problem and, eventually, agreed international action; and, in the UK's own energy sector, the pursuit of policies which will ensure that the problem is not made worse. The Government is already committed to taking those steps which are clearly sensible at the present time, and supporting research and other action which will lead to greater understanding of the problem and more soundly-based response strategies in the

future. These actions cover the responsibilities of a number of Government Departments, all of whose contributions will be needed.

4. The basis for international action will come from the activities of the Intergovernmental Panel on Climate Change (IPCC), organised under the United Nations Environment Programme and the World Meteorological Organisation. The IPCC, whose membership embraces a wide range of nations, including some from the developing world, has embarked on a wide-ranging programme, examining the causes, effects, and possible responses to global warming. The UK is playing a major role in this work, which will, amongst other things, produce better data on which to base future decisions. The UK has also independently proposed at the United Nations a Framework Convention on global warming (which the Committee has welcomed), and is taking a leading role in its preparation.

5. The Government agrees with the Committee's view (Para26 of the Report) that the UK and other developed nations should set an example to the rest of the world, to demonstrate the seriousness of its intent. On the domestic front, the Government is pursuing a number of policies in the nergy sector which will help to deal with the potential threat of global warming:

- programmes for support for energy efficiency and research into renewable sources of energy;

- new requirements for for nuclear and renewables elements in the electricity supply system, under the Non-Fossil Fuel Obligation;

- new incentives for improved efficiency of electric power generation, arising from the privatisation of that industry;

- support for research into cleaner coal combustion.

These policies are considered in more detail in the following paragraphs of the Department's response to the Committee. In addition, the Government's support for global reductions in emissions of chlorofluorocarbons (CFCs) will also have major benefits in reducing their contribution to the greenhouse effect.

DOE insert >

6. The Memorandum below sets out the Government's detailed response to the Committee's Report. The headings and paragraph references correspond (unless otherwise indicated) to those in the Report.

"In addition the Government will continue to press for the pricing of fuels to reflect

1. BACKGROUND

1.1 The Committee briefly explains the origin of the Greenhouse Effect, and its possible implications, and considers, in broad terms, some of the responses which might be made. In general, the Government agrees with the Committee (and much of the mainstream scientific community) that the subject needs urgent attention: but, in the energy sector, the priority is to pursue actions which, while justified in their own right, will also assist in dealing with the greenhouse problem.

1.2 The Government endorses the Committee's recognition of the relatively minor role of the UK in the production of greenhouse gases on the global scale (Para 4). The Committee notes (Table 1) that Carbon Dioxide (CO_2) emissions are generally thought to be responsible for about half of the postulated warming, although such estimates must be treated with caution, since there is as yet no definitive method of distinguishing man-made warming from the various natural cycles. As a later section of the Report explains, there are a number of other greenhouse gas emissions, resulting from a wide variety of human activity - commerce, industry, leisure; and some of the non-energy related ones (such as Chlorofluorocarbons - CFCs) may be more readily amenable to control without significant change to lifestyles or to economic activity than are emissions from the energy sector.

1.3 The lack of firm scientific data on the possible extent and effects of global warming makes it difficult, at this stage, to define the appropriate response to meet a problem whose scale is as yet uncertain. Much scientific work is in progress into the mechanisms and interaction of the oceans, the atmosphere, the biosphere, and the geosphere; but this will take many years to attain any degree of comprehensiveness. Clearly, it would not be right to wait for 20 years or more, until work such as the World Ocean Circulation Experiment is complete: we might then, as the Committee suggests, find ourselves beyond the point of no return. But more data is clearly needed, and it is expected that the preliminary work of the Intergovernmental Panel on Climate Change (IPCC), in which the UK plays a major role, to be reported in its interim report due in 1990, will provide further and expert assessment of impacts and possible responses to allow future policy to be more soundly based than is possible at present.

1.4 Para 12 also discusses the possibility that there may be both winners and losers among countries as a consequence of global climate change. The Government agrees with the Committee that it would not be sensible to base our approach on the possibility of some national or regional benefit for the UK.

1.5 The Committee suggests (Para 20) that much more money should be devoted to R&D into global warming, and that only governments can be expected to fund or co-ordinate this. Research in this area has moved into higher gear, and the vast bulk of the science is international. Although, within the UK, responsibility for this work lies mainly with the Department of the Environment and the Research Councils, the Department of Energy joined quickly with the Department of the Environment to find the funding necessary to help set up the IPCC's Working Group I (on the science of the effect). For such work, funds can be found at short notice, and to the extent needed - more money for this particular project, for example, would not mean any material improvement in the work produced. Much of the energy-related research being undertaken by the Department of Energy (ie renewables, nuclear, energy efficiency, and clean coal combustion) is providing the basis for future emission-curtailment systems, so that response strategies can be initiated more quickly, if they are required.

