



Environment and Rural Development Committee

4th Meeting, 2005

Wednesday 2 February 2005

The Committee will meet at 10.00 am in Committee Room 1.

1. Inquiry into climate change: The Committee will take evidence from—

Panel 1

Mark Akhurst, Climate Change Manager, BP plc;

Dr Stephen Garvin, Building Research Establishment, Scotland;

Dr Peter Mallaburn, Head of Government and International Affairs, the Carbon Trust;

Mike Thornton, Head (Scotland), the Energy Saving Trust;

Panel 2

Gregor Murray, the Business Environment Partnership;

Tom Hart, Committee Member, Scottish Transport Studies Group;

Daniel Kleinberg, Policy Analyst, the Scottish Council for Development and Industry;

Panel 3

Janice Pauwels, Head of Sustainable Development, the City of Edinburgh Council;

Dave Gowans, Project Director, Moray Flood Alleviation Project;

Professor James Curran, Head of Environmental Strategy, SEPA;

Colin Galbraith, Director of Scientific and Advisory Services, SNH.

Mark Brough
Clerk to the Committee
Direct Tel: 0131-348-5240

The following papers are attached:

<u>Agenda Item 1</u>	
Briefing paper from SPICe (<i>for members only</i>)	ERD/S2/05/4/1a
Submission from BP plc	ERD/S2/05/4/1b
Submission from the Building Research Establishment Scotland	ERD/S2/05/4/1c
Submission from the Energy Saving Trust	ERD/S2/05/4/1d
Submission from the Business Environment Partnership	ERD/S2/05/4/1e
Submission from Tom Hart	ERD/S2/05/4/1f
Submission from the Scottish Council for Development and Industry	ERD/S2/05/4/1g
Submission from the City of Edinburgh Council	ERD/S2/05/4/1h
Submission from Moray Flood Alleviation Project	ERD/S2/05/4/1i
Submission from SEPA	ERD/S2/05/4/1j
Submission from SNH	ERD/S2/05/4/1k

SUBMISSION FROM BP PLC

Introduction

BP has identified what it calls the “energy paradox”....the energy that provides society with heat, light and mobility, fuelling economic growth and development, simultaneously presents society with serious environmental and social challenges.

High among these is the issue of Climate Change. BP believes that the best chance of stabilising atmospheric concentrations of greenhouse gases will be by balancing the growth in energy consumption driven by the world’s expanding population and improving living standards, with moves to reduce the amounts of carbon emitted. A shift to a lower carbon economy through a multiplicity of efforts, BP believes, can be secured but requires a global effort.

The key question to be answered is whether policy initiatives are designed to incentivise the kind of actions which will really make a difference, or whether they merely add to the regulatory and competitive burden faced by companies, with little or no discernible benefit.

The Debate

BP is an active participant in the global Climate Change debate and in no way seeks to minimise the importance of the issues involved. In 1997, BP was the first company in the oil and gas industry to accept that precautionary action is justified to address the potential risks associated with Climate Change. We have placed an important emphasis on reducing our own emissions, including emissions from our operations based in or managed from Scotland. We do not think there is a single solution to this problem. And we believe that both governments and the private sector must work in partnership to arrive at solutions.

Recently, BP has come to the judgement that to avoid serious impact upon societies or the environment, it would be a necessary objective of global energy policy to aim to stabilise atmospheric concentrations of greenhouse gases at around 500-550 parts per million. Today’s level is around 370 ppm and has risen from pre-industrial levels of 280 ppm. We believe this could be achieved by balancing the growth in energy consumption with moves to reduce the amount of carbon emitted. A shift to a significantly lower carbon economy is, in our view, an attainable goal: but it can only be reached by a variety of measures. For example, an expansion of renewable energy; or nuclear, or gas (at the expense of coal); or other technological advances allowing both increased energy efficiency and new energy sources. There are many options, and all have their advocates and opponents.

This is a global challenge. There is very little which an individual country can do on its own. And it is against this background that the EU Climate Change Policy has to be judged. Does it encourage and facilitate, at affordable costs, a global initiative to reduce carbon emissions? Or does it merely add to the regulatory and competitive burden faced by companies operating in Europe, with little or no discernible environmental benefit?

Emissions Trading

BP welcomes the fact that the EU is in the process of establishing a functional Emissions Trading Scheme (EU ETS) as the basis of its overall policy. BP has long advocated emissions trading as a system which is best equipped to allocate

resources where they are most effective, at least cost, and with the potential actually to add value.

There are however a number of practical issues which must be resolved if an emissions trading scheme is to be either effective in its objective or acceptable to potential participants.

There are of course other policy options. But the great advantage of emissions trading is that it does not seek to prescribe any particular solutions; it specifies the allocation reduction which is required (unlike, for example, a carbon tax) and it is a means of encouraging and providing incentives to the types of investment which make carbon reductions a reality. In its perfect form, an emissions trading scheme is a vehicle for incentivising investment, rather than demanding compliance. But a badly constructed emissions trading scheme can, in our view, all too easily fall into the “compliance” culture.

EU Climate Change Policy

Against this background, BP would make the following points:

Overall, we believe the EU has adopted a valuable leadership position on Climate Change. But we believe that now we must avoid an undue preoccupation with Kyoto, and its relatively modest targets for emissions reductions. There is considerable room for improvement in both economic and emission efficiency within the established energy infrastructure of the EU. But, equally important, the EU has a vital role in promoting the adoption of new, lower carbon infrastructure in non-OECD countries.

This is the key challenge. On the one hand, developed economies must be encouraged to clean up their own act as far as is possible, through the replacement of obsolescent technologies and energy efficiency, bearing in mind the cost and competitiveness equations. But the real prize is to be found in those economies where an energy infrastructure is yet to be established and where the right incentives to spend a relatively modest amount of extra money could make a significant impact on carbon emissions.

The EU is of course a collection of Member States which has to balance the relative attractions of Member State and EU initiatives. Much of the current policy delegates accountability to the Member State level, consistent with the regulation in question. As Climate Change increasingly becomes an issue of economic competitiveness there will need to be a stronger and more business-focused response at EU level.

This should be encouraged by the EU ETS provided it is correctly framed and introduced. BP firmly believes in the need for a strong carbon currency, around which an international trade in allowances and credits can develop. The EU ETS represents a major step towards this goal. But there is a danger that its potential could be undermined in its application. In particular, it could all too easily undermine the competitive position of EU economies for little or no environmental benefit.

BP has no problem with a “cap and trade” system, which is the foundation of the EU ETS and which, in general terms, we believe to be on the right lines. But there are disappointing indications that the system is evolving in a number of ways which threaten its original objective. For example, the development of National Allocation Plans may prove very difficult to reconcile with issues of competition and equity

amongst European businesses. There are difficult issues even within the UK's own National Allocation Plan.

But of equal if not greater concern is the relatively limited purview of the EU ETS. We would encourage a much greater emphasis on its potential global role, which ought to be much broader than an arrangement which simply places various EU efficiency projects in competition with one another. The potential for the EU ETS to assume this responsibility would become even greater if the Kyoto Protocol's ratification is further delayed. And approaches such as "Joint Implementation" and "Clean Development Mechanism" have an important role to play in any scenario.

One should not necessarily be concerned over the failure of Kyoto to be implemented as intended. The European Union has a unique opportunity to unite the international community around material carbon reductions which would far exceed Kyoto aspirations, if only an international tradable carbon currency could become a reality as a result of the EU ETS. In addition, by its example the EU could promote a more business-focussed approach, where a key priority is to maintain international competitiveness in a carbon-constrained world.

