House of Commons

Science and Technology Committee

Government Response to the Committee's Fourth Report: Towards a Non–Carbon Fuel Economy: Research Development and Demonstration

Sixth Special Report of Session 2002–03

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The Science and Technology Committee

The Science and Technology Committee is appointed by the House of Commons to examine the expenditure, administration and policy of the Office of Science and Technology and its associated public bodies.

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Fourth Special Report

On 3 April 2003 the Science and Technology Committee published its Fourth Report[1] of Session 2002–-03 Towards a Non Carbon Fuel Economy: Research, Development and Demonstration. On 6 June we received a memorandum from the Government which contained a response to the Report. The memorandum is published without comment as an appendix to this Report

Appendix

On 3 April 2003 the Science and Technology Committee published a report on its findings from this inquiry. This note sets out below the Government response to the Committee's conclusions and recommendations.

The Government is grateful to the Committee for its report. It recognises the key role of RD&D in bringing on the low-carbon technologies needed to achieve emission reduction targets over the long term. The Energy White Paper endorses the research priorities recommended in the Chief Scientific Adviser's Energy Research Review. The Government has also demonstrated its awareness of the particular importance of increasing investment in fundamental research activities: an additional £28 million was allocated to the Research Councils in last year's spending Review to support research into sustainable energy.

The Government agrees that there is a need to improve the strategic direction, cohesion and co-ordination of the UK's energy policy making and the delivery of its energy research, development and demonstration programmes. It believes that the best way of securing this is through the new Sustainable Energy Policy Network and an Energy Research Network as set out in the White Paper. It believes that it should focus on establishing well designed policy instruments, transparent monitoring, securing commitments and above all in ensuring delivery of outcomes through the new Networks rather than through a new organisation. The proposed renewable energy authority risks diverting effort into the creation of structures and possibly new silos separate from the main stream of energy policy rather than into the delivery of programmes and commitments.

The Government welcomes the support the Committee has given to the Government's proposals in the White Paper for tackling barriers to the development of renewables such as planning and connection to the networks. The Government does not accept the Committee's finding that the market pull for Renewables is inadequate. The Renewables Obligation, exemption from the Climate Change Levy, the future EU Emissions Trading Scheme combined with capital grants and support for RD&D provide a huge package of support for renewables which will be worth around £1 billion a year by 2010 from the Renewables Obligation and from exemption from the Climate Change Levy alone, and which is bringing forward very substantial investment. In March alone more consents were granted for wind power than were built in the whole of the 1990s.

[1] Fourth Report from the Science and Technology Committee, Session 2002–03, Towards A Non-Carbon Fuel Economy: Research Development and Demonstration HC 55—I

The White Paper sets out a detailed analysis of how cuts of 15-25 million tonnes of carbon could be achieved by 2020 through energy efficiency, transport and renewables and the EU emission trading scheme. It believes that ambitious progress with these technologies is achievable and that we can meet our targets with them. It recognises however that the future is uncertain and therefore does not rule out the possibility that at some point new nuclear build might be necessary. However the current economics of nuclear power make it an unattractive option for new generating capacity and there are also important issues for nuclear waste to be resolved.

The Government is strongly committed to change the way we produce and use our energy supplies. We are committed to putting ourselves on a path to cut the UK's carbon dioxide emissions by 60% by 2050 with real progress by 2020. The Energy White Paper sets out a long-term strategic vision to meet these challenges and against that background sets out detailed shorter-term policies to put us on the path on which we need to go. The White Paper sets out over 130 commitments to secure the White Paper's energy policy objectives. It is determined that these commitments will be delivered has already established the network of policy units and outside organisations to achieve these goals.

RECOMMENDATIONS AND CONCLUSIONS

1. We agree with the value of a target for renewable electricity generation but we must not lose sight of the principal objective, which is to introduce non-polluting, sustainable forms of energy on a large scale (paragraph 15).

The Government endorses and takes note of this recommendation. Diverse forms of sustainable energy will not only help to meet our low carbon targets but will strengthen our security of supply.

2. The EPSRC has a large area of science to fund but it is hard to accept that energy research, given its economic and environmental importance to the UK, should receive such a small slice of the cake (paragraph 22).

In addition to the £9M spend on low and non-carbon technology research in 2002/03 the Engineering & Physical Sciences Research Council (EPSRC) supported £68M in blue skies research with potential relevance to low or zero-carbon energy technology. The importance of the sustainable energy agenda is recognised in the recent launch of the SUPERGEN (Sustainable Power Generation and Supply) programme (in conjunction with Biotechnology & Biological Sciences Research Council—BBSRC, Economic & Social Research Council—ESRC, Natural Environment Research Council—NERC), which will invest £25 Million over 5 years and the Carbon Vision programme which is jointly supported between Research Councils and the Carbon Trust.

3. Half the membership of the EPSRC's council is from industry and we fear that this may lead to conservatism. We regret that technologies with the potential of wave and tidal or hydrogen are given so little funding. The EPSRC should be given a stronger lead by Government to ensure that investment is consistent with wider energy policy (paragraph 23).

EPSRC experience of industrial representatives on both the User Panel (UP) and Council are that they are visionary and well aware of the importance of funding high risk/high return research. The industrialist representatives come from a diverse range of backgrounds and bring excellent complementary expertise to Panel and Council members from university backgrounds. Industrial representatives on UP and Council have been strongly supportive of the need for long term visionary research.

As part of the first tranche of funding under the SUPERGEN Programme two major research consortia in the areas of hydrogen (£3M) and wave and tidal energy (£2M) have recently been approved.

4. We appreciate that striking the right balance between funding applied and blue-skies research is difficult but we urge EPSRC to ensure that researchers with innovative, if risky, projects get the funding they need (paragraph 26).

EPSRC has for a number of years been actively encouraging its research community to submit high risk/high return research projects and has been actively briefing its peer review community to take due account of highly adventurous proposals as part of the assessment process. To further promote adventurous research the EPSRC recently issued a £4.5M adventure fund aimed specifically at supporting multidisciplinary adventurous research.

5. We agree with the Government that there are merits in placing fusion research under the auspices of the EPSRC but we have reservations about its commitment to the technology. To maintain the UK's position in this field, we believe it should remain a special case for funding with a ring-fenced budget. We will be watching the operation of the new funding arrangement for nuclear fusion research at Culham with great interest (paragraph 28).

EPSRC formally took budgetary responsibility for the Fusion Programme on 1 April 2003. EPSRC recognises the importance of active engagement between Culham and the broader UK academic community and initial steps have been taken to facilitate this including providing Culham with access to High Performance Computing, funding for research networks and CASE studentships. An external Fusion Advisory Board has been established to advise all the stakeholders (including EPSRC, UKAEA, DTI and OST) and is currently looking at the developing vision for the UK Fusion programme and the funding arrangements required to achieve this vision.

6. It is pleasing to see that the Research Councils are beginning to improve the way they are working together and in particular that they put in a successful joint bid to the Spending Review on sustainable energy (paragraph 29).

The new £28 million cross-Council 'Towards a Sustainable Energy Economy' (TSEC) programme should more than double Research Council investment in sustainable energy research by 2005-06. In their SR2002 bid, the Research Councils recognized the importance of adopting a cross-Council, multidisciplinary approach to tackling the research issues of sustainable energy. The TSEC programme will build on new programmes such as SUPERGEN and the Carbon Vision Programme, both of which involve EPSRC, ESRC and NERC.

7. We urge the Research Councils to make an early decision on the continuation of funding of the Tyndall Centre to avoid any interruptions in the Centre's research programme, and to increase its resources (paragraph 32).

The Tyndall Centre's continuation will be subject to the outcomes of a review of its achievements during the first funding phase (2000-2006). On behalf of the Research Councils funding Tyndall, NERC will lead that review, which will take place in spring 2004. The emphasis and scope of the review were considered at the Tyndall Centre Supervisory Board meeting on 8 May 2003.

8. We welcome the cross-Council programme on sustainable energy. The Research Councils' expenditure on energy research has been pitiful and this investment is a step in the right direction. But it only remains a step, which we hope will be followed up vigorously in the future. If UK technologies are to succeed the scale of investment must increase rapidly (paragraph 34).

Whilst the Research Councils spent an estimated £11 million in 2002-03 on low and non-carbon energy technology, they also support blue skies research which could have possible energy applications. For instance, EPSRC estimate they would support £68 million in 2002-03 in blue skies research with potential relevance to low or zero-carbon energy technology. However, as the Committee acknowledges (Recommendation 72), investments in RD&D must be complemented by policies to stimulate the market.