1.6 The Committee suggests that the UK and its EC partners should devote a sum equivalent to an arbitrarily specified proportion of GDP into global warming R&D (Para 22). While the Government accepts the need for developed countries to provide adequate funding for such R&D, it does not accept that such funding would necessarily be related to some arbitrary proportion of GDP. Effective research requires a bottom-up pressure of sensible ideas, and cannot simply be called into existence by allocating large R&D funds. UK expertise in global environmental research lies in well-defined areas; and it is important that research should remain focussed and goal-oriented, rather than simply expand to mop up all the funding available to it.

1.7 The Government welcomes the Committee's recognition (Para 25) of the seriousness of its intent in relation to the international community, in the proposing of a Framework Convention on global warming. The UK is setting an example to other countries in the systematic way in which it is approaching both the science and the technology of the threat: on the science front, we are supporting and expanding the relevant areas of our national expertise (eg modelling, oceanography); while on technology our continuing support of the nuclear option, extensive promotion of

renewables technologies, the push to repeal the EC Directive on gas burning, and support for tropical forestry initiatives, are all clear positive leads which we hope others would follow.

1.8 There are, as the Committee recognises, a number of difficulties with the conclusions of the Conference Statement of the Toronto Conference on the Changing Atmosphere (Paras 27-39), which proposed a 20% target for reduction in CO_2 emissions. These conclusions were arbitrary, and without substantial scientific rationale. The Conference Statement containing them was drafted with little regard to the discussion which took place during the Conference, which did not formally agree it or adopt it; and the statement was issued some time after participants had dispersed. In any event, such simple percentage targets may not be the best approach, since the circumstances and development of particular countries vary; such targets could have quite different implications for neighbouring countries, let alone those in different continents, and provide no real indication of commitment. The evidence given to the Committee illustrates the wide span of views on the technical practicability of the proposed Toronto targets; and some of the witnesses mentioned too that large social, as well as economic, changes might be required.

1.9 The Government notes the view of the Committee that targets will be a useful measure to judge progress in combatting global warming. The present difficulty is that there is no clear, agreed objective (other than the broad one of reducing the threat of global warming), and targets and intermediate "milestones" cannot properly be set. Through the work of the IPCC we may discover whether, and to what extent, emissions targets might be a useful part of a response. The work of the IPCC, with its United Nations base, its wide range of participation (including countries from the developing world), and its deliberate concentration on proper scientific appraisal, will provide a more thorough and comprehensive view of impacts and responses than was possible at a single event such as the Toronto Conference.

2. CARBON DIOXIDE AND OTHER ENERGY-RELATED GREENHOUSE GASES

Hydrocarbons

2.1 There are still great uncertainties about the quantities of hydrocarbons emitted from various sources. Restriction of such emissions, apart from methane, (ie evaporation from petrol tanks, industrial processes,and solvent evaporation) is more relevant to the control of

tropospheric ozone, and will probably be developed for that purpose. Tropospheric ozone is a minor contributor to the greenhouse effect, and will be controlled for its direct phytotoxic and health effects. Methane control measures are possible through a number of initiatives, including the use of landfill gas and coalbed gas for energy purposes.

Landfill gas

2.2 The development of the UK landfill gas resource is one of the key elements of the Department of Energy's renewable energy R&D programme. The Department has played a pivotal role in the development of this technology, through both its landfill gas R&D programme and nine demonstration projects funded under the Energy Efficiency Office's (EEO) demonstration programme, which has been particularly sucessful at stimulating commercial application of the existing technology. There are now 30 commercial projects in operation with another 28 at the planning and construction stage, utilising landfill gas for heating and electricity generation. It is expected that a significant number of other schemes will be drawn up over the next few years as awareness of the economic and environmental benefits of landfill gas extraction become more widely known.

2.3 The R&D programme is developing the technology further to extract the maximum benefit and utilise the resource to the fullest extent. 29 advanced projects (in addition to those at 2.2 above) are under way or planned, with a contractual commitment of over £5 million.