Unfortunately, not everyone within the EU sees the issue in this way. Some are still wedded to the concept of national targets as the most effective way of galvanising action, while overlooking the fundamental advantage of emissions trading which is to direct investment to where it has the most environmental impact. One understands the political reality that OECD countries must be seen to set an example, but then there is the danger that far greater environmental benefits elsewhere, are lost.

The EU's greatest contribution to addressing Climate Change issues could come through focussing on assistance to developing, non-OECD countries. As stated, the prime need is to avoid the quickest and easiest route in developing new energy infrastructures, when, with additional investment – on a relatively modest scale – it would be possible for those countries to base their future growth and development on lower carbon economies.

For this to happen, there has to be a broad range of support, including financial support. Targets have their place when encouraging OECD nations to improve efficiency from largely pre-existing energy infrastructures. But if a step-change is to be achieved it will come through economic growth built upon the foundation of new and competitively advantaged energy infrastructures. The great advantage of a global emissions trading system, which could grow out of the EU ETS if the latter is properly constructed, is that companies are incentivised to provide the necessary investment where the environmental benefits are greatest.

Finally there is a role for both government and industry in encouraging a higher level of public understanding and support for such initiatives. This is not easy to achieve, given the complexity of the issues, the nature of the scientific debate, the distinction between risk and hazard, and the inevitable background of uncertainty. But another advantage of emissions trading generally is that it encourages an enterprising and individualist approach to this issue, rather than a top-down, centralist conformity. This in itself should encourage a higher level of engagement on the public's behalf.

SUBMISSION FROM BRE SCOTLAND

BRE

BRE (the Building Research Establishment) is a private research organisation and the UK's leading centre for research and consultancy on:

- construction quality, process and productivity
- environmental impact of construction, sustainability and whole-life performance
- energy efficiency of buildings, and renewable energy in buildings
- building performance - structures, materials and systems
- prevention and control of fire, and risk science
- built environment knowledge dissemination and systems.

BRE is committed to making its comprehensive expertise and experience available to the benefit of those involved in the construction and associated industries, from multinational companies and government departments to individual architects and builders. It does this through:

- commissioned research, development and testing programmes, for individual clients and for consortia,
- commissioned consultancy and advice
- product testing for certification purposes
- publication of Good Building Guides, Good Repair Guides, research reports, books, etc.
- events, training and e-commerce activities.

BRE operates from four sites, of which the East Kilbride and Inverness offices form BRE Scotland. BRE is owned by the BRE Trust a registered charity.

BRE's main business is in building and construction related work and this aspect is concentrated on in this paper.

Buildings and Climate Change

Buildings are significant contributors to the emissions of greenhouse gases and therefore to climate change. Measures that will serve to mitigate the effects of climate change have been taken for both new and existing buildings over the past 30 years; however the contribution from buildings remains high. Buildings are also vulnerable to the impacts from the changing climate. Based on the UKCIP scenarios of climate change several groups have addressed the potential impacts and measures to reduce these have been addressed.

Both these issues are covered in this short paper.

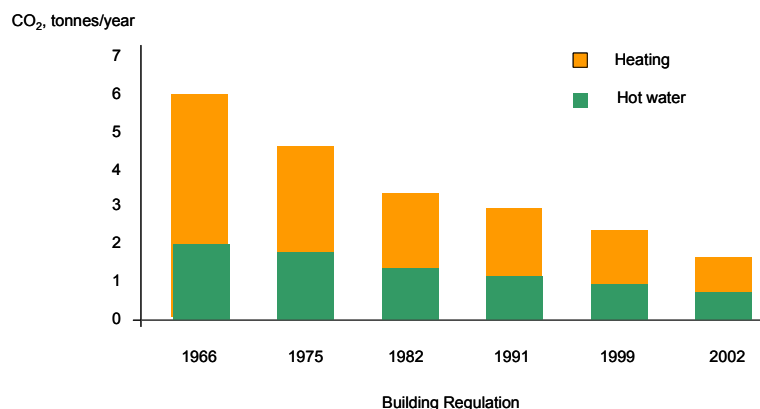
Mitigation

The following points summarise the current position with regard to buildings and their contribution to the occurrence of climate change (source, Defra web site):

- Buildings contribute almost half, about 46%, of the UK's carbon dioxide emissions. Our homes alone contribute about 27%.
- Demand for housing continues to grow, meaning increasing pressure to find land for development. This point seems equally applicable to Scotland, even although population trends might indicate otherwise. Demographic changes are leading to smaller households and so to more dwellings in total.

Buildings also have significant impacts in terms of the use of natural resources such as timber and materials in their construction; especially due to construction and demolition waste being a significant waste stream. Materials use and waste also impact on energy consumption.

The Building Regulations have progressively increased the requirements for thermal insulation and, more recently, have included minimum requirements on services like lighting and boiler efficiency. The figure below illustrates the CO₂ emissions from a typical-sized semi-detached house built to the minimum requirements of regulations at the dates shown.



Clearly the regulations have had a major impact on improving energy efficiency of new buildings, but it also means that the further scope in terms of traditional measures is limited and the focus is expected to be increasingly on renewable and low carbon sources.

In view of the low replacement rate of the building stock, this also means buildings built to standards well below current new-build levels will remain a large part of the stock well into the future. In this sense, ways of attaining improvement of the existing stock are important. The Energy Performance of Buildings Directive will require energy assessments of existing buildings when sold or rented, which will serve to increase public awareness.

The SAP rating is a measure of the energy efficiency of buildings and has been compared for new and existing buildings, as follows:

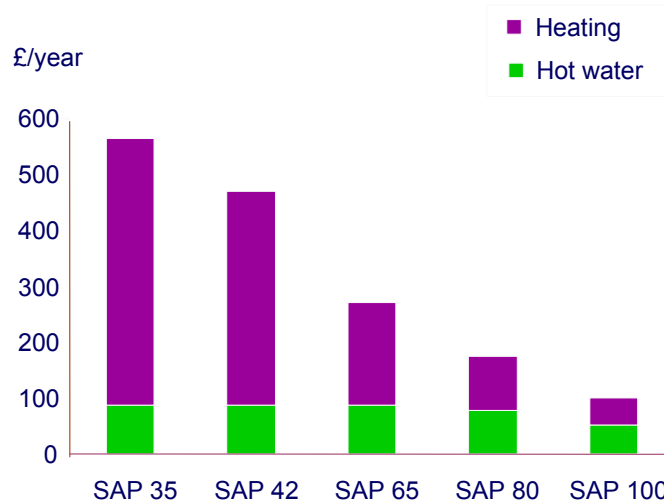
- Average of existing stock – about 45
- New build (2002 Regulations) – about 95.

The positive impact of a higher SAP rating on heating and hot water costs can be seen in the figure on the next page. There is a clear financial case for government, local authorities, householders and business to become more energy efficient in the buildings that they operate.

There are a number of potential problems with regard to the use of building regulations as an instrument to improve the energy efficiency of existing buildings. Alternative means of encouraging building owners to upgrade properties is required.

In addition to the need to consider the energy efficiency of the existing building stock there are a number of other areas where further consideration needs to be paid with regard to buildings energy efficiency. These are briefly set out here in no particular order.

Insulation installation quality – recent work carried out by BRE on new housing developments in NE Scotland has shown that poor installation of insulation in lofts, walls and floors can substantially impact on both the comfort in dwellings and the energy efficiency. Better installation standards need to be encouraged and work undertaken with major and smaller housebuilders to ensure that proper installation achieves the required energy efficiency targets.