9. We will await the development of a UK Energy Research Centre and a National Energy Research Network with great interest but we are concerned that its remit is too narrow and aims to modest to turn energy RD&D into deployed technologies (paragraph 35).

The Research Councils are the funding facilitators for the UK Energy Research Centre (UKERC). Within the context of the 'Towards a Sustainable Energy Economy' programme the remit and aims of the Centre will be decided by the academic and user communities, and will reflect the broad expertise and opportunities this Centre will need to address. Furthermore, the synergy of such partnerships should result in outputs that are greater than the sum of the individuals.

10. We understand that UKERC will provide "a focal point for data and information on UK energy research funding". If this means that the Centre will provide a one-stop shop for those seeking energy-related RD&D funding then it is a proposal that we warmly welcome (paragraph 36).

One of the key objectives of UKERC will be to provide a 'one-stop shop' for a number of important functions, including acting as a focal point for data and information on UK energy research funding.

11. We have no doubt that the Research Councils are funding world-class research into low carbon energy, but is our impression that instead of driving these exciting new technologies forward they have a passive, unadventurous approach. There will be few sleepless nights in our competitor countries (paragraph 37).

Exciting new initiatives such as SUPERGEN (Sustainable Power Generation and Supply) have been designed and realised by EPSRC working with ESRC, NERC and BBSRC. These multi-million pound programmes are building new partnerships between the research communities and stakeholders to explore groundbreaking low carbon technologies. Building research consortia which bring together leading university research groups and industry with the aim of creating national networks of excellence to address research challenges in sustainable power generation.

12. We do not understand why the functions of the Carbon Trust could not have been taken on by existing Government bodies. We suspect that its formation was primarily a political gesture to bolster the Government's green credentials (paragraph 41).

As the White Paper makes clear the Government cannot deliver a low carbon economy on its own. One of the key pre-requisites of a move to a low carbon economy is the need to leverage massive private investment away from conventional technologies and into low carbon technologies.

The Government, in consultation with business and other stakeholders as part of the Climate Change Levy discussions, decided that a new delivery vehicle, specifically designed to work with business and the investment communities, would be the best way to put UK business and the public sector on the path to a low carbon economy. The Carbon Trust was therefore set up as an independent company, business-led and Government backed with funds from the Climate Change Levy, Defra and the Devolved Administrations. Its business plan is agreed annually with its funding providers but within this broad framework, its independence gives it the freedom to deploy public funds according to the needs of non-domestic energy users and investors in order to deliver the public policy aim of reducing carbon emissions. Importantly, its position as a private, business-led, not for profit company has enabled the Carbon Trust to acquire and develop the skills necessary to work effectively both with Government and the business/investor communities.

The Carbon Trust has already shown the value of this approach by making a number of investments in projects that would have proved difficult for Government alone to deliver, such as equity investments. As announced in February its projects to date will total some £70M of public/private investments in a range of low carbon technologies.

13. It is too soon to judge the effectiveness of the Carbon Trust but we detect a lack of urgency. It must be an active partner of the UK Energy Research Centre in its provision of advice and information on funding (paragraph 42).

We would agree that it is too soon to judge the effectiveness of the Carbon Trust. However, we reject the view that there is a lack of urgency—either in Government or the Carbon Trust. In a relatively short period, the Carbon Trust has established itself as a key player in the development of long term policies and programmes to help meet the Energy White Paper targets and commitment to create a UK low carbon economy.

The Carbon Trust is a member of the Chief Scientific Adviser's High Level Group on energy RD&D—and its predecessor, the Energy Research Review Group at which the concept of a UK energy research centre was first considered. Its RD&D activities will be

complementary to the Energy Research Centre and it will share information on its RD&D funding and the specific technologies supported under the Carbon Trust's programmes. The Carbon Trust's investment programme is much broader in scope than just RD&D and the Carbon Trust is also working closely with and is intended to be complementary to other sources of public (and private) funding. The Carbon Trust is also a member of the new Sustainable Energy Policy Network.

Energy RD&D

14. The DTI seems to be looking for reasons not to invest in RD&D. The Government must be doing more than filling in the gaps left by the private sector and drive forward important technologies (paragraph 47).

15. The Government has expressed its concern that the UK does not derive sufficient commercial benefit from the excellence of its science base. The DTI's inability to fund properly energy RD&D projects is a clear case of its policies betraying the fine words of its Ministers (paragraph 48).

16. The UK is spending much less than its competitors on energy RD&D. The PIU money and the Research Councils' new Sustainable Energy Programme provide a welcome and long-overdue boost to energy RD&D in the UK. We are pleased to see the Chief Scientific Adviser recommending further increases in the future and strongly urge the Government to make a commitment to this end over a defined period (paragraph 57).

The Government accepts that the absolute level of UK Government expenditure on energy RD&D is currently lower than its competitors. After a long period however, during which expenditure was substantially reduced, the trend has begun to be reversed in recent years.

DTI investment in new and renewable RD&D has gone up very significantly over the last year. It is now investing £19m per annum in industrially led RD&D and has launched 4 capital grants schemes worth £170m in total. The Research Councils are also investing in university-led research through the SUPERGEN programme, worth £25m.

DTI is carrying out a Review of Renewables Innovation Spending in order to allocate the new budgets arising from SR2002 and the Energy White Paper and to consider the case for longer term funding in preparation for SR2004. The Research Councils are extending the SUPERGEN programme, working with the Carbon Trust on a £14m Carbon Vision programme and taking forward the new £28m "Towards a Sustainable Energy Economy" programme. The latter exercise includes work on the new UK Energy Research Centre.

The Renewables Advisory Board was established to work with industry on driving forward the deployment of renewable technologies. One of its working groups is carrying out a Review of Renewables Innovation Spending as set out in the Energy White Paper, paragraph 4.14,

'As well as making progress towards our 2010 target, and paving the way for our 2020 strategy, we need to make sure that we are planning for the longer term up to 2050. We are already reviewing innovation spending, including that for renewable energy, across

government. With respect to renewable energy, we will review the barriers to successful innovation across the range of renewable technologies and will set out a programme for developing, with industry, strategies for the successful application of those technologies in their liberalised energy markets.'

The Renewables Advisory Board also has working groups addressing the barriers of finance, planning, public perception and the grid.

17. We support the idea of a single entry portal for those seeking support for RD&D in fuel cells but believe there is merit in extending the concept to embrace all new energy technologies (paragraph 60).

The funding landscape for new energy technologies is undoubtedly more complex now than it was even two years ago. The Review of Renewables Innovation Spending is mapping that landscape and expects to make recommendations about the co-ordination of separate funds in order to make the funding as transparent and accessible to industry as possible.

18. The coordination of public funding bodies and research policy in the field of energy RD&D has been poor. We shall be monitoring the progress of Government and the Research Councils in improving coordination with great interest. The establishment of a UK Energy Research Centre is a step forward but we have little confidence that it has the remit to solve the problem (paragraph 61).

The UK Energy Research Centre (UKERC) is being set up to improve the coherence of energy RD&D by enhancing co-ordination of the UK energy research agenda. It will be an independent centre within the framework of the Research Councils. It will not be responsible for coordinating energy RD&D policy beyond that funded by the Research Councils. That wider coordination is the remit of the Chief Scientific Advisor's High Level Group on Energy RD&D, which brings together the key public funders including the Research Councils, as well as the DTI's energy group. (See also the response to Recommendation 22 below).

Picking winners

19. It is reasonable to ask how the Government can have an energy RD&D policy that does not embrace a vision of which technologies should be backed (paragraph 65).

20. The Government has the option of creating a framework of incentives, such as tax credits for RD&D, which will devolve the responsibility for picking winners (and inevitably some losers) to industry; but it also has to make choices and take risks too, especially in its support for RD&D, where it cannot avoid setting some priorities. The Government has an important role in identifying those of Britain's strengths that are consistent with the industrial environment and the market. It should provide a clear and unambiguous focus. (paragraph 65).

21. The Government seems nervous of being accused of picking winners. As a result tough decisions have been avoided. We should be selecting all of those research projects

for funding which we have the capacity to execute and which have a reasonable chance of delivering solutions and significant benefit for UK society (paragraph 67).