2.4 A detailed technology transfer plan is being developed for landfill gas, which will further aid the promotion and uptake of the technology. The results of the Department's R&D programme in this area are being disseminated via conferences, technical workshops, seminars etc. In addition, a comprehensive range of promotional literature is now available, directed both at lay public audiences, to raise general awareness about the prospects for landfill gas and other renewables, and at target professional audiences in particular market sectors, to stimulate greater interest in the development of these technologies. These activities will intensify over the next year or two.

2.5 The Non-Fossil Fuel Obligation (NFFO), which is an important part of the Electricity Act 1989, will also provide an enhanced opportunity for the development of landfill gas for electricity generation. There are now around 14 sites generating electricity from landfill gas, with an installed capacity of around 18MW. This is expected to increase to over 26 sites, with an installed capacity of

around 50MW, by 1991. An example of current interest in this area is that shown by NORWEB, who co-sponsored a study by ETSU of landfill gas possibilities (with the "renewables" tranche of the NFFO specifically in mind), and have initiated discussions with Local Authorities and private waste disposal companies with a view to setting up joint ventures to exploit landfill gas, which could, in time, provide perhaps 15-20 MW capacity.

Oxides of Nitrogen

2.6 While, as Para 45 notes, there are emissions of nitrous oxide (N_2O) - which is a powerful greenhouse gas in its own right - from power stations, most N_2O is believed to be of natural origin, and only a small proportion comes from energy facilities. Emissions of nitric oxide (NO) and nitrogen dioxide (NO_2) - which do come largely from power stations and transport, and are known collectively as NO_x - are only indirectly relevant to global warming, although they are involved in the formation of acid rain. Their main greenhouse impact is in the production of tropospheric ozone, and will be controlled as a secondary consideration for that purpose, the prime consideration being to reduce acid deposition. The Government recognises the need for vigorous controls in this area, and is committed to NO_x emissions standards for new generating plant, to substantial cuts in emissions from existing plant, and to a freeze on total emissions, as a result of its agreement to the EC Large Combustion Plant Directive and the UNECE NO_x Protocol.

The Carbon Cycle and Forestry

2.7 The Committee suggests (Para 49) that the Government reassess the possibility of energy forestry as a means of producing energy. On behalf of the Department, the Energy Technology Support Unit (ETSU) has recently reviewed the potential of wood as a fuel, and a report will be published shortly. The main conclusions of the report are:

- wood fuel from forestry wastes can already be supplied to small scale industrial users, predominantly in rural areas. With further development and improvement, the market could be widened;

- energy forestry, both single stem and coppice plantations, can supply wood at £2.00/GJ if developed and managed by farmers;

- simple market penetration models have been used to show that, by the year 2000, the economic potential for wood from conventional forestry could be 0.64 - 1.23 Mtce per annum;

- short rotation forestry could have a short term economic potential of 0.09 - 0.19 Mtce per annum. By the year 2050 this potential could have risen to 0.42 - 2.09 mtce per annum.

As part of the Department's biofuels R&D programme, over 35 projects with a contractual commitment of over £7 million are under way or planned on forestry. These include pilot scale trials, and projects aimed at reducing the uncertainty in the economics and potential contribution from forestry, with the R&D covering both the supply and use of wood as a fuel. The programme is being undertaken in close collaboration with the forestry industry.

2.8 A further review will be undertaken once the results of the present and planned R&D work are available. All the results of the Department's forestry programme will be widely disseminated and promoted, both to the forestry industry and to potential users of fuel wood in industry and commerce.

2.9 The impact of improvements in forestry and wood use in the UK will, however, be limited, due not least to the relatively small amount of woodland remaining here. Of far greater moment is the need to maintain tropical forests, which have a role of global importance in the recycling of CO_2 and in the maintenance of genetic diversity of plants and animals. The Overseas Development Administration (ODA) is responsible for UK policy in this area. Its aims are to support efforts to arrest the destruction of rainforests; to direct more UK overseas aid to encourage the wise and sustainable use of forest resources in developing countries; and to encourage additional forestry research. This involves assistance to many developing countries (eg Cameroon, Ghana, Indonesia, Nepal), with increasing aid expenditure on forestry as part of a new initiative announced by the Prime Minister in October 1988. The first results of this initiative include an offer of up to £40 million of new aid to India for forestry projects (and developement of CFC-free strategies) and the package of measures to assist Brazil announced by the ODA following the then Minister's visit there in July 1989.