Innovative insulation materials – until recently insulation for walls, floors and lofts was predominantly based on plastic or mineral wool type materials. As insulation standards have become more stringent the insulation has generally become thicker in response. In turn manufacturers have begun to produce novel insulation materials that are thin sheets based upon low emissivity surfaces that reflect heat back into the building. In theory these products work, but there is a need to ensure that in practice the performance is achieved.

Renewables in buildings – Energy from renewable sources offer significant potential. Small scale generation to supply power to rural communities offers great potential for Scotland. Encouragement should be given to research that leads to the appropriate and wide scale implementation of solar, thermal and wind technologies in housing and other buildings in Scotland.

Energy Performance of Buildings Directive – this will be implemented in 2006 and represents a significant opportunity to address the energy efficiency of existing non-domestic buildings. There is a need to ensure that the Directive is properly implemented in Scotland and that it leads to a continuous improvement in building's energy efficiency. Greater use of Certification and auditing of whole buildings is a possible means of implementing the Directive and improving building energy efficiency, but this needs further investigation and commitment from Executive Departments in a local context..

Adaptation

Flooding in 2002 and drought in 2003, then flooding again in 2004: are these indications of climate change or just natural variability? The impacts of climate change on buildings and construction are difficult to quantify. In 1998 BRE published a study (*Impact of Climate Change on Building*) that gave a broad view of the impacts of climate change. Further work was carried out over the period to 2000 when a report (*Potential Implications of climate change in the built environment*) was published that attempted to quantify the issues for UK buildings, particular challenges that were identified are as follows:

- Impact on the construction site activities, making site work more difficult and hazardous;
- Increased weather-tightness problems;
- Increasing instances of foundation instability;
- Increased flooding risk, especially in river plains and coastal locations;
- Poorer materials durability;
- Increased storm damage;
- Summer overheating becoming more common.

The UK Climate Impacts Programme (UKCIP) has published a series of climate change scenarios that has been used in the work by BRE. Average annual temperature increases of up to 2.4°C have been predicted for Scotland, as well as increased rainfall and storminess. These are all likely to have a negative impact on the building stock.

Offsite construction may be viewed as a potential means of overcoming the increased risks from climate change, however, many buildings are still constructed using traditional means. This may well change, and the increased pressure which climate will exert on site activity may be one of the catalysts. In Scotland over 50% of housing is timber framed, allowing a weatherproofed shell to be erected and then internal works to be completed. The table below summarises the key issues involved in the impact of climate change on housing (Nb – this has been developed for the UK).

Issue	Key Climatic Changes	Consequence of No Action	Design Change Possibilities
Weather-tightness	Increased Winter Rainfall and wind changes	More rain penetration of properties	Recessed windows and doors Greater eaves overhang Better detailing around openings Wider cavities in masonry
Materials durability	Increased temperatures Higher rainfall Increased UV	Poorer durability of plastics and timber joinery, plus increased potential for cracking of masonry and concrete, corrosion of metals more likely	Higher quality materials, improved workmanship, detailing of movement joints
Foundation Movement	Increased summer drying of soils	Increased damage due to foundation movement (currently £200-400 million per year).	Increase foundation depth in susceptible locations.
Flood Risk	Increased winter rainfall events, allied with construction on flood plains	Increased damage and disruption (currently greater than £200 million per year).	Design to accommodate water ingress in vulnerable locations, buildings to dry out quickly and resistant materials to be used
Overheating	Hotter summer temperatures	Increased use of air conditioning and energy.	Better natural ventilation and passive shading, use of vegetation to keep houses cool in winter Consider the use of thermal mass in design

Impact studies have been carried out for Scotland, as well as the rest of the UK, and considerable research effort has been expended in this respect. Large European Commission funded projects related to climate change have also been undertaken in recent years. However, in reality these studies are no more than scoping studies and feasibility studies on what the impacts are and how buildings can be adapted.

There is a need to undertake research and seek implementation of solutions that not only preserve and maintain the existing building stock for an economically advantageous period, but also seek new buildings that are 'climate change proofed' As yet that research has not been undertaken. Buildings and building materials that monitor climate change are a possibility, but commitment from government and industry is required.

SUBMISSION FROM THE ENERGY SAVING TRUST

Executive Summary

The Energy Saving Trust (EST) believes that it is essential for the Scottish Executive to show clear leadership on climate change issues and to demonstrate its commitment to a low carbon economy by implementing a well structured programme that will deliver major reductions in greenhouse gas emissions. In particular, substantial reductions are required in the Scottish residential, transport and public sectors that can only be achieved by transforming the levels of awareness, understanding and behaviours of consumers. EST is well placed to assist the Scottish Executive in delivering its climate change objectives through a variety of policy instruments.

Introduction

1. This is the EST's submission to the Environmental and Rural Development Committee inquiry into the Review of the Scottish Climate Change Programme. This submission should not be taken as representing the views of individual members of EST.
2. EST was established as part of the Government's action plan in response to the 1992 Earth Summit in Rio de Janeiro that addressed worldwide concerns on sustainable development issues. We are the UK's leading organisation working through partnerships towards the sustainable and efficient use of energy by households, communities and the road transport sector. EST activities in Scotland receiving funding from the Scottish Executive include eight Energy Efficiency Advice Centres, transport programmes and the Scottish Community and Householder Renewables Initiative (SCHRI). We believe that the proven expertise of the EST in Scotland will prove particularly helpful to the Scottish Executive in delivering climate change objectives and have currently seconded a staff member from our Scottish team to the Executive to help develop the proposed energy efficiency strategy.
3. EST welcomes the Committee's inquiry into the Review of the Scottish Climate Change Programme. We are grateful for the opportunity to submit evidence both here in writing and to the Committee on 2nd February 2005. As one of the key delivery agents for energy efficiency and carbon reduction in these sectors, EST will be responding in detail to both the Scottish Parliament and UK Government's reviews of their respective Climate Change Programmes.
4. Our submission is not intended to be a comprehensive response to the review of all policies that are necessary to deliver the Scottish Climate Change Programme. Rather, it provides a broad overview of the key issues for the household, communities and road transport sectors in Scotland. Furthermore, some policy instruments are best implemented at the EU level, e.g. transport voluntary agreements, or are reserved issues for the UK Government e.g. fiscal energy efficiency measures. Therefore, for the purposes of this submission, EST only addresses those instruments that could be developed by the Scottish Executive.
5. Against this background our submission focuses on seven key sections.
 - The viability of a Scottish Greenhouse Gas (GHG) Emission Reduction Target.
 - The proposal for developing a Scottish Energy Efficiency Strategy.
 - Potential additional residential energy efficiency measures.
 - Support for small scale renewables
 - Potential additional transport measures.
 - Potential additional public sector measures.
 - Development of Scottish Building Regulations.

The viability of a Scottish Greenhouse Gas Emission Reduction Target

- EST supports the Scottish Executive's commitment to making an equitable contribution to meeting the UK's Kyoto protocol target. Whilst supporting the principle of setting a Scottish GHG target, we recognise the complexities in establishing the robust GHG projections that would be required to underpin a Scottish GHG target. Given the lack of control over reserved issues EST therefore believes that an approach based on specific sector targets might be a better way forward. Sectoral targets would not need to be specifically carbon based., for example the renewables generation target set out in *Securing a Renewable Future*, but should deliver large carbon savings and incorporate milestones to demonstrate progress. We strongly support the philosophy already adopted by the Scottish Executive that, where feasible, targets should exceed those set by UK Government e.g. the Scottish renewable generation target.