The planned Review of Renewables Innovation Spending will consider this issue.

The Chief Scientific Adviser's Energy Research Review concluded that it would be unwise to attempt a prescriptive forecast of 'winning' low-carbon options for the future and to concentrate Government expenditure on those alone. There would be a grave risk of foreclosing other options which may turn out to be winners in time. The Review did, however, identify six key areas in which the degree of technological potential (or 'headroom') indicated that enhanced research effort was especially likely to yield step-change benefits. This approach has been endorsed in the Energy White Paper. The Chief Scientific Adviser's High-Level Group on Energy RD&D has been examining how the six key areas are being reflected in current funding programmes.

Renewable Energy Authority

22. Britain's energy structures are too complicated. As a result, efforts to stimulate RD&D are fragmented and directionless. No public body or Minister is taking responsibility for driving forward technological innovation and deployment (paragraph 68).

23. Much bolder action is needed to make non-carbon technologies play a significant contribution to the UK's energy mix. For this reason, we recommend the creation of a Renewable Energy Authority. It should emulate the function of UKAEA in driving the nuclear industry after the World War II. The Authority would subsume the UKERC and the Carbon Trust, the DTI's energy programme and the energy policy unit. It would:

1. conduct applied research and development in selected technologies;

2. conduct demonstration programmes, usually but exclusively in collaboration with industry;

3. provide a fast-track planning service to non-carbon energy applications; and

4. supervise infrastructural modifications to the grid and distribution networks to facilitate the connection of distributed generation (paragraph 68).

69. Given the importance of reducing UK carbon emissions, we propose a Renewable Energy Act at the earliest opportunity. The Act should include the following provisions:

1. The establishment of a Renewable Energy Authority (REA) with UK-wide responsibility for co-ordinating and promoting RD&D in renewable energy and disbursement of funds for that purpose.

We agree that there is a need to improve the strategic direction, cohesion and co-ordination of the UK's energy policy making and the delivery of the UK's energy research, development and demonstration programmes. We believe that the best way of securing

this is through the new Sustainable Energy Policy Network and a National Energy Research Network. The recently established Policy Network consists of departmental policy units and key outside organisations (including the Carbon Trust) responsible for delivering the Energy White Paper. It will ensure that the Government as a whole pursues effectively policies and programmes that are needed to ensure that the Government delivers its objectives including those related to technology and innovation. The DTI's Energy Strategy Unit acts as its hub. The Policy Network reports directly to a Ministerial Group chaired by the Secretary of State for Trade and Industry and the Secretary of State for Environment, Food and Rural Affairs.

A principal responsibility of the new UK Energy Research Centre will be to establish and co-ordinate a National Energy Research Network which will assist in establishing interdisciplinary teams with expertise in scientific, technological, social and economic and health impacts of energy. A new UK Energy Research Centre will act as a hub for this Network.

The Government has also established a new Renewables Advisory Board- comprising representatives of the relevant industries, the Government and the Devolved Administrations—to provide expert independent advice to the DTI on renewable issues.

The Government does not believe that reorganisation is necessary. Rather it believes that it should focus on establishing well-designed policy instruments, transparent monitoring, securing commitments and above all in ensuring delivery of outcomes through the new Networks. The proposed renewable energy authority risks diverting effort into the creation of structures and possibly new silos separate from the main stream of energy policy rather than into the delivery of programmes and commitments.

The Government therefore has no plans to create a Renewable Energy Authority and will co-ordinate and promote renewables RD&D through the Sustainable Energy Policy Network currently being established across government.

24. We are puzzled by the Government's assertion that privatisation and liberalisation has not led directly to a decline in energy RD&D—it has led to a dramatic decline, by far the largest decline in all OECD countries. The forces that drove innovation in the past are at least as strong as they ever were and it seems hard to believe that the Chief Scientific Adviser's energy group and several of our witnesses are so ill-informed. We are concerned that the Government is poorly placed to stimulate energy RD&D investment in industry if it is in a state of denial over its causes (paragraph 71).

The Government recognises that RD&D and innovation more widely has an absolutely key role in bringing forward low carbon technologies needed to achieve emission reductions over the long term. The Chief Scientific Adviser's Energy Research Group was unable to determine precise levels of spending on energy research across industry. It recognised, however, that there had been an apparent decline since the privatisation of the previously nationalised energy industries which had been an important source of research effort.

The Energy White Paper sets out a strategy for the long term to give industry the confidence to invest to help us deliver a truly sustainable energy policy. It is intended to

send out long-term signals to the energy sector regarding the need to reduce carbon emissions. By setting the UK on a path a 60% reduction in emissions by 2050 the Government is seeking to create a framework in which RD&D in the energy sector can be encouraged.

25. The fall in private sector RD&D expenditure has been higher than would have been expected from simply improving its focus. We conclude that there has been a real and damaging reduction in the amount of private energy RD&D spend since privatisation and liberalisation of the market (paragraph 72).

It is the effectiveness of the expenditure which matters. The UK can also benefit through technology transfer from other countries. The Chief Scientific Adviser's high-level group comprising representatives of the Government Departments and other bodies, such as the Research Councils, responsible for public funding of energy research, will help co-ordinate and set a strategic direction for research, reflecting the ERRG's priorities.

Detailed proposals for a new Energy Research Network and Energy Research Centre are currently being developed by the Research Councils, who will present them in due course.

It is intended that, through the Network, they will establish interdisciplinary teams with expertise in the scientific, technological, social, economic and health impacts of energy, providing much needed coordination and cohesion.

The new Energy Research Centre will play a key role in co-ordinating research, facilitating collaboration with industry and UK participation in international projects, as well as being a centre of excellence in its own right.

26. We recommend that the Government establish demonstration projects to establish how distributed sources of electricity generation can be incorporated into local networks, in particular the development of metering systems to allow domestic generation to export power to the network (paragraph 79).

The Government is anxious to assist industry in the development and demonstration of new technology. Through the New and Renewable Energy Programme, the Government is currently funding a range of R&D and demonstration projects, including the demonstration of the Regenesys storage technology (Little Barford) as a means of integrating renewables into the electricity networks and the application of voltage regulator technology (North Wales) to enhance the capacity of local networks to accommodate increase levels of renewable generation capacity. In addition, the Government is working with industry to mount field trials to demonstrate the benefits of advanced metering systems to the integration of micro scale renewable generation and CHP and to demonstrate a number of techniques for the intelligent operation of distribution networks.

Funding is available to do more in this area however it is currently difficult to involve industry in developing viable demonstration projects. The reasons for the reluctance of utilities to innovate are not entirely clear but probably reflect concerns about their ability to recoup the costs of R&D. Given the need to transform the electricity networks to facilitate the achievement of the Government's targets for renewables we shall be urging Ofgem to

allow the distribution network operators (DNOs) to recover the costs of R&D work. The opportunity to do this will arise through the current price control review.

The Government is also funding a range of projects to facilitate the integration of distributed generation, through its involvement in the Distributed Generation co-ordination Group.

27. United Utilities rightly recognises the value of non-technical research into commercial and regulatory initiatives for distribution networks. We recommend that the Economic and Social Research Council make provision for such studies (paragraph 80).

Along with the NERC and BBSRC, the ESRC collaborated in a supplementary call under the first Phase of the EPSRC's SUPERGEN Programme. As a result of this, a new inter-disciplinary research consortia on Future Network Technologies is being supported and will be addressing the impact of economic and regulatory structures as a key element of its broader programme on the future evolution of power networks. The joint Research Council Tyndall Centre is also supporting relevant research on these issues. Social, economic and regulatory issues more generally will be a key focus of research under the cross-Council 'Towards a Sustainable Energy Economy' Programme.

28. We appreciate the commercial constraints on companies and recommend that the Government and the regulator work to create a better environment for RD&D (paragraph 82).

The Energy White Paper has addressed the issue of how to ensure that distributed and renewable generation has the appropriate incentives to enable it to be connected to the electricity network. There are a number of commitments in the White Paper in these areas and the Department is working with OFGEM to ensure that they are achieved thus helping to create a better environment for RD&D. The Department recognises the regulatory arrangements are crucial to our ability to deliver infrastructure which will permit the development of renewable generation, especially in peripheral areas, so as to support our environmental objectives.

29. It is disappointing that the UK's experience in the North Sea oil and gas industry is not being employed to develop new marine energy technologies. Clearly the incentives for oil and gas companies are insufficient, a situation which the Government should remedy (paragraph 85).