Flue Gas Decarbonisation

2.10 Flue gas decarbonisation is a theoretical option for the reduction of airborne CO_2, by removing it from flue gases and disposing of it in some other way. As the Committee notes, this is a very difficult problem, not simply from the point of view of the technology, which has only been tried in small-scale plant; but also because of the problem of disposing of the large quantities of the CO_2, of the order of 5-6 million tonnes annually for each GW of baseload coal-fired power station. The Department has commissioned, via ETSU, studies on the costs of extracting CO_2 from flue gas with a view to using it for enhanced oil recovery and/or injection into depleted North Sea gas wells - these being options which offer reasonable prospects of low leakage back into the environment. The Department will continue to keep under review technological options in this sector.

3. CHANGING THE FUEL MIX

Greater use of Natural Gas

3.1 The Government agrees with the Committee that increased use of natural gas for power generation would help reduce the potential greenhouse problem (Para 68), and welcomes the Committee's endorsement of its stance on the EC Directive on the burning of gas for power generation.

3.2 The Committee recommends (Para 69) that the Government consider favourably any proposition for joining Great Britain to the European gas grid. Existing UK gas reserves are sufficient to take us into the next century, and the need for a European connection to allow imports in large quantities is not seen as a priority. As and when such a development is proposed, it would be considered in the usual way; but it must be for the market to come to a view as to when such a connection might be necessary.

Hydrogen

3.3 The Government accepts the recommendation of the Committee (Para 73) that the potential benefits of hydrogen be reviewed, and is undertaking such a review with ETSU which should be completed in 1990. However, for any impact on CO_2 emissions to accrue from the use of hydrogen, it must be produced (usually using electricity) from a non-fossil source, and, in the UK, these are relatively limited, apart from nuclear or the electricity-generating renewables. In

many uses, the electricity used to produce the hydrogen is likely itself to be the more versatile and efficient fuel.

3.4 The Department is aware of the the joint Canadian/German/EC initiative mentioned by the Committee (Para 73), which is intended to demonstrate the transport infrastructure needed for bulk hydrogen, and its use in vehicles. The gas is to be produced in Canada from hydroelectric sources and shipped to Germany for use in conventional power generation and a public transport bus fleet. While there may not be much new technology involved in the proposal, it should help to illustrate the economics of long-distance transport of hydrogen and its use in sectors such as transport. The Department will keep in touch with developments on the project.

Nuclear Power

3.5 The Government shares the view of the Committee that nuclear power on its own cannot provide the answer to global warming, but that it can make an important contribution to reducing CO_2 emissions from power generation (Para 82). It notes that the Committee intends to investigate fast reactor research in the light of increasing concern about CO_2 emissions and the long-term viability of traditional fission. The Department will, of course, be giving evidence to this enquiry.

Renewables

3.6 The Committee recommends (Para 90) that "the Department should undertake further thorough analysis of the renewable energy sources which could be deployed over the period to 2025 in the UK.." and that "funding of renewables should be increased substantially so that technologies are brought nearer to exploitation." The most comprehensive review of the potential of the UK renewable energy resource was undertaken in 1988, and the results published as Energy Paper 55. Existing programmes are developing the technology and enabling substantial estimates of potential to be produced on an ongoing basis. From time to time, as data become available from the programme, updated estimates will be made and published.

3.7 Energy Paper 55 also included, for the first time, a detailed breakdown of the financial resources required to develop the UK renewable energy resource over the next ten years. These estimates are being used as the basis for the Department's bid for resources for renewables R&D as part of the annual Government expenditure cycle, and will be reviewed from time to time, as more information from the

programme becomes available. For 1989/90, the provision represents a 10% increase in the budget over that for 1988/89. Over £50 million is earmarked for expenditure on renewables R&D over the next three years. It is expected that the existence of the tranche of the Non-Fossil Fuel Obligation reserved exclusively for renewables will provide further impetus to the private sector to invest in relevant R&D, and will give a considerable boost to the prospects for generation from renewable forms of energy in the UK.

3.8 The Committee also suggests (Para 90) that the analysis of renewables should take into account "the advantage of their environmentally benign nature". It should be borne in mind that no energy production is environmentally benign, or even neutral - there is always some impact, which changes the environment in some way. It is true that renewables may have some advantages in the context of the greenhouse effect: but they still have a local, or even regional, impact. The obvious local effects are visual intrusion, noise, and effect on land values: but it is less easy to be certain of the cost of such things as the long term effect of changes to bird habitats, or of the potential costs of changes to local underground water tables as a result of a Severn barrage.