The proposal for developing a Scottish Energy Efficiency Strategy.

- It is widely accepted that energy efficiency has a crucial role to play in reducing carbon emissions, eliminating fuel poverty, improving business efficiency and enhancing security of supply. EST therefore strongly supports the development of a specific Scottish Energy Efficiency Strategy, which would be consistent with the approach adopted for Renewables and Transport in Scotland. EST also advocates the incorporation of separate energy efficiency targets for residential, commercial, industrial and public sectors, expressed in tonnes C.
- The residential sector, which in 2002 accounted for around 27% of UK end user CO₂ emissions, has considerable potential to realise energy efficiency savings. Across the UK, EST currently projects that a realistic potential reduction of 5.7MtC can be achieved through residential energy efficiency measures by 2010, comprised of the following specific measures:

Measure	Potential 2000-2010 (MtC/year)
Cavity Wall Insulation	0.9
Other insulation	0.5
Efficient Boilers	1.3
Lighting	0.4
Cold appliances	0.6
Other appliances	0.9
New build	0.5
Efficient Glazing	0.3
Other	0.3
Total	5.7

Potential additional residential energy efficiency measures

- Cost effective measures that can contribute to energy efficiency improvements are dominated by improvements in building fabric, boiler efficiency, high efficiency lights and appliances. However, free markets have failed to deliver the necessary investment for a number of reasons that reflect the fact that energy efficiency is very low down the list of priorities for most people. EST believes that a range of additional policy instruments is required to deliver the potential residential energy efficiency savings and has identified the following instruments that could be developed by the Scottish Executive as part of a Scottish Energy Efficiency strategy.

- EST is piloting the concept of a Sustainable Energy Network (SEN) in other UK countries through building upon the existing infrastructure provided by the network of Energy Efficiency Advice Centres (EEACs). These currently focus on energy efficiency advice, in the SEN model their work would be extended to supplying information and advice to encourage energy efficiency and the use of renewable energy in both homes and road transport. We believe that this integrated approach is likely to prove more cost effective than separate initiatives and suggest that it be considered accordingly. EST is currently undertaking consultations in Scotland on the 'Future of the EEAC Network'.
- In addition to delivering carbon reductions, sustainable energy can also help alleviate fuel poverty. We believe that some improvements in the interaction between fuel poverty programmes, such as Warm Deal and the Scottish Housing Quality Standard (SHQS) with the Energy Efficiency Commitments (EEC), are possible and warrant further investigation. This could include the use of EST's Home Energy Efficiency Database as an information repository to achieve better co-ordination.
- EST supports the mandatory extension of the SHQS standard to vulnerable households in the private rented sector to drive the investment required to raise building standards.
- EST welcomes the requirement (under the EU Energy Performance in Buildings Directive) to include a home energy efficiency report in Purchasers Information Packs. If implemented in a rigorous manner this requirement should prove a valuable tool in stimulating the uptake of energy efficiency measures.
- EST believes that the tax incentives for landlords for energy efficiency measures may not prove as effective as hoped and that a regulatory approach requiring landlords to undertake and implement energy efficiency measures identified in a home energy efficiency report would be more effective.

Support for small scale renewables

10. In our opinion it is particularly important to provide lower carbon and more affordable heating to off-gas grid homes through insulation measures combined with gas network extensions where feasible and renewables where not. We therefore welcome the recent extension of the SCHRI programme and believe that adopting the SEN approach in Scotland would help underpin the SCHRI in providing a major stimulus to the development of small scale renewables. This would be enhanced by the implementation of a specific low carbon building programme, as currently being considered by the DTI, that would incentivise both renewable and energy efficiency uptake. We therefore recommend that the Scottish Executive supports such a programme.

Potential additional transport measures (including public sector)

11. Urgent action is required to negate the increasing road transport emissions that are forecast by the DTI¹. EST therefore welcomes the Scottish Executive's commitment to support the development and uptake of clean low carbon vehicles and fuels. EST believes that this is best approached via a technology-neutral grant funded programme. However, there is considerable further scope to tackle transport emissions, key to which is the provision of information and advice to users. Additional measures that the Scottish Executive could implement include:

- Facilitating the provision of improved advice, including travel plans and fuel efficient driving across all market segments, which could be undertaken via the existing EEACs.
- Additional stimulation, assistance and subsequent sharing of best practice in the development of innovative road user charging schemes, supported by the matched funding currently available.

¹ DTI Updated Energy Projections 11/11/04

- Encouraging the development of Low Emission Zones (based on defined standards) that would exclude highly polluting vehicles, possibly as an extension to the existing Air Quality Management Areas.
- Supporting the development of low carbon fleets, most notably buses, but also other commercial fleets. For example, through the facilitation of:
 - Quality Partnerships between Local Authorities (LAs) and bus fleet operators where bus infrastructure improvements are provided in return for efficiency and/or environmental improvements in the bus fleet.
 - Clear Zones in urban areas where LAs work with bus operators, business and residents to reduce traffic and emissions.
 - Quality Contracts, where LAs are able to grant exclusive route-operating rights based on providing best value, whereby only the cleanest buses can be employed.
 - Potential congestion charging initiatives in major cities.
- Commitment to the introduction of green travel plans for public sector operations and to exceed UK Government's departmental targets for reducing road transport emissions.
- Introduction of mandatory emission standards for licensed taxis.

Potential additional public sector measures (in addition to transport)

12. The public sector, particularly Local Authorities (LAs) due to the level of influence they can exert, have a key role in leading on environmental issues. Additional policy measures that could be implemented include:

- A requirement for LAs to develop and implement sustainable energy strategies.
- Mandatory energy certification and labelling of all public sector buildings, not just those over 1000m², including periodic review and requiring demonstrable improvement to an agreed minimum acceptable standard.
- Setting challenging CHP and renewable targets for the public sector.
- Mandatory "greening" of procurement programmes, e.g. high efficiency products, public sector buildings such as schools, and vehicles.

The EST is well placed to assist the LAs in delivering these measures, through the provision of advisory services and the sharing of best practice.

Development of Scottish Building Regulations

13. EST advocates the continued strengthening of Building Regulations, which are probably the single most important policy instrument for reducing carbon emissions in the very long term. It is therefore critical to ensure regulatory compliance and in this respect mandatory air tightness testing of new homes is important. We support the previous approach of the Scottish Executive in adopting tighter standards than in England and Wales and believe that there is a further opportunity to strengthen Scottish Building Regulations to encourage housebuilders to develop low, or even zero, carbon homes. In addition to including a mandatory requirement to install condensing boilers, an obligation to install a minimum percentage of renewable generation and/or micro-chp in gas-connected homes could also be incorporated.

SUBMISSION BY THE BUSINESS ENVIRONMENT PARTNERSHIP

“Tackling climate change need not be a burden on business. The BEP has clearly demonstrated that energy efficiency, waste minimisation and improved environmental management can have clear financial benefits for small businesses in Scotland.”

Executive Summary

The Business Environment Partnership (BEP) is a public / private sector partnership that provides free support to small to medium sized businesses across eastern Scotland on the benefits of energy efficiency, waste minimisation, environmental management and the development of new products and services. The advice provided is practical, focused and targeted. The Partnership is grateful for the financial support it receives from the Scottish Executive, Scottish Enterprise, the European Regional Development Fund and from our wider sponsors and partners¹. BEP works closely with the Business Gateway and we believe that integration into the existing business support mechanism is the key to our success.