We are determined that wave and tidal technologies should be given the opportunity to play the fullest part they can in the expansion of generation from renewables. We are supporting, along with the Scottish Executive and others, the establishment of a marine test centre off the coast of the Orkney Islands. This centre, a first in Europe, is expected to open later this year.

The Government has recognised the synergies between the emerging offshore renewables sector and the development of North Sea oil & gas and is aware of a number of oil and gas companies that are seeking opportunities to develop offshore wind farms. That is why Renewables UK was created in 2002 to apply the same concerted, strategic approach which

was applied to oil & gas to renewables, in order to reap very substantial benefits for the country.

Renewables UK is a team whose role is to help secure maximum benefits for UK industry from the rapidly growing worldwide renewables market and to assist in overcoming barriers to renewables projects in the UK via the Renewables Advisory Board. This means optimising the benefits of renewable energy to the UK in order to maximise opportunities in manufacturing, services, exporting and jobs.

Renewables UK is working closely with individual companies, regional support agencies, other government departments, trade associations and the devolved administrations to:

maximise UK content in projects in the UK and overseas

communicate opportunities

overcome barriers to developments

disseminate information

co-ordinate the continued development of and support for the UK supply chain.

30. We are pleased that the UK Government supports an EU target of 3% of GDP invested in RD&D but given the strong link between investment and productivity, we are disappointed that it has not adopted this "aspiration" for the UK. We recommend that the Government does so (paragraph 87).

The 3% target is part of the EU's R&D action plan, which we broadly welcome. Momentum now needs to be maintained through implementation by the Commission and Member States of actions appropriate to their national circumstances. We would emphasise the importance (recognised in the action plan) of framework conditions, for example the pursuit of a more dynamic and competitive business environment. In terms of public spending, the focus should be on where spending is most effectively directed to address market failures, and how public spending can have a greater impact in levering in greater private funding of R&D and therefore lead to improved productivity and economic prospects.

31. The Government should recognise that even companies not regularly making a profit need to think long term and invest in RD&D and should consider introducing mechanisms that provide that incentive (paragraph 91).

The Government recognises that an increasing number of companies undertake R&D before they have any sales or profits to cover their costs. Under the SME R&D tax credit, introduced in April 2000, loss-making companies can surrender unused tax relief to the Exchequer, receiving in return a payment of 24p for every pound of qualifying R&D expenditure. This recognises the particular difficulties that small and especially new companies have in raising finance.

The R&D tax credit for larger companies, introduced in April 2002, does not include a payable element because more established larger companies do not generally face the same difficulties in accessing external finance as SMEs.

32. The existence and nature of R&D tax credits are not well understood by companies—particularly the smaller ones—and the rules of the R&D tax credit seem to be too complicated or inadequately explained. The Government should remedy these problems, since if energy RD&D is to be resuscitated in the UK in the field of low carbon technologies, a clear and significant tax incentive is much needed (paragraph 92).

The Government consulted widely on the design of both the SME R&D tax credit and the extension to larger companies. In designing the credits, the Government sought to maximise the incentives for companies to undertake additional R&D, and recognised the need for the credit to be:

stable, so that companies can rely on it;

transparent and predictable, so that companies can build the tax savings into their investment decisions; and

simple in design, to minimise the costs of administration.

Introduction of the tax credits was supported by a series of national roadshows designed to promote take-up and by a Press campaign in Autumn 2002. The roadshows were attended by R&D businesses from across the country, and interest and take-up both continue to increase. Building on the feedback received during the roadshows, Budget 2003 announced a package of measures to improve the R&D tax credits—allowing more businesses, particularly small and medium sized enterprises, and more types of expenditure to qualify.

Budget 2003 also announced that the Government would consult with businesses on improving the definition of R&D to ensure that it remains consistent with technological developments and competitive internationally.

33. The Government has failed to encourage an environment that encourages technical innovation, to provide sufficient direct investments and to make any significant response to the scale of market failure (paragraph 93).

The Government recognizes the importance of innovation to economic prosperity and the role which R&D plays in the innovation process. This includes the ease with which knowledge developed in academe can be transferred to the business sector. That is why the DTI and Treasury launched a review of innovation policy last December and why Richard Lambert has been asked to conduct an inquiry into university business relationships. The outcome of these reviews is expected in the autumn.

34. The proposed UK Energy Research Centre and Network should play a crucial role in bringing forward the next generation of skilled people for the energy sector. We recommend that it adopt this as a key part of its mission (paragraph 98).

A stated requirement for UKERC is that it will "Support the development of interdisciplinary research capacity (e.g. postgraduate training)".

35. We recommend that the Government recognises low and non-carbon energy as a shortage area, recognising its importance in combating climate change (paragraph 99).

Government recognises the importance of the provision of skilled people in all aspects of the energy agenda. The Energy White Paper outlines a number of actions to address this issue at all skill levels. The additional funding provided to the Research Councils for energy research will enable a significant increase in the provision of PhD training associated with the new research programmes. As examples, EPSRC has funded over 40 PhD posts as part of the first tranche of Research Consortia under the SUPERGEN Programme in future networks, wave and tidal energy, hydrogen generation and storage and biomass generation. The UK Energy Research Centre will also provide new opportunities to enhance PhD training through increased networking and opportunities for wider skills training. We are working closely with employers to ensure that as soon as possible all parts of the energy industry are included within the emerging sector skills councils network which has recently received a substantial increase in Government funding.

36. It is hard to imagine the nuclear skills situation improving, since the Energy White Paper has all but ruled out new nuclear build. Even with no new nuclear build, nuclear engineers will be needed for many years to come to deal with decommissioning and storage but few graduates will be inspired to join an industry in its death throes (paragraph 105).

EPSRC recognises the training need in these areas and is looking to address it in a variety of ways including the identification of these areas as priorities for universities when they develop their Collaborative Training Account bids. These accounts, which are complementary to Research Training Accounts, aim to put collaborative postgraduate education and training on a more strategic footing, reflecting both EPSRC's priorities as well as those of individual universities.

The report of the "Nuclear Skills Group", published in December 2002, concluded that although the nuclear industry is not facing an immediate skills problem unless action is taken soon problems could arise over the next 10-15 years. Following the report, DTI has been exploring the possibility of establishing a Sector Skills Council (SSC) to cover the nuclear industry. Good progress is being made in discussions with an existing SSC to expand its coverage to include the nuclear industry. If all goes well, the new enlarged SSC could be up and running early next year.

37. We argued in our report on Science Education from 14 to 19 that science education needed to be made more relevant. There are few better examples of a subject that could enthuse our schoolchildren than non-carbon energy, which has the power to tackle the potentially catastrophic effects of climate change (paragraph 107).

There is currently room in the Science Curriculum at 14-19 to teach and enthuse young people about the importance of non-carbon energy and the potentially catastrophic effects of climate change. At Key Stage 4, students are taught about the efficient use of energy, the

need for economical use of energy resources, and the environmental implications of generating energy. They also learn how the carbon cycle helps to maintain atmospheric composition and how energy is transferred from power stations to consumers.

More generally, the Government is working to ensure that the science curriculum at Key Stage 4 provides a core of learning that is relevant and exciting for all learners. The Qualifications and Curriculum Authority (QCA) are reviewing the programme of study at Key Stage 4. They have given final advice to Ministers and a consultation process is now underway. We are also piloting a new GCSE "Science in the 21st Century" from September 2003. The new GCSE aims to provide a sound and stimulating science education for all students whether they become consumers, users or producers of science.

38. We consider CO2 sequestration to be a necessary part of the transition to a non-carbon fuel economy. Nevertheless, it is important that its use should not act as a disincentive to the elimination of carbon-based fuels (paragraph 110).

The Government accepts that research into CO2 sequestration, although it has significant potential for mitigating emissions of CO2, cannot act as a disincentive to the elimination of carbon based fuels. The Energy White Paper sets out our target of the UK putting itself on a path to a reduction in CO2 emissions of some 60% by around 2050. We are pursuing this target by a range of different measures including greater energy efficiency, increased use of renewables, use of biofuels for road transport and the EU carbon trading scheme.

39. We commend the Government's positive approach to CO2 sequestration. There is a real opportunity in the North Sea with enhanced oil recovery as the initial economic driver. Policy mechanisms are needed to ensure that it happens and that there is an agreement on the legal and environmental issues of CO2 storage (paragraph 111).