3.9 Proper assessment of environmental factors associated with different energy sources is, however, an important topic, for which methodologies have not yet been fully developed. For this reason, at the request of the Department, ETSU placed in June 1989 a contract with Newcastle University to develop a methodology for assessing the external costs and benefits of energy technologies, and which can be applied across the whole spectrum of such technologies. This work follows on from the pioneering work of Olaf Hohmeyer, whose book "Social Costs of Electricity Production", published by the European Commission, was an important first step in the quantification of external costs of electricity production, covering atmospheric pollution, major accidents, land use, noise, landscape values, employment, depletion,public costs, and subsidies. The first report from Newcastle University is due at the end of 1989.

Coal

3.10 The Government welcomes the Committee's agreement (Para 93) that coal is by far the largest source of fuel resources, both in the UK and in the world, and that we cannot turn our back on that fact. The important issue, then, is to seek cleaner and more efficient ways of burning

that coal so as to reduce the amount needed to produce power, and thereby to reduce emissions of CO_2.

3.12 The Committee mentions the "Topping Cycle", which is a new development which avoids the temperature limitations of the fluidised bed process and enables full advantage to be taken of advances in gas turbine technology. The prime purpose of the "Topping Cycle" programme at Grimethorpe is to take advantage of the existing facilities to test the advanced hot gas cleaning systems which are essential if the full potential of the system is to be realised. A commercial plant would use fluidised bed combustion to consume partially reacted coal from the partial gasification stage; but for this programme, the facility will burn coal to generate hot dusty gases, and the temperature of the gases leaving the hot gas cleaning stage will be raised to the operating level for modern gas turbines by the firing of propane gas as a supplementary fuel. This high temperature gas will be fed to an experimental gas turbine through the hot gas cleaning system. In this way, the ability of the cleaning system to protect the gas turbine will be assessed under conditions similar to commercial operation.

3.13 Detailed discussions between the Department and British Coal (BC) have been taking place since January 1989, with attention focussed on the technical basis for the advanrages claimed for the Topping Cycle and the level of private sector support which might be obtained. These discussions culminated in the Government's decision to provide additional funds for this work, and the Secretary of State's announcement on 24 August of up to £8 million Government support for the £16 milliom Topping Cycle development. BC is confident is confident that the balance of the funding can be found mainly from private sector sources.

3.14 European Community support amounting to around £3.5 million has been secured by British Coal for R&D on the partial gasification stage and other components of Topping Cycle R&D being carried out at their Coal Research Establishment, and BC will seek further such support whenever the opportunity arises. The Government's assistance will help bring Topping Cycle technology to the point where support for a prototype power plant can be sought from the new Community "Thermie" programme which is expected to start in 1990.

4. ENERGY EFFICIENCY

4.1 The Government agrees that energy efficiency measures have great potential for containing CO_2 emissions (Para 102); as the Committee found, however, there are different views on how that potential can best be realised. There is evidence that energy efficiency has in the past been substantially boosted by price rises (particularly in the 1973 and 1979 fuel crises), but the related effects on the economy suggest that price rises as a means of promoting energy efficiency would have profound effects on our international competitiveness.

4.2 In this context, the Committee asked the then Secreary of State, Mr Parkinson, about the relative energy efficiency performances of the UK and Japan (Q.510). While the Report notes the difficulty of making accurate assessments of countries' comparative performances (para 106), it is instructive to consider the impact of Japanese fuel prices. Modelling the effect of such prices on UK energy consumption, using the price elasticities of demand incorporated in the Department's energy demand model, the UK's energy intensity for 1987 would fall from the 0.43 shown in Table 25 to 0.31, compared with 0.26 for Japan (this calculation excludes consequential effects on the economy of the massive price rises). It is clear, therefore, that a large part of the difference between current energy intensities in the UK and Japan is attributable to higher Japanese energy prices, which in turn are due particularly to their lack of indigenous energy resources; we have not attempted to quantify the contribution to the remaining difference of obvious factors such as ambient temperature and dwelling space per head, but they suggest that the underlying levels of energy efficiency would be much more similar if UK prices moved to Japanese levels. As a more direct and local comparison, the UK's energy ratio has improved considerably in recent years against other Member States of the EC, and has been improving twice as fast as the EC average.

4.3 The Government believes in the full market pricing of fuels as fundamental to promoting efficiency in the economy and safeguarding international competitiveness. The efficient working of the market will promote energy efficiency more effectively than Government intervention, however well intentioned. The Government's role is to stimulate the market for energy efficiency goods and services, and to tackle barriers (especially lack of information, but also institutional barriers) to the free play of market forces.