Since 1998 BEP has worked with 735 companies to realise more than £8.6 million in cost savings through improved management of energy, raw materials, water and effluent. This work has also assisted companies to develop new market opportunities worth more than £27 million. This work has successfully demonstrated that tackling climate change need not be a burden for business and that real economic benefits can be attained through greater business efficiency and the development of new market opportunities.

In the last year alone, BEP have identified opportunities in 169 companies to reduce CO₂ emissions by **30,888** tonnes of which more than **5,800** tonnes have already been realised. Financially these energy savings have contributed to **£1.17 million** in cost savings. Whilst the contribution that an individual SME may make to reducing CO₂ emissions may be comparatively small, this work has shown that realised CO₂ savings could be more than **8.35** million tonnes CO₂. In financial terms this would equate to approximately £2 billion in savings that would greatly contribute to business competitiveness. Greater awareness amongst businesses and financial incentives are required to achieve this.

Our written response to the Environment and Rural Development Committee Climate Change Inquiry focuses on our experience as a frontline business support service. It describes the challenges that small to medium businesses face and makes recommendations for both policy and practical measures required to deliver significant CO₂ reductions in future. Scotland has made significant progress in reducing pollution from businesses – but this has focused on specific problems such as particulates, dioxins and emissions which harm human health. The focus now needs to be turned to carbon .

Introduction

The Business Environment Partnership (BEP) was formed in 1997 to provide free support and advice to small to medium businesses. The practical support provided focuses on energy efficiency, waste minimisation and the development of new products and technologies. The BEP is currently expanding, now employing 12 full time business advisers, based in Dalkeith, Livingston and Aberdeen.

¹ Partners and funders include Scottish Executive, Scottish Enterprise, European Regional Development Fund, Aberdeen City Council, Aberdeenshire Council, East Lothian Council, City of Edinburgh Council, Enviroco, Forward Scotland, Midlothian Council, Scottish Energy Efficiency Office, Shanks First Fund, SEPA, West Lothian Council, Waste Recycling Group

During 2004 the BEP has identified energy savings equivalent **30,888** tonnes of CO₂, which relate to **£277,000** of cost savings, **£100,000** have already been implemented. These are part of the **£1.7 million** in savings identified through BEP's wider work, including waste minimisation and environmental management. BEP's work has led to cumulative, **implemented** savings of over £8 million since 1998.

The BEP has a focus on the *implementation* of our recommendations and has a unique business support model which delivers tangible business and environmental benefits². BEP is closely integrated into the Scottish Enterprise Network – through the Business Gateway - and the close links we have with mainstream business advisers are one of our key strengths.

Our **student placement programme** continues to deliver practical, cost effective support to businesses, in addition to the learning and experience gained by the students. The programme is helping to bring the environment into mainstream enterprise throughout Scotland. In the last 4 years, our students have identified more than £4 million in savings.



Rhona Brankin MSP and Robin Harper MSP presenting awards to last year's students

Several case studies which demonstrate the BEP's success are included in this response. They demonstrate the significant cost savings that small to medium sized business can make and in every case, energy efficiency has improved the profitability of the businesses involved. Whilst the individual contributions in terms of CO₂ savings are small – the cumulative effect of a large number of businesses making savings is the key to tackling business emissions.

The business contribution to climate change

According to the Scottish Executive's consultation paper³, Scottish businesses emit approximately 9,000,000 tonnes of CO₂ equivalent per annum⁴. However, this excludes transport emissions which are related to business (including travel to work, road haulage and the movement of products around the country). Total transport

² For more information, please visit www.thebep.org.uk

³ Review of the Scottish Climate Change Programme, Scottish Executive 2004.

⁴ Including 'business' emissions and 'industrial process' emissions, NB it is not clear how these figures have been calculated

emissions in Scotland are currently 10,000,000 tonnes of CO₂ equivalent per annum and a significant percentage can be attributed to business activity. A further 650,000 tonnes of CO₂ equivalent are emitted through waste management⁵ and it is assumed that the majority of these can be attributed to the disposal of commercial waste and products⁶.

Businesses in Scotland therefore make a significant contribution to climate change. A lot of this is due to inefficiency and waste and the opportunities to reduce this contribution are significant.

What's being done to tackle this problem ?

The Scottish Executive has made significant progress in recent years to start to tackle the problem, including support for the BEP, Scottish Energy Efficiency Office, the Energy Saving Trust, the Carbon Trust and other initiatives. All of these initiatives have made a significant contribution to improving business efficiency but progress made in terms of CO₂ reductions is small compared to the size of the problem and there is still a long way to go to meet the reductions required to combat climate change. Many of the savings made in the business sector between 1990 and 2002 have been achieved through the closure of the Ravenscraig Steel Plant⁷, rather than improved efficiency amongst existing businesses. Many of the savings identified by business support organisations are *identified* not *implemented*. If significant reductions are to be achieved in future, more action is required to facilitate implementation.

Business advice

We recognise the achievements that have been made to improve business efficiency through the work of the various support agencies⁸, but the provision of energy efficiency advice to businesses in Scotland could be better co-ordinated. There is currently a lack of awareness of the support available amongst businesses and those businesses who seek support are often confused by the services available and the criteria that apply. For example different support is provided depending upon the business sector, size of energy bill, geographic location, and whether the business is primarily interested in tackling energy or waste costs.

Creating a "single entry point", for example Business Gateway, would help direct businesses to the source of appropriate support and should encourage the integration of environmental considerations into core business development strategy. The work of Scottish Enterprise to achieve this is recognised as a positive development and should be further encouraged.

This should be coupled to an awareness raising campaign to educate businesses about the business benefits that can be realised through cost savings and new market development through improved energy efficiency.

Practical support is required to facilitate implementation of carbon dioxide reducing measures. Many SME managers recognise that improved energy efficiency can benefit their business but lack the time or financial resources to implement practical energy saving recommendations. Support is required to assist SMEs benefit from financial assistance available through Loan Action Scotland and Enhanced Capital Allowances.

⁵ The calculation of this figure is not clearly defined in the Scottish Executives consultation paper

⁶ Domestic waste disposal includes the disposal of products and packaging produced by businesses

⁷ Review of the Scottish Climate Change Programme, Scottish Executive 2004.

⁸ e.g. BEP, the SEEO, Carbon Trust

A strategic review of business support is required and the BEP would be pleased to participate in this process. All of the existing support mechanisms have strengths and weakness. We would welcome the opportunity to share our experiences with public sector agencies and to collaborate on future delivery.

The challenges that small business face

The experience of our work with small businesses has suggested that small businesses face specific challenges in relation to environmental issues, which are the need for:

- time to look into these issues and to find information and advice;
- capital to invest in energy efficiency;
- reliable and impartial information / expertise on measures to improve efficiency;
- improved understanding of their impacts on climate change.

An increase in the support available and improved awareness amongst businesses are required to meet these challenges.

Financial support mechanisms

Several financial support mechanisms are available for businesses, including the Enhanced Capital Allowance Scheme⁹ and Loan Action Scotland (LAS)¹⁰ and the BEP actively promotes and supports both of these schemes. However, many companies find these schemes, and the criteria which apply to them complicated which discourages applications. Independent specialist support is required to support a Loan Action Scotland application. Without clear access to this support companies are restricted from making an application.

Case Study: Dalhousie Castle Hotel

Following an initial environmental review a detailed analysis of electricity use was undertaken together with a staff awareness survey. Annual cost savings of **£3,000 - £10,000** were identified through a number of energy efficiency measures. The Hotel has consequently trialed a new heating controller which demonstrated 24% savings in room heating costs and has now been installed in all bedrooms.