The Government recognises the opportunity that enhanced oil recovery (EOR) represents as an initial driver towards CO2 sequestration. As the Energy White Paper recommends, we will set up an urgent implementation plan in co-operation with the developers, generators and oil companies to establish what needs to be done to get a demonstration programme project up and running. This study will reach conclusions shortly to enable decisions on funding to be taken as soon as possible thereafter.

With regard to the CO2 sequestration issue, the DTI is currently reviewing the feasibility of CO2 sequestration in the UK and we expect to publish a report of our conclusions shortly. The results of this work will determine if any R&D work in the area of CO2 separation and capture is necessary. The Government accepts that there are outstanding issues about the environmental risks and perceived risks of storing CO2, and about the legality of storing it under the seabed. These are issues that need to be resolved and we are currently giving this attention.

40. We believe that the UK should play to its strengths and exploit its natural resources. As such, the continued use of coal has a role in the UK's energy mix provided that CO2 emissions are substantially reduced. We therefore support investment in clean coal technologies, for export as well as UK use, in tandem with CO2 sequestration (paragraph 114).

The Government is funding a Cleaner Coal Technology programme worth £25m over 3 years. This programme has two elements:

a) Support for R & D into new cleaner coal technologies, including: support for 40 R & D projects covering coal gasification, higher boiler efficiencies. This work is focussed on increasing efficiency so that there are less emissions per kWh of electricity produced.

b) Facilitating the transfer of UK cleaner coal technology to other countries (eg India and China) and promotion of UK technology.

We are also considering providing support for the retrofit of a supercritical boiler to an existing power plant as a demonstration project. In effect this involves the replacement of a boiler in an existing coal-fired power station with a new much more efficient "supercritical" boiler. The effect of this would be that the new boiler would operate at much higher steam temperatures and pressures with the result that less coal would be required per Mw of output and hence there would be lower emissions of CO2.

41. The Carbon Trust's RD&D budget is not very large and we dispute the Government's assertion that it has the funding to make a significant impact on energy efficiency RD&D (paragraph 119).

The Government agrees that innovation is essential if we are to deliver a low carbon economy. We believe that the Carbon Trust, through its Low Carbon Investment Programme, is making a real and significant difference by bringing together researchers and private sector investors and venture capital to bridge the gap between RD&D and investment that prevents low carbon technologies coming to market. LCIP has already announced projects which will be worth £70m in total with the Carbon Trust attracting private sector gearing of over around 3:1.

As the White Paper makes clear (paragraph 7.28) the Government is also prepared to fund innovation where this can achieve best results in terms of delivering our policy objectives. The Carbon Trust is uniquely placed to understand how the private and public sector can best work together to stimulate the investment needed to drive innovation in energy efficiency in the UK and we are encouraging them to play an active part in the government's innovation review.

Building Regulations

42. The housing market is driven by Government regulations and it is our view that these have not been tough enough in the past (paragraph 122).

43. We welcome the Government's pledge to make major revisions of its building regulations and recommend that these are demanding, recognising that these can be a powerful stimulus to innovation by manufacturers (paragraph 122).

44. We await the revised building regulations in the hope they will provide the market pull for innovative energy-efficient products. We hope they are able to compensate for the lack of technology push generated by the feeble level of public RD&D funding in this area (paragraph 124).

The Building Regulations energy efficiency requirements were revised in 1995 and 2002 with the aim of making the best contribution towards achieving the Government's targets for saving energy and reducing carbon emissions whilst keeping in line with Better Regulations policies. The Building Regulations requirements address health, welfare, safety and convenience and building access as well as energy efficiency in functional terms that do not prescribe particular technologies or construction practices. It is essential that they continue to be proportionate, cost-effective, sufficiently flexible for designers, and that they remain technically sound so that they do not cause builders to take unnecessary risks with, for instance, rain penetration and condensation.

The Government has signalled in the Energy White Paper that it will raise building energy performance standards over the next decade, learning lessons from the standards achieved in other comparable European countries. Towards this end, it has signalled an immediate start on the next major revision of the Building Regulations with the aim of bringing them into effect in 2005. The principal aims in the revision work in progress include:-

setting standards that take more account of the value of energy savings, and of the environmental costs of carbon emissions, throughout the life of buildings, and addressing building performance as a whole so that designers have more flexibility to take up the innovative low-carbon and zero-carbon technologies the Committee perhaps has in mind, and avoiding creating unnecessary regulatory or technical barriers to innovation by others.

In achieving these goals, we will also look to see whether the technical guidance supporting the Building Regulations functional requirements can be framed to give more stimulus to the product and design innovation that the Committee are seeking.

45. We find it hard to reconcile the Government's apparent lack of interest in a relatively mature technology with the enthusiasm of the International Energy Agency. We recommend that the Government follow up the IEA's report with its own assessment of the role that hydro can play in the UK's energy supply (paragraph 125).

The Government fully recognises the merits of hydro generation and this is why we have ensured that new and existing hydro generating stations of up to 20MW capacity (subject to a requirement to refurbish generating stations commissioned before 1 January 1990) qualify for support under the Renewables Obligation.

Despite the natural constraints to future development pointed out by the Committee, since the introduction of the Obligation last year we have already seen a proposal for a new large-scale hydro-electric scheme at Glendoe which would be the largest built in Scotland for 40 years.

Since the last major resource study was carried out back in 1990 we acknowledge that there may be merit in the Committee’s recommendation and will give it our consideration.

46. We recommend that the Government commission a cost-benefit assessment of different solar technologies (paragraph 133).

The Government recognises the potential benefits of solar thermal heating and is providing support to encourage its deployment through grants under Clear Skies. Support for solar-

PV recognises the contribution that it could make to renewable electricity targets, particularly in the medium to longer term.

47. We are pleased to see that wave and tidal energy has received greater governmental attention since our predecessors' report. We hope that the recent increases in funding represent the first stage in building capacity, leading to investment commensurate with the potential of wave and tidal energy. We can look forward in the near future to investment commensurate with wave and tidal energy's potential impact on the UK's energy supply (paragraph 135).

As the Committee notes since the wave programme began in 1999 both the level and sources of funding in this area have significantly increased. Support for research and development of marine technologies has grown under the DTI's New and Renewable Energy Research and Development Programme which now currently funds seven projects leading to full-scale demonstrations.

Support has also been expanded through a number of new initiatives such as the EPSRC's SUPERGEN programme and we are also seeing investment on commercial terms through organisations such as the Carbon Trust and NaREC.

48. Wave and tidal energy has enormous potential and can deliver a clean and predictable energy supply. We recommend that the UK should make a major investment in this niche market and aim to generate at least 5% of its electricity using wave and tidal technologies by 2020 (paragraph 138).

The Government fully recognises the potential contribution that wave and tidal energy could make in realising our aspirations for increased levels of renewables generation. The Energy White Paper sets out those aspirations but does not specify what level of contribution will be expected from individual technologies. This is consistent with our current policy, through the Renewables Obligation, of letting the market decide.

Despite encouraging progress none of the technologies currently under development and supported by the DTI have yet reached the stage where an informed decision can be made about their future prospects. Several of the concepts currently supported are nearing the point in their development where such decisions can be made and we would expect the position to become clearer in the next few years.

49. We welcome the attention being given to hydrogen RD&D by the Government. There is a UK big opportunity to take the lead here in a key area of energy research (paragraph 154).

The Government welcomes the Committee's support for the higher priority being accorded to hydrogen research and agrees that this is an area where the UK has much to offer. The Chief Scientific Adviser's Energy Research Review Group highlighted this as one of their six priorities.

50. We are struck by the particularly high number of public funding bodies active in bioenergy. The Government should simplify its support schemes in this area (paragraph 158).

The Government recognises that there are a number of schemes in this area. The schemes recognise the breadth of bioenergy issues. There are a large number of different fuel sources (from dedicated energy crops to wastes). There are also significant supply chain issues (e.g. in co-firing). In addition, there are a number of technologies for converting the fuel to energy (electricity, heat or transport) or other products. The DTI is working to ensure that there is good co-ordination/synergy between the different schemes.

51. We support policies to encourage less wastage and more reuse and recycling but it is inevitable that there is waste and Government policy should place no obstacles in the way of technologies that can harness waste which cannot be recycled to generate power (paragraph 162).