4.4 The Report refers to an apparent relegation of energy efficiency initiatives in the Department's priorities (Para 104). As Mr Parkinson made clear in his evidence to the Committee, the EEO's work has moved on to a new phase, from general advertising and subsidies to focussed dissemination of authoritative information and advice. This is not a relegation of priority; the Government's response to the 4th Report of the Committee sets out the funding changes in detail - and explains that they will not adversely affect progress towards the national improvement in energy efficiency of 20% over ten to fifteen years from 1983.

4.5. The Government agrees with the Committee's view that there are market imperfections in the energy efficiency field (para 107), and the EEO's strategy is directed to improving the operation of the market. Through the Best Practice programme, the EEO will enable people to work out how efficiently they use energy, compared with others in similar situations; it will establish what are the most effective existing and new technologies and energy management techniques in each sector, and disseminate them widely; and it will help the development of new methods of improving energy efficiency. The Government is confident that the work of the Regional Energy Efficiency Officers will ensure that the Best Practice programme reaches the right decision makers at all levels of industry and commerce. In the public sector (para 109, 112), Mr Parkinson announced on 20 July the framework for a campaign within Government Departments to achieve savings rising to £45 million per year (15% of their current energy bill) in five years; this includes the appointment in each Department of a Minister with specific responsibility for energy efficiency.

4.6 The anomalies in the new tariff structure for gas (recorded in para 110) were drawn to the attention of Ofgas who discussed it with British Gas. The Government was glad to learn that British Gas are considering a revision of their tariffs to remove this disincentive to energy efficiency.

4.7 The Report urges a review of strategy and a higher profile and pro-active stance in the promotion of energy efficiency (para 111), a mixture of regulation, penalties and incentives (para 113) including a mandatory labelling system for appliance and domestic buildings (para 115), and incentives to encourage the installation of energy efficiency measures (para 118). The Government believes that, since energy efficiency makes financial sense as well as being environmentally important, it is generally unnecessary to set regulations or to give people other

taxpayers' money to do what they know to be in their own interests. The Government has recognised, through the Homes Insulation Scheme, support for Community Insulation Projects, and its proposed new Home Improvement Scheme, the special position of low-income households, and it continues to recognise this fact.

4.8 The Government welcomes measures designed to reduce market barriers to the take up of cost-effective energy efficiency measures. Under a voluntary agreement concluded early this year, virtually all manufacturers of domestic electric appliances in Western Europe are now providing standard energy consumption information in harmonised form for those appliances which are major consumers of electricity (dishwashers, washing machines, tumble driers, refrigerators, freezers, ovens); in addition, all electrical appliances are marked with their maximum rate of consumption - for appliances such as fires or lamps this is the same as average consumption, effectively an energy label. In this context it is not apparent what benefits would be gained by a mandatory scheme. Also, the trade in domestic electrical appliances is well developed, with many major manufacturers operating from bases in different countries and selling electrical models in different markets: the energy consumption of appliances sold in the UK is generally similar to those sold elsewhere. Special high efficiency freezers are insulated to withstand periods of power failure up to 48 hours and are not cost-effective in terms of energy saving alone - it is the general reliability of electricity supply in the U.K. which makes them unmarketable. The EEO has commissioned a comprehensive survey of the energy efficiency of appliances, covering the various options for facilitating rational choice by providing energy information in various ways, including energy labelling.

4.9 As with appliance labelling, the Government supports the development of home energy audits and labels, but does not regard a mandatory regime for labelling domestic buildings as appropriate. In particular, compelling householders to spend sizeable amounts of money (up to £200) in this way is not justifiable, and a public subsidy is not an acceptable alternative. The Government is continuing to encourage the development of commercially-based home energy labels.

4.10 In relation to transport (paras 121-124), the Department of Transport is concerned with energy efficiency and has promoted improved energy efficiency in road transport by providing publicity and information about the

financial advantages of fuel saving to vehicle owners and operators. This includes:-

- twice yearly publication of official fuel consumption figures for new cars available in the UK. These booklets which are available in showrooms enable new car buyers to compare different models on the basis of results from standards tests;

- advice, included in the above booklets, on which cars can use unleaded petrol and on driving operation and maintenance techniques to enable motorists to make the most of their petrol;

- in collaboration with the EEO, publication of a booklet "Energy Efficiency in Road Transport" which gives advice to commercial vehicle operators on ways of improving fuel economy.