Hotel & Restaurant



Also, with support through the Energy Saving Trust's Loan Action Scotland, the Hotel has switched from electric hot water heaters to gas heating and has incorporated a number of energy efficiency considerations into the design of the new spa development which will **save over £10,000 per year** in running costs and **avoid over 200 tonnes of carbon dioxide emissions** annually.

The Climate Change Levy

The Climate Change Levy (CCL) was introduced by the UK Government in 2001, with the aim of encouraging businesses to use less energy. The CCL has raised significant funds to support the work of the Carbon Trust, SEEO and others. However, it is hard to judge the effect that the CCL has actually had in reducing carbon emissions. Many businesses have 'negotiated agreements' which exclude them from paying 80% of the

⁹ See <http://www.eca.gov.uk/>

¹⁰ See <http://www.energy-efficiency.org/howto/help/loan/index.html>

CCL. Many companies have a low awareness of the CCL, or the practical ways in which CCL may be reduced.

Case Study: Bell Bakers

Bakery

This project involved an investigation into energy use, including detailed assessments of energy profiles in order to identify areas of potential cost savings through low and no cost measures.

A total of **£17,000** potential annual cost savings were identified. Those which required minimal capital expenditure included:

- £1,500 by relocating compressor equipment to improve efficiency,
- £3,770 from improved lighting management & maintenance
- £1,000 by closing cooker lids
- £1,800 by reducing effluent.

Employees are now more energy conscious and the company is offsetting the impact of the **Climate Change Levy**. Improving energy efficiency will benefit the environment through reduced emissions to the atmosphere.

“The BEP raised awareness of government backed energy saving schemes such as Loan Action Scotland. As a result of this we benefited from a £15,000 interest free loan to replace boilers and heating systems with new efficient equipment”. Without the assistance of the BEP we would not have brought in this environmentally sound equipment”

Glen Watson, Links Veterinary Group

Transport

Road transport makes a very significant contribution to climate change in Scotland – and a significant percentage of road transport can be attributed to business. Initiatives are required which encourage:

- **local procurement** – reducing the distances that products travel;
- **more efficient vehicles**;
- **alternative fuels which are less carbon intensive**;
- **non road transport** (especially rail);
- less **air transport** of goods;
- employers to provide **alternatives to the private car**, including walking and cycling.

A strategic review is required of existing public sector policies on transport – with a focus on reducing the volume of goods transported by road and by air. We support the revision of *Smart Successful Scotland*¹¹, which places an emphasis on connectivity for businesses, particularly if focus is maintained on digital / telecommunications connectivity. We also welcome the inclusion of a CO₂ indicator to monitor progress.

Significant funding for public transport, alternative transport modes and research into alternative fuels¹² is required to give businesses realistic and cost effective alternatives to road transport. Tax incentives which promote more efficient vehicles are required – there is little incentive for businesses to change at present.

¹¹ Scottish Executive 2004

¹² e.g. biofuels, hydrogen fuel cells, LPG

Technology and innovation

Scotland has a strong track record in technology innovation, particularly in the engineering sector. The BEP welcomes the development of the Green Jobs Strategy¹³ by the Scottish Executive and the opportunities identified for renewable energy in particular. However, significant investment in low carbon technologies is required if Scotland is to make a meaningful contribution towards tackling climate change in the future.

The BEP is leading the development of low carbon technology for the building sector in Scotland through the *Hydrogen Office*¹⁴ project, which aims to demonstrate that a commercial office building of around 1000m² can be powered entirely by clean renewable energy. The project will utilise hydrogen fuel cells to deliver 100% carbon free energy to the building – the first project of its kind in the world.

Case Study – Renewable Devices

The BEP has provided ongoing support to Renewable Devices since 2002, including student placements and specific research projects. The growth of their company, employing 8 new staff in 2004 demonstrates the potential for Scotland to benefit from renewable energy. They have recently signed a contract worth £9.2 million with Scottish and Southern Energy to roll out the production of their Swift wind turbine.



Conclusions

Reducing carbon emissions from Scottish businesses represents a significant challenge. However, investment in business advice and support can deliver the following benefits:

- ✓ significant cost savings for businesses;
- ✓ increased business competitiveness
- ✓ improved environmental awareness amongst companies;
- ✓ development of new innovative products by Scottish business
- ✓ the creation of new 'green' jobs.

Working in partnership with other agencies we have already made a small but significant contribution towards tackling climate change, particularly in the SME sector. With the additional funding provided by the Scottish Executive in 2004 and the increase in our resources, we aim to increase this contribution in future. Our approach has been to promote the benefits of environmental management for SME's and to encourage people to recognise that relatively small changes in each SME can add up to significant changes for the Scottish environment and for the Scottish economy. The Business Environment Partnership represents a long standing public / private partnership and clearly demonstrates the benefits of the public sector working in partnership with the private sector to tackle climate change.

¹³ <http://www.scotland.gov.uk/consultations/environment/tjisc-00.asp>

¹⁴ See www.thehydrogenoffice.com for further information

SUBMISSION FROM TOM HART

Linking Business and Environmental Concerns

Background I am a committee member of the Scottish Transport Studies Group and was Chair of this Group and Editor of its Quarterly Scottish Transport Review until November 2004. I am a retired Lecturer in Economic and Social History at Glasgow University and have had particular research interests in recent Scottish economic history and environmental issues and in comparative approaches to transport policies and outcomes on a European, North American and world basis since the 1870s and in relation to future prospects. I was an invited participant at the OECD Sustainable Transportation Conference in Vancouver in 1996 and have written extensively on sustainable transport issues since the 1970s. I was co-editor of the 1999 Report of the Scottish Forum for Transport and the Environment Report on *Transport Policy Options for a Sustainable Scotland 2000-2020 : An Assessment of Three Scenarios* and have contributed the Transport chapter to the forthcoming SNH publication in *Energy and the Scottish Environment*.

I am a Vice President of the Scottish Association for Public Transport and a Board Member of TRANSform Scotland – the campaigning body for sustainable transport. I believe that the gap between environmental groups and business lobbies in relation to climate change and sustainable development has often been exaggerated and that there is a considerable area of common ground between these groups. There is a need for both to understand each other better.

Headings for Committee

Sectoral Contributions to cutting Greenhouse Gas Emissions

Cuts will require contributions from all sectors of the economy. I would not claim to be an expert on sectors outside transport but do consider that measures to make better use of existing energy merit fuller consideration and can make a substantial contribution towards further moves to less energy-intensive economies.

In many quarters it has been assumed that due to increasing road use and – particularly - to the rapid expansion in air travel (with both heavily reliant on fossil fuels), the transport sector will find it particularly difficult to cut emissions and may argue that emissions trading could allow it to increase emissions by ‘buying up’ greater savings made in other sectors. In part, this may happen but it should not divert attention from the need for substantial cuts in greenhouse emissions from transport.

Coping with Existing and Projected Climate Change Impacts

Some climate change is inevitable and requires more attention to mitigating action within Scotland – including significant costs within transport, a review of waterfront developments and serious consideration of a Clyde tidal barrage at Erskine.

The Need for more Radical Action to cut Greenhouse Gas Emissions

Scientific evidence suggests a strong case for more radical action but it needs to have international political and business backing for effective results

Action is becoming more urgent to cut transport emissions more rapidly in the next 10 years as well as in following decades. This can be done without significant adverse economic impacts and with some bonuses in terms of health, social inclusion and quality of life.