The Government's Waste Strategy is underpinned by the waste hierarchy referred to in the Committee's report. Following the hierarchy, the best option is waste reduction, followed by re-use, recycling, composting and then energy recovery. Disposal is at the bottom of the hierarchy, including incineration without energy recovery.

The Government accepts that, even with extremely high levels of recycling and a significant reduction in waste produced, there will still be millions of tonnes of residual material to deal with. Landfill Directive targets, which require us to divert huge quantities of biodegradable municipal waste away from landfill, mean that we must utilise alternatives. This is where energy recovery has a key role to play.

At the moment, there are 14 municipal waste incinerators in England and Wales, burning 9% of our municipal solid waste, and generating 200 mega watts of energy – two of these facilities burn waste derived fuel. The Government is keen to ensure that appropriate facilities are made available to deal with residual material in the future, but ultimately decisions about waste management are a matter for local authorities.

They must take into account local circumstances, and select the best practicable environmental option for their area. This is the option that provides the most benefits or the least damage to the environment, as a whole, at acceptable cost, in the long term as well as in the short term. Guidance is provided centrally in Part 2, Chapter 3 of Waste Strategy 2000.

The Government considers that the Renewable Obligation will provide some incentive for development of energy from waste technologies. The RO specifically identifies pyrolysis, gasification and anaerobic digestion as renewable technologies qualifying for support under the terms of the order. Conventional (i.e. mixed) waste incineration is not included. However, this is by no means the only measure that aims to help. There is also support available for new energy from waste technologies through the DTI's New and Renewable Energy Programme and their joint Bioenergy Capital Grants Scheme, with the New Opportunities Fund.

The Community Energy Programme, worth £50 million, promotes community heating mainly based on CHP. Two schemes already being supported that use energy from waste.

A new technologies programme has been announced as part of the new Waste Implementation Programme. This will aim to encourage change, and address a number of

barriers to the development and uptake of waste management technologies. This includes those that produce energy from waste.

The Government is aware of public concerns relating to the safety of some energy from waste processes, in particular, mass burn incineration. A review of the health and environmental impacts of different waste management and disposal options has been commissioned, and a report is due in the autumn. This will provide a side-by-side comparison of a variety of options, including energy from waste, which can be used by local authorities when they make their waste management decisions. The report will also provide background for consideration in making a decision about the use of economic instruments in relation to energy from waste.

52. For the Government to keep the nuclear option open, participation in the Generation IV Forum is essential to give the UK a stake in the direction of future technologies. We recommend that provision is made for British companies to participate actively (paragraph 167).

The UK has been involved in the Generation IV International Forum (GIF) initiative from its beginning both to contribute towards safer and more proliferation resistant reactor designs by sharing internationally our nuclear technology and regulatory experience and to provide UK industry and researchers with the opportunity to participate in the final GIF R&D programme if they wished. UK industry and researchers must now consider the emerging R&D programme and decide where they wish to participate, given their own interests and priorities. Where those research interests match existing and future publicly funded research programmes, good quality proposals may be eligible for public support. Any direct government support for UK participation in the R&D programme must be considered in the context of the priorities it has set out in the Energy White Paper.

53. We applaud BNFL's investment in pebble bed reactors and the long-term view it is taking of reactor technologies in an uncertain climate. We will watch the development of the technology with interest (paragraph 169).

The Government recognizes the potential of the PBMR technology. The BNFL Board will no doubt need to sure that continued involvement in the project is affordable and fits with the company's overall strategy.

New nuclear build

54. Public opinion is a major obstacle to new nuclear build but this should not preclude the funding of research which could go a long way to addressing public concerns into the waste and safety of existing systems. We believe that the Government should not underestimate the public's pragmatism and should not be afraid of people's ability to balance its legitimate concerns with the great dangers posed by climate change (paragraph 170).

56. The Government's announcement that new nuclear build would require another public consultation and another White Paper is perplexing. The Government says with great pride that this is "the most significant consultation on energy policy ever carried

out in the UK". There would have been no shortage of views expressed on the nuclear issue and unless the situation changes substantially, which seems unlikely, a further consultation would simply involve the same people repeating the same arguments (paragraph 178).

58. The next generation of fission reactors is likely to be the last. Nuclear fission power should be used to keep the UK's CO2 emissions as low as possible until fusion power and other non-carbon technologies are commercially available (paragraph 180).

The Government agrees that nuclear power is currently an important source of carbon free electricity, and is likely to remain so for the next two decades. The White Paper does not contain proposals to support new nuclear power stations. They are currently economically unattractive, and there are important issues around the disposal of nuclear waste to be resolved.

The Government is supporting research to develop improved systems to handle the nuclear legacy and increase public confidence in UK radioactive waste management arrangements. Research into public attitudes to nuclear fission is being considered by the Research Council's under the "Towards a Sustainable Energy Economy" (TSEE) initiative, as part of the programme addressing societal drivers and barriers to developing a sustainable energy economy.

As the White Paper sets out, to deliver our objectives on climate change and security cost-effectively, our focus is on energy efficiency and renewable energy. We believe that ambitious progress, over and above what has been achieved before, is possible, and we have set out the policies we believe are necessary to achieve that.

But we accept it is uncertain. The White Paper makes it clear that it does not seek to define precisely how energy markets and technology will develop over the next 20 years. No Government can accurately predict this. This is why we have not ruled out the possibility that new nuclear build might be necessary in future to meet carbon targets.

It is therefore wrong to surmise that a "further consultation would simply involve the same people repeating the same arguments". Clearly, should government take the view in future that new nuclear build is needed, that decision would have to be based on a new analysis and understanding of progress towards our carbon objectives.

As Government is the ultimate guarantor of nuclear safety, any future decision to support new build will require very careful consideration. Nuclear power stations cannot simply and easily be switched off or mothballed; and they leave a lasting legacy.

Given this, if we perceive in future that new nuclear build is likely to be needed to meet carbon targets, it is right that the analysis should be backed by a full and specific public consultation, and a White Paper that clearly sets out the case. This would need to consider exactly the sort of balance of legitimate concerns the committee has suggested.

55. We recommend that the Government monitor technological developments in transmutation and keep it under review as part of its radioactive waste management strategy (paragraph 175).

The Government undertook to maintain a watching brief on the development of partitioning and transmutation in its 1995 White Paper "Review of Radioactive Waste Management Policy: Final Conclusions" (Cm2919). It has subsequently done so through a series of research contracts let by the Defra and its predecessor departments. A particular emphasis of the work has been to assess the ability of partitioning and transmutation to contribute to radioactive waste management in the UK context. Following the publication of reports of this work in 1996 and 1999, the current Defra contract, placed with BNFL, runs until late 2003. Additionally, in anticipation of initiation of the Government's "Managing Radioactive Waste Safely" programme, which has been established to identify the best means of managing the UK's higher activity radioactive wastes in the long-term, the Government has also asked its Radioactive Waste Management Advisory Committee (RWMAC) to assess and report on the potential for partitioning and transmutation to contribute to UK radioactive waste management. RWMAC's report is expected later this year. The option assessment part of the "Managing Radioactive Waste Safely" programme itself will be overseen by a new independent advisory committee – the Committee on Radioactive Waste Management (CoRWM) – which is currently in the process of being set up. We would expect the new committee to include assessment of the possible contribution of partitioning and transmutation as part of its work, which will ultimately lead to the Committee providing recommendations to Government on optimum policy for the long-term management of UK waste.

57. The nuclear industry faces a continuing decline unless positive steps are made now. The only way to keep the nuclear option open is for the Government to indicate that it would in have no objection in principle to granting permission for new reactors to be built, even on a modest scale, to send a clear message that the technology has a future. It should benefit from its status as a carbon-free source of energy (paragraph 179).

Specific proposals for the construction of new nuclear power stations remain, like any other form of generation, for the private sector. As with any other form of generation, were the private sector to bring forward such a proposal the Government would, of course, consider it properly for planning consent under the Electricity Act. Similarly the regulators would consider it from the point of view of nuclear safety, emissions and security.

However, it is clear that, in the absence of any specific Government support, such proposals are unlikely in the short term.

The Committee notes that nuclear "should benefit from its status as a carbon free source of energy". On the specific issue of the Climate Change Levy (CCL), the Committee has noted that this is a downstream energy tax on energy users, not a carbon tax. Removing nuclear power from the tax would remove 25% of the UK electricity supply and severely reduce the effectiveness of the Levy as an instrument to encourage improvements to energy efficiency.