Account is also taken of fuel efficiency in policies on control of emission of carbon monoxide, hydrocarbons, nitrogen oxides and diesel particulates. In Europe the Government has championed an approach to regulating these emissions which would allow the most fuel efficient engines to be used. A European Community Directive now sets state-of-the-art emissions standards for new small cars. These standards will take effect in 1992, and will probably entail the use of three-way catalysts. The Government welcomes the Directive. It will pave the way for tighter standards for all sizes of car, and enable manufacturers to plan their production with those limits in mind. However, while controls involving the use of three-way catalysts will significantly reduce emissions of carbon monoxide, hydrocarbons, and the oxides of nitrogen, they will do nothing to reduce emissions of CO_2. This is a serious omission. In the development of the roads programme, and specifically in the recent Roads White Paper, one of the major objectives is to relieve traffic congestion and hence to improve road transport energy efficiency. Congestion is a major cause of poor energy efficiency, as well as costing industry and motorists dearly in terms of time lost.

4.11 A key Government objective is to investigate the options for reducing the amount of fuel burnt by vehicles. These include many of the options mentioned by the Open University in their evidence to the Committee. They have been given added significance by the concern over global warming from CO_2 emissions. The European Community is committed to looking for ways to reduce these emissions.

4.12 Fiscal incentives (Para 123), both in relation to company cars and to vehicle excise duty, are a matter for the Chancellor of the Exchequer, who bears such questions in mind.

4.13 The Government agrees that there are unresolved environmental questions concerning the burning of aviation fuel at high altitude (Para 124). High altitude pollution monitoring is very costly, but Warren Spring Laboratory is about to embark on a study of aircraft emissions which will include measurements of the greenhouse gases, CO_2 and N_2O at ground levels, and computer modelling of effects at altitude.

4.14 The Government notes the Committee's general welcome for its policy in regard to Combined Heat and Power (Paras 125-129), and will continue to encourage the economic implementation of CHP, and work towards the identification and elimination of barriers which inhibit such development. Section 47 of the Electricity Act places a duty on the Director-General of Electricity Supply to keep CHP under review.

4.15 The Committee recommends (Para 131) the development of methodology for conservation supply curves. The Government has been aware for some time of the approaches described, and the arguments for the development of such methodology. It is interesting as a concept, but in practice there are difficulties in ascribing values to the variables in any model (for example, if demand for energy falls, the exact fuel type and timing of the reduction may be as important as its volume); for this reason, it is not likely that conservation supply curves can be a reliable predictive tool.

5. THE MARKET

5.1 The Committee suggests (Para 134) that market mechanisms unaided would not produce an adequate response to global warming, and that it would like to see "..market forces in favour of moderating demand fortified by the fiscal system, regulatory measures, and incentives." The Government has made it clear (Baroness Hooper's evidence, Question 139) that it does not regard concern for the environment and the operation of free market mechanisms as incompatible. Many free markets operate within a range of given parameters which are set by government intervention, such as regulations on health or safety. But for such intervention to come about in a realistic and useful way, it is first necessary to understand quite well the problem

which is to be overcome and the appropriate means of resolving it: this is difficult, in the present state of knowledege, with the greenhouse effect.

5.2 Current and future energy prices are likely to continue to encourage the efficient use of energy. It is recognised that there are external costs associated with energy consumption which are not fully taken into account by market mechanisms; and the Department is taking steps (Paragraph 3.10 above) to provide a methodology to allow this to be done. However, when that knowledge is gained, and the parameters for appropriate action set - by regulation if that should prove necessary - it is expected that market mechanisms would provide the most efficient means through which a response to global warming can be made. The ability of market mechanisms to force innovation and to influence the behaviour of producers and consumers alike should not be underestimated.

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5.3 The Committee recommends (Para 136) "..that the environmental costs and benefits of all energy technologies should be at the forefront of the Department's thinking in future.." The need for proper analysis of environmental impact is recignised - although, as already mentioned, the methodology does not yet exist for a precise quantification of environmental impact, especially in global terms. The Department's Energy Paper 54 "Energy Technologies for the United Kingdom: 1986 Appraisal of Research,Development, and Demonstration" included an initial assessment of the environmental impact of each of the technologies considered (spelt out in detail in the Background Papers, published as ETSU-R-43). That assessment did not take account of global warming; but it will be reviewed, incorporating the new environmental impact methodology when that is available. The Department has powers under the Electricity and Pipeline Works (Assessment of Environmental Effects) Regulations 1989 to require the production of an environmental impact assessment before granting consent to new large-scale power sources: this allows due consideration of the environmental effects of new plant, but, if tighter national emissions standards are eventually to be required, that would be covered by existing (or revised) legislation on air quality.