Is there a need for stronger Scottish action if other parts of the world are less responsive? It is important that other parts of the world do respond but stronger Scottish and UK/EU action can help convince the rest of the world that stronger action offers benefits rather than economic damage. Action in Scotland with respect to 'new energy', conservation and innovation could also help give Scotland a lead in this expanding field while releasing resources to expand other Scottish economic opportunities. Despite the rural appearance of much of Scotland, it is important to remember that over 85% of the Scottish population lives in urban surroundings with most movement being generated in and between towns and cities.

The Case for Scotland to support Stronger UK/EU initiatives

e.g. fiscal and regulatory reform to boost energy conservation and alternative fuels; remove incentives for ever-increasing movement by energy intensive mode

- exploration of economic implications of lower growth in air travel
- greater urgency in evaluating high-speed rail as an alternative to Anglo-Scottish air travel

OUTCOMES - could achieve a 15% cut in CO2 transport emissions by 2015 provided volume of movement is unchanged – less if growth occurs and possibly negative if growth is concentrated on energy-intensive movement – clarify in further urgent research

Actions within Scotland

- review traffic management, fares and road pricing to encourage less movement and/or less energy intensive movement
- review land use planning to ensure, in practice, greater support for shorter trips and shifts to less energy intensive and intrusive movement
- simplify procedures for assessment and approval of schemes with high scores in relation to emission reduction (involving some revision of STAG with particular reference to separating 5 year priorities and longer-term options requiring evaluation. This process could also aid new requirements for Strategic Environmental Assessment)
- support early action on **Transport Scotland**, effective **Regional Transport Bodies** and simplified authorisation procedures for priority rail, tram and bus priority schemes plus more action on traffic calming, 20 mph limits and specific programmes to expand walking and cycling
- accelerate **Scottish Strategic Transport Review** (already started with view to completion in 2006) - expand priority for cross-Glasgow rail links (from south and west to east and north) able to integrate improved airport access with wider benefits for users across central Scotland and on access routes from the north – expand rail and bus vehicle capacity and introduce fully integrated multi-modal fares in association with road pricing

- delay road schemes giving substantial increases in capacity

e.g the **urban M74**

proposed additional **Forth crossing** at Queensferry

(though proposed restricted upgrade of A80 to motorway, the A8000 improvement and further M8 works between Baillieston and Newhouse appear acceptable within a sustainable economic strategy)

OUTCOMES – could achieve 0.7% a year cut in CO2 emissions if volume of movement stays stable – or 2.4% a year if integrated with UK/EU action.

In practice, a 10% growth in total volume of movement related to Scotland over next 10 years is likely within realistic sustainable scenarios. This still leaves an **overall cut of 15% in transport CO2 emissions between 2005 and 2015**. If, as seems feasible, all growth was in the rail, bus, shipping and air sectors, this outcome would be fully compatible with lessened congestion, improved reliability and the Executive's stated aim of stabilising road vehicle kilometres in Scotland over the period 2021.

Urge setting a **Scottish target for 15% CO2 cuts in transport by 2015** (with similar or better cuts achieved in other sectors).

A 15% CO2 cut by 2015 is compatible with the favoured objective of 60% UK cuts by 2050 with actual programmes being monitored and modified in 5 year reviews taking account of developing information and research.

**SUBMISSION FROM THE SCOTTISH COUNCIL
FOR DEVELOPMENT AND INDUSTRY**

I am writing to set out the Scottish Council for Development and Industry's response to the Committee's call for evidence for its Inquiry into Climate Change. SCDI has a long track record of engaging with environmental issues and we have previously provided advice to the Scottish and UK parliaments and governments and industry regulators on energy issues and sustainable development. SCDI's membership of over 1,000 is drawn from the private, public and voluntary sectors and includes organisations involved in energy production, use and conservation.

SCDI welcomes the Committee's inquiry and agrees that, with the UK holding the Presidencies of the G8 and the EU later this year, it is a timely one. The inquiry also comes at a time when the UK Government and Scottish Executive are looking at producing an integrated sustainable development strategy. We have yet to respond to the Executive's recently published consultation on its Review of the Scottish Climate Change Programme but this is clearly of central importance to this inquiry.

Overview

The first point to note is that climate change – and SCDI accepts that there are very few experts who do not accept that a significant degree of climate change is occurring – requires concerted action across almost all policy areas and by all governments, companies and individuals. While it is right for the Scottish Executive to be ambitious in talking about climate change, it must also be pragmatic in considering what initiatives and language are appropriate in a Scottish response to the issue. Almost all governments equivalent in size or powers to the Scottish Executive have struggled to make concrete progress across the portfolio of issues that constitute 'sustainable development' or 'tackling climate change'. The UK Government, with the full range of legislative powers, has recently said that it is not likely to meet its own 2010 target of a 20% reduction in carbon dioxide emissions from 1990 levels. SCDI therefore welcomes the Scottish Executive's success in putting these issues on the public agenda but recognises that matching rhetoric to effective action and measurable outcomes will be a long and sometimes frustrating process.

As both the causes and effects of climate change are often global in nature, the Scottish Executive ought not to be tied to targets or monitoring processes that are discretely Scottish but take no account of wider effects. Thus, while it would be useful to make progress on disaggregating Scottish figures, it could be that an increase in overall Scottish emissions contributed to an overall net reduction in UK emissions. Setting an arbitrary, politically determined target would be environmentally undesirable and could jeopardise progress towards meeting UK Kyoto targets.

Effects on Scottish Business

The effects on Scottish business of climate change and the actions taken to combat it are difficult to gauge. In some cases, the effects are obvious; there is evidence that the Scottish ski industry is suffering in part because of a decrease in snow cover. In other cases, the effects are obvious although the cause may be harder to directly attribute to climate change rather than climate instability. Recent flooding and gale damage are cases in point.

SCDI is open-minded about the effects that the environmental regulations concomitant to tackling climate change and, indeed, environmental change, might have. The market for renewable energy is an obvious opportunity but there are likely to be further opportunities stemming from civil engineering projects to combat or adapt to flooding risks, consultancy work to advise businesses and householders how to minimise energy use, boiler technologies to allow for cleaner energy production such as the carbon abatement technologies for coal-fired power plant that have been developed by Mitsui Babcock. All of these will create markets, both domestically and abroad, in which Scottish companies may profit.

Energy

The energy sector, as perhaps the easiest sector to regulate, has seen a great deal of the action taken to combat carbon and greenhouse gas emissions. At a UK level, emissions from this sector have fallen significantly since 1990 (by 20% as of 2002) as a result of regulatory action, increased renewable generation and changes in the energy mix. As the EU Trading Scheme and other legislation is brought forward, this will continue to be a key sector for government action aimed at tackling climate change. With research suggesting Scotland's prodigious natural resources could produce 60 GW of electricity from renewable sources (around 75% of UK need), recent support for wind, wave and tidal power makes this a sector which could be of great potential benefit to Scotland. It is also perhaps the sector where the difficult choices between environmental protection and economic development can be seen in the starkest relief. Insecurity or intermittency of energy supply raises issues as fundamental and as potentially devastating as those associated with a failure to tackle carbon emissions.

SCDI's evidence to the Enterprise and Culture Committee's 2004 consultation on renewable energy set out our support for the Executive's target of 40% electricity generation from renewable sources by 2020. We remain supportive of the target but increasingly keen to see evidence that progress towards this goal is compatible with wider UK energy policy and transmission network developments and planning. On- and offshore- wind, from which the greatest part of new renewable energy would be sourced, produces electricity only intermittently and there are issues as to whether transmission capacity to transport power at times of surplus production will exist or be accessible to new entrants to the market. In addition, other fuel sources need to be operational to meet base load when the weather conditions prevent adequate wind generation.