However, nuclear power is likely to benefit from the introduction of the EU Emissions Trading Scheme in 2005, which includes coverage of the electricity generation sector. As the Committee has noted, the White Paper states that 'this will be a central plank of our future emissions reduction policies, through which the traded carbon market can set a signal for the value of carbon reductions in the economy'.

Fusion

59. We conclude that the progress in fusion research has been substantial in recent years. Together with the huge impact that fusion could have in reducing carbon emissions, we consider it be foolish not to at least maintain the current level of resources invested in UK fusion research (paragraph 188).

60. From 2003, EURATOM funding for the UK's national fusion programme will decline from 25% to 20%. We would like the Government's reassurance that it will compensate UKAEA for this loss in income (paragraph 190).

61. The UK has been fortunate to host JET but it must not waste this good fortune. We recommend that the Government invests resources to maintain the UK's domestic fusion programme with a view to building a major facility in the future. We believe that fusion power will become a reality and the UK must benefit from the fruition of this technology (paragraph 191).

The UK invested some £14m in Fusion in 2002-3. In addition, as host of EU facilities, the UK will have benefited from some £30 million in contributions from EU partners. Some additional funding has been made available for fusion through SR 2002, with £1 million per year added to EPSRC's baseline. As mentioned the independent Fusion Advisory Board, which has been established to advise all the stakeholders (including EPSRC, UKAEA, DTI and OST), is currently looking at the developing vision for the UK fusion programme set in the international context and the funding arrangements required to achieve this vision.

As ITER becomes the focus for international fusion research there is likely to be a realignment of the national fusion programme. Whilst the vision for this is being developed, the Government cannot make commitments about the level of resourcing it will make available.

The Government recognises the contribution JET has made to fusion research and the significant UK skills base in this field. OST's recently updated Large Facilities Strategic Roadmap now includes the IFMIF materials testing facility and MAST, the UK fusion device also based at Culham.

62. The UK can only play a significant role in international programmes if it is done from a strong national base. Participation in multinational ventures must be used to complement a strong domestic RD&D base (paragraph 197).

The Government agrees with this recommendation. A strong UK research base is crucial if we are to play our part in the international arena. To date UK R&D organisations have participated in many collaborative research projects either through their own initiative or under the arrangements of the many international agreements to which the UK is a party.

As the committee has noted, the benefits of international collaboration are many, raising the game not only of those involved but also of the wider community, creating a 'ripple' effect whereby other organisations benefit from the knowledge gained through further

collaborations. The returns to the UK research community through these kinds of collaboration are significant.

The UK has made a significant contribution to the collaborative research efforts carried out under the auspices of the IEA and the EU. Under the EU's Framework Programme, UK organisations achieved funding which exceeded the UK contribution to the budget, recognising the excellence in UK innovation and technology. The new Framework Programme with its aim of establishing a European Research Area will help foster genuine and lasting collaborations between research organisations of the Member States, within an enlarged EU.

Cooperation under the Memorandum of Understanding with the US is gathering pace and we are confident that it will lead to fruitful collaborations between UK and US research organisations.

A commitment to investing in improving the UK R&D base is crucial if we are to remain important players in the international research community.

63. At present the transmission companies and network operators have little obligation or incentive to invest in bringing forward and installing the technology needed to make large-scale renewable generation a reality. The lack of these incentives discourages industry to tackle the problems remaining with many exciting new energy technologies. We are pleased that the Government appreciates the need to revise the regulatory framework. In selecting the methods of energy generation for the future, account will need to be taken of the potential changes needed in the distribution network infrastructure (paragraph 202).

The Government concurs with the Committee's view that changes to the regulatory regime are required in order to incentivise distribution and transmission network operators to provide the technology and infrastructure necessary to accommodate the levels of renewable generation implied by the renewables target and the aspirations set out in the Energy White Paper. The Transmission Issues Working Group (report yet to be published) and the Distributed Generation Working Group has highlighted the need for transmission and distribution network developments respectively and progress in delivering these requirements will be monitored via the joint DTI, Defra, Ofgem working group proposed by the Energy White Paper.

64. If the UK is to stand a chance of reaching its renewables target, it needs to stimulate development of less mature technologies now. The Renewables Obligation fails to provide this incentive. It should be reformed or replaced with a mechanism that will (paragraph 208).

The Government accepts that the 10% by 2010 target is challenging and it is still early days in the implementation of the Renewables Obligation. The signs that the Obligation is stimulating the development of renewables on a scale not seen before is, however, very encouraging. Also, by underpinning the Obligation with capital grants for those technologies close to commercialisation but not there quite yet and through its substantial R&D programme to bring forward the less mature technologies, the Government is

working actively to support the whole range of renewables technologies. The Government does not accept the Committee's recommendation that the Obligation should be reformed or replaced by another mechanism, and is committed to its continuation to 2027.

65. We recommend that the Government introduce a tax incentive that distinguishes between: fossil fuel with carbon capture; carbon neutral technologies; nuclear fission and mature non-carbon technologies; maturing non-carbon technologies 10 to 15 years into the market; non-carbon technologies 5-10 years into market; and nascent renewable technologies in their first 5 years of commercial use (paragraph 209).

The Government has introduced the Climate Change Levy as a tax on the business use of energy. This has been designed as a downstream energy tax, in line with the recommendations of Lord Marshall in his report on Economic Instruments and the Business Use of Energy. In introducing the levy, the Government wished to avoid taxing domestic energy use, given the extent of fuel poverty in the UK, and a downstream tax makes it possible to do this. The levy encourages all sectors of business to improve their energy efficiency and thereby to reduce carbon emissions.

The levy includes an exemption for most forms of renewable energy and for good quality combined heat and power, given the Government's wish to encourage these environmentally-friendly forms of energy generation.

The levy forms an important part of the Government's Climate Change Programme, along with other measures to encourage new low-carbon forms of energy generation including the Renewables Obligation and Government spending.

The levy is consistent with the requirements of the EU Energy Products Directive, on which political agreement was reached in March 2003.

66. Ofgem should establish a more supportive framework for innovation and RD&D toward the new "climate friendly" technologies. Ofgem must be more willing to allow RD&D against companies' profits when looking at prices (paragraph 213).

Ofgem's statutory objective to protect the interests of energy consumers involves promoting competition and regulating monopolies. Environmental considerations are a key factor in meeting those responsibilities. A significant increase in renewable generation may mean that distribution network operators (DNOs) require additional incentives to connect and to reinforce their networks economically and efficiently. Incentives may also be needed to encourage DNOs to utilise renewable generation to help them run their networks more efficiently. The role that RD&D has to play in this overall picture is currently a matter for discussion in the context of the new distribution price control, which is to take effect in April 2005. Ofgem is currently consulting widely on price control and incentive issues in preparation for the new price control. An initial consultation paper is scheduled for late June 2003. A second consultation is likely to follow in December.

67. While we agree with many of its sentiments, we remain disappointed with the White Paper, largely because that is what it is, a document full of sentiments with few practical policy proposals that give us any confidence that its targets (and aspirations) can be met. It has ducked a central issue—whether to provide a future for the nuclear

power industry—and failed to give a lead. On the specific issue of RD&D, it makes all the right noises but fails to pledge any further investment nor provide any further direct incentives to industry to do so. RD&D investment in the UK is set to remain at the bottom of the international league table (paragraph 215).

We believe that it is crucial that the Government defines its long-term strategic vision for energy policy and against that background sets out shorter-term policies to put us on the path on which we need to go. That is what industry and consumers need to invest for the future and that is what the White Paper provides. We do not believe that it is sensible to define every detail of the policies we need to pursue over the next twenty years or beyond. We shall need to review the impact of policy changes and the changing costs of technologies and to amend the our detailed policy measures in the light of experience.

The White Paper contains a large number of practical policy measures and over 130 commitments. In the area of Renewables for example it analyses the barriers to achieving the Government's targets and aspirations and sets out clear programme for tackling these including:

£60m in new money for renewables projects bringing the spending on renewable energy up to £348m in total over four years;

reforming the planning rules to provide guidance to local planning authorities and developers about the best way to promote renewables through the planning system;

simplifying the procedures MOD applies to Renewables while still accommodating our national security needs;

the publication by OFGEM of an incentive framework for connecting and utilising distributed generation later this year for implementation in April 2005.