5.4 The Committee recommends (Para 138) that "..energy saving be included in the non-fossil fuel component of electricity supply.." and that "..something akin to the non-fossil fuel requirement must be introduced to secure the full take-up potential of CHP." The primary aim of the Non-Fossil Fuel Obligation is to achieve security of supply through diversity of fuel inputs. Energy efficiency and fossil fuel CHP schemes do not fulfil this aim, and have

therefore not been included in the obligation. Electricity from CHP schemes, where the fuel source is non-fossil, contribute to diversity in supply, and will be able to count towards the obligation. As diversity has a cost, it is necessary to legislate to ensure that it is maintained. Measures which improve efficiency, however, such as CHP and energy efficiency, benefit those who implement them. There is no need to legislate for proposals which are in the consumer's own interest to implement.

5.5 The Committee accepts (Para 141) that a simple carbon tax would create problems of acceptability on the grounds that nations would be affected to different extents by virtue of their energy sources rather than their energy consumption, and recommends that the EC should examine the feasibility of fiscal measures which would reflect the costs of global pollution caused by energy production of all types. Such measures would reflect transboundary costs, and not those specific to the nation where the energy production is taking place. It may be that fiscal measures of this kind could arise out of the work that the IPCC is carrying out at present, and which ranges much wider than the EC. The Government will give serious consideration to any recommendations from that forum on this aspect, taking into account both internal and transboundary effects.

6. CONCLUSIONS

6.1 The Committee says (Para 146) that it would be inexcusable if pusillanimity and the inability of governments to plan long term allowed irreversible global warming to occur. The Government fully agrees: the question is what, at the present state of knowledge and international consensus, are the sensible courses of action. The Government has already been able to settle on a number of policies which will help with the problem. Further information, eg from the IPCC, will allow this process to continue.

6.2 The Committee accepts (Para 147) that the present uncertainties surrounding the scale, pace, and consequences of global warming are such as render unjustifiable the immediate introduction of expensive or draconian penalties for CO_2 emissions. It recommends the setting of emissions targets because the "insurance premia" required to achieve them are so modest - although much of the evidence presented to the Committee suggested that the Toronto target of 20% reduction, used for illustrative purposes, would be very difficult indeed to achieve and would even then take many years. The Government believes that, at this stage, the

adoption of targets would be premature, in the absence of adequate information.

6.3 The Committee acknowledges that the Government had been in the forefront of UN activity on climate change (Para 149), and looks for early action to accelerate the adoption of energy supply and demand measures which are inherently economic and which would reduce CO_2 emissions. The Government is pursuing a number of such measures already. To go beyond this, at significant cost to the UK, in the absence of agreed international action, would be both economically punitive and unlikely to have any significant global impact.

6.4 The Committee expresses concern at changes in the Department's R&D budget, and recommends that this should be substantially increased. Recent developments in the Department's budget have been explained to the Committee. The Committee is to conduct a separate enquiry into the fast reactor. Expenditure on renewables is rising, and the Govrnment has announced, as already noted, a substantial increase in expenditure on clean coal combustion research. These areas of research are both ones which carry large potential benefits in terms of global warming.

6.6 Against a background at the time of media speculation and rumour, the Committee recommends (Para 154) the retention of the Department of Energy, to provide a coherent overview across all sectors so as to deal with the likely problems ahead. The Prime Minister has announced that the Department will continue as a separate entity at least for the life of the current Parliament. It should, however, be borne in mind that the Department of Energy is only one of a number of Departments in this particular area: other important roles are played by the Department of the Environment, the Ministry of Defence (via the Meteorologiocal Office), the Foreign and Commonwealth Office and the Overseas Development Administration, and the Ministry of Agriculture, Fisheries, and Food.

6.7 As noted at the beginning of this Memorandum, the Committee's enquiry and Report have performed a valuable service in helping to expose the debate on the greenhouse effect to a wide audience. It is encouraging to note that, overall, the Report agrees that the Government is generally doing the right things; and that the Department's programmes - in their support of nuclear power, renewables, and clean coal combustion - are aimed in the right directions to help combat the threat of global warming. In an area beset with so much uncertainty, there is clearly room for some divergence of views on how quickly and how far to react.

Both the Committee and the Government recognise the great importance of this issue, and the Government will continue, through its support for work via the IPCC and elsewhere, to devote great attention to resolving the uncertainties and developing policies to combat the problem.