The Government is already committed to massive help to Renewable projects through the Renewables Obligation, the Climate Change Levy and the EU Emissions Trading Scheme. By 2010 it is estimated that support from the Renewables Obligation and the Climate Change Levy alone will be worth around £1billion a year. It is committed to reviewing progress in 2005/06 and will then elaborate a strategy for the decade to 2020. Support for renewables is involving very substantial costs for consumers and taxpayers. Setting a further strategy for implementation in the middle of this decade will enable us to take account of the experience of carbon prices arising from the emission trading scheme and changes in the costs of renewable technologies with the experience of several years of the Renewables Obligation.

In reducing carbon dioxide emissions the Government has decided to give priority to renewables and energy efficiency. It believes that ambitious progress with these technologies is achievable and that we can meet our targets with these technologies but the future is uncertain. It therefore does not rule out the possibility that at some point new nuclear build might be necessary. This is not ducking the issue but a reasoned and prudent approach.

The Chief Scientific Adviser's Energy Research Review Group agreed that the UK's spending should be raised and to that end the Government is increasing spending on energy research, development and innovation. DTI spent around £40m supporting sustainable energy-related research and development in 2001/02. It set up the Carbon Trust in April 2001 to lead on low carbon technology and innovation and it is spending £75 over the next three years. The Research Councils will have spent over £11m on energy-related research in 2002/03. We have allocated an additional £28m to the Research Councils under the spending review 2002 for further research in support of a sustainable energy economy.

68. There is no prospect of achieving the target of 10% renewable generation by 2010 or the aspiration of 20% by 2020. There is no chance of meeting the Government's targets for CO2 reductions if current policies and market conditions remain in place (paragraph 216).

The number and scale of renewables projects now off the drawing board and into the planning system is very impressive and is a direct result of the introduction of our renewables policy, mainly the Renewables Obligation backed up by capital grants and exemption of renewables electricity from the Climate Change Levy. We disagree strongly with Committee's view that there is no effective legislative stimulus to renewable development—the Obligation is working smoothly and well—and the market arrangements, while presenting some problems for renewables, are not a strong disincentive to renewables investment.

69. Given the importance of reducing UK carbon emissions, we propose a Renewable Energy Act at the earliest opportunity. The Act should include the following provisions:

2. The replacement of the Climate Change Levy and the Renewables Obligation with a unified Carbon and Renewable Energy Tax to be levied on the electricity generators, the yield from which should be hypothecated to the REA (paragraph 217).

Strong advice from industry throughout the consultation on the Energy White Paper was to maintain and enhance those support mechanisms now in place. For that reason the White Paper reiterates that the Government remains, 'firmly committed to the current Renewables Obligation and will maintain the level of support it provides as planned until 2027' (para. 4.12). A review will take place in 2005/6 which will consider how best to use the Obligation as part of a 'strategy for the decade until 2020.'

The rationale behind the Renewables Obligation is set out in response to recommendation 64, while the reasons for introducing the Climate Change Levy are set out in response to recommendation 65. The CCL encourages improvements in business energy efficiency and incentivises most forms of renewable energy, while the RO gives further support to the development of renewables. The Government also has spending programmes to encourage new renewables technologies such as offshore wind and energy crops.

70. Despite recent increases in Government energy RD&D funding, investment is pitiful in absolute terms and in comparison with out international competitors. We believe the UK should be investing more, on economic grounds and to ensure that the

technology is suited to Britain's national needs and takes advantage of our strengths. By repeating the not picking winners mantra, the Government has failed to take a lead. We consider the following areas to be our strengths, reflecting the UK's natural sources and research strengths :

1. Offshore technologies—wind, wave and tidal

2. Nuclear fusion

3. Nuclear fission (paragraph 218).

The Government has significantly increased its spending on offshore renewables over the last year. Offshore Wind now has a capital grants scheme supporting development of the technology within the Renewables Obligation. The £74m budget was increased by £28m, as announced at the British Wind Energy Association Conference on 26th March 2003, in order to allow a third round of bidding to proceed with funding of at least £40m to be allocated. Of the six offshore wind farms to have gained consent so far, all six have been awarded a grant and the first farm at North Hoyle off the Welsh coast has started construction. The Future Offshore consultation has now closed and the Crown Estates anticipates that a second leasing round for wind farm sites will be announced in June. Legislation is in preparation to allow wind farm developments beyond the 12 nautical mile territorial limit. All of these activities confirm the Government's commitment to the technology and the case for further funding will be considered through the Review of Renewables Innovation Spending.

On wave and tidal, current forecasts for research and development spending currently total £11.88m between now and 2005/6, including the allocation of the £5m for demonstration projects from the PM's £100m fund. EPSRC will shortly announce £2.6m for a SUPERGEN consortium on Marine Energy. Further to this, Minister has announced a further £2m for wave and tidal research and development and a possible capital grants programme of at least £5m.

Nuclear fission (especially waste management) and wave and tidal power were among the six key areas, identified by the Chief Scientific Adviser's Energy Research Review, in which increased research effort was considered likely to generate radical breakthroughs. The White Paper endorsed those key areas.

The Energy Research Review also recommended support for fusion research and singled out work on materials as a key priority. The White Paper has recognized the long-term potential of fusion and the Government is fully committed to UK participation in the International Thermonuclear Experimental Reactor Project (ITER).

71. Offshore technologies should be funded at least on a par with fusion (currently £23.5 million a year) and fission should be funded at £10 million a year to fund participation in the Generation IV Forum and boost the academic skills base (paragraph 218).

The UK invested some £14m in Fusion in 2002-3. In addition, as host of EU facilities, the UK will have benefited from some £30 million contributions from EU partners. Offshore

technologies are now funded to this level. Offshore wind has £102m in capital grants to be allocated over three years and has forecast R+D spend of about £4m until 2005/6. Wave and tidal has £11.88m R+D funds committed to 2005/6 plus a further £2m for 2004/5 and a possible capital grants programme of at least £5m. This totals £124.88m and thus gives about £40m of funding to be committed per annum over the next three years.

72. Investments in RD&D must be complemented by policies to stimulate the market. Grants for deployment and tax incentives must be employed to greater extent, commensurate with the threat from global climate change (paragraph 219).

It is intended that the Review of Renewables Innovation Spending will address this issue for the renewable energy technologies. As far as tax incentives are concerned the current position is that electricity from most renewables (excluding large-scale hydro > 10 MW) is eligible for exemption from the climate change levy. Heat from renewables, like solar water heating, is not subject to the Climate Change Levy at all. The Government has also introduced a new duty rate for biodiesel, 20p/litre below the rate for ultra-low sulphur diesel, and will be introducing a 20p/litre differential for bioethanol from January 2005. Solar water heaters bought by business are eligible for enhanced capital allowances, and are subject to 5% VAT if bought by householders. This does not apply to other renewables as by and large they benefit from the Renewables Obligation.

Clarification on Tables 1 and 7 of the Committee's report

The funding figures for "Clean Coal" and "Other" shown at Table 7 of the Report are misplaced. Table 7 sets out the DTI's expenditure on capital grants for low carbon energy technologies. There have been no capital grants for clean coal, and none are planned. The clean coal programme is funded through the RD & D programme and therefore the funding line in Table 7 for clean coal should be included in Table 1 of the Report on UK Government funding of energy RD & D, under the DTI heading, rather than in Table 7. Similarly the "Other" line also belongs in Table 1. Table 1 therefore slightly understates Government (and DTI) funding of energy R, D and D, while Table 7 slightly over-states DTI expenditure on capital grants.

It is acknowledged that the Table on Government Expenditure that was sent to the Committee last autumn could have been expressed more clearly. That table broke spending into three categories, New and Renewable R &D, Capital Grants, and Other (covering both Clean Coal—since this is not a renewable source of energy—and Other expenditure not elsewhere specified). The split between the latter two categories may not have been not sufficiently clearly set out in the table.

Department of Trade and Industry

6 June 2003

Reports from the Science and Technology Committee in the 2002—03 Session

The following reports have been produced by the Committee since the start of the 2002—03 Session of Parliament. The reference number of the Government's response to the Report is printed in brackets after the HC printing number.

Session 2002–03

First Report	The Work of the Particle Physics and Astronomy Research Council	HC 161 (HC 507)
Second Report	Annual Report	HC 260
Third Report	The Work of the Medical Research Council	HC 132 (CM 5834)
Fourth Report	Towards a Non- Carbon Fuel Economy: Research and Development	HC 55 (HC 745)