The current regulatory regime encourages the 'dash for gas'. In the future, as North Sea production declines, we will be increasingly reliant upon gas imports for electricity. We need to work to ensure diversity of gas and general fuel supply to avoid being at the mercy of international markets that have seen previous price spikes for a commodity often sourced from geopolitically unstable areas. SCDI shares the view that is increasingly being voiced in the media that a full debate needs to be had about how renewable generation will be supplemented and complemented by other fuel sources in the coming years and decades. We are disappointed that there is so little discussion of one of the most significant carbon neutral generating sources, nuclear power, in either Scottish or UK considerations of climate change and energy policy. Scottish expertise in cleaner coal technology will be important – and provide opportunities – both nationally and internationally. SCDI is also aware of the view that there is legislation and regulation in Scotland that has constrained the uptake of biomass and woodchip fuel.

Finally, SCDI commends the wide range of initiatives targeted at minimising the need for energy generation. We have previously worked with Envirowise and the Scottish Energy Efficiency Office to help Scottish business and organisations to access the benefits associated with energy efficiency.

SUBMISSION FROM THE CITY OF EDINBURGH COUNCIL

1. Introduction

- 1.1 The City of Edinburgh Council welcomes the opportunity to submit written evidence to the Environment and Rural Affairs Committee as part of its enquiry into climate change
- 1.2 The Committee has asked for views in three areas:
 - whether the Scottish Climate Change programme is contributing effectively to the fulfilment of the UK's international obligations;
 - how current policy development can be climate change proofed, and
 - what the policy priorities should be across the different sectors, including the public sector.

2. General

- 2.1 The City of Edinburgh Council views climate change as a key strategic issue requiring action at a range of levels from global to local. The Council was the first in Scotland to sign the Friends of the Earth declaration to reduce greenhouse gas emissions and has implemented a range of policies and mechanisms across departments and service areas aimed at mitigating or adapting to the effects of climate change. Many of these have specific targets and include policies on:
 - sustainable transport;
 - energy efficiency and conservation (including domestic energy);
 - green fleet;
 - procurement;
 - sustainable design and construction;
 - flood prevention; and
 - air quality.
- 2.2 The Council acknowledges that working towards mitigating or adapting to climate change impacts requires implementation of a range of complex policy solutions, including working in partnership. As an example of this, the Council is a member of the Edinburgh Sustainable Development Partnership which is currently working to develop a city wide climate change strategy for Edinburgh. This multisectoral approach is one that the Council believes must be adopted in the longer term to address urban climate change issues.
- 2.3 Given the political and public acceptance of climate change, the need to understand, meet and exceed targets is an imperative. The key aims of both the UK and Scottish Climate Change programmes (CCP) must be to reduce greenhouse gas emissions, reduce the dependency on fossil fuels and move towards a low carbon economy.

3. Is the Scottish Climate Change Programme contributing effectively to the fulfilment of UK international obligations and to the delivery of the UK's climate change objectives?

- 3.1 The key to assessing effective contributions relies on addressing a number of issues namely the appropriateness of targets, the reliability of data and the use of policy reviews.

- 3.2 Currently the UK is on track to meeting its emission reductions target in terms of the Kyoto Protocol. The Scottish Executive has stated its aims of making “equitable” contributions to these, although the Council feels that it would be helpful to have a definition of “equitable”. It can be assumed however that the Scottish CCP is contributing effectively.
- 3.3 The setting of future targets is crucial. Kyoto has been questioned as a suitable benchmark for greenhouse gas emissions both in terms of its short time frame as well as having tentative targets in the first instance. Therefore, the Council suggests that far from making “equitable” targets in a UK context, the Scottish CCP should strive to exceed these and define clear longer-term targets. At the very minimum, the domestic target should be 20% by 2010 with Scotland aiming to reduce its own emissions in sectors other than power generation by at least 20% by 2010.
- 3.4 To assess effectiveness of any programme depends on the reliability of the data. The Council’s view is that the ultimate success of the programme depends on robust data, in order to determine whether targets have been met or not. Some concerns have been expressed that the energy related emissions baseline used by the UK government is too optimistic and that the policies within current programmes will not realise the necessary reductions in emissions. Since the devolved governments are also using the same baseline data, it may be very difficult to meet required targets without additional policies being put into place. Issues concerning data and emissions baselines must be addressed.
- 3.5 The Executive should now give serious consideration to the setting of a Scottish target for climate change to provide more focus and emphasis across sectors.
- 3.6 The last issue relates to assessing the effectiveness of the various policy drivers within the Scottish CCP. It is not known if policy reviews have been carried out at UK or Scottish levels. Without addressing this issue, the danger is that the programme simply proceeds on a “business as usual” basis. There is a legitimate perception that many of the reductions in emissions have been achieved for economic efficiency reasons – for example the wide adoption of Gas Turbine technology in the power sector – and **NOT** as a result of policy achievements. In addition if scenarios change in some sectors, for example increased emissions predicted in the industry and transportation sectors, policies must be reviewed to reflect this.
- 3.7 The Council suggests that the Executive must carry out comprehensive reviews of its climate change initiatives. For example, in the domestic energy sector, HECA is one of the main policy drivers. The City of Edinburgh Council has a recognised example of best practice for its HECA programme and is on course to meet its own housing stock emissions reductions. However it is **not** on course along with most other local authorities to meet its targets in the private housing and housing association sectors. Progressing with these policies when they are clearly not on target is not going to deliver the programme objectives. As a further linked example, in the residential sector, the two main policies are the Warm Deal and Central Heating Programmes which lead to year on year reductions of about 0.5% each. However emissions in this sector are around 14% so these policies are only making a 1% contribution.

4 How can the process of policy development in Scotland ensure that policy across all portfolios is “climate change proofed”?

- 4.1 The Council’s view is that the Scottish Executive must send out clear policy signals and provide strategic leadership in terms of climate change objectives.
- 4.2 There is a need to ensure that the Scottish CCP programme itself is “proofed” in terms of strategic sustainable development objectives to ensure that the wider implications of climate change impacts can be evaluated and incorporated into future policies. The current programme is stronger on the environmental aspects of sustainability and less so on the social and economic, which includes issues such as improving resource efficiency, affordable warmth, fuel poverty, skills transfers and employment in low carbon technologies. These issues should have greater or at least equal status. This needs to be redressed.
- 4.3 Economic externalities must also be incorporated into the programme in terms of future policy development. When considering the costs and benefits of climate change to business it is important to integrate the costs of damage from climate change.
- 4.4 The Council’s view is that there needs to be more strategic connections between policy frameworks. A single Scottish CCP should not be seen as the sole framework for addressing climate change rather all policies and programmes of the Executive should be screened for climate change objectives.
- 4.5 As an example the Scottish Executive recently launched its Green Jobs strategy (June 2004). This key strategy refers to specific issues such as energy efficiency, renewables, forestry, agriculture, waste and recycling. These are all critical areas influencing climate change and yet there was no reference to climate change in the strategy itself. By missing these strategic linkages, the opportunity is lost in terms of assessing how, within a Green Jobs strategy, critical areas such as skills training and development in renewable energy technologies can play their part in mitigating climate change in Scotland.
- 4.4 The Council’s view is that the Executive needs to “mainstream” climate change across its strategies and programmes in order to ensure that linkages are made to climate change objectives. For example the City of Edinburgh Council’s policies on its green vehicle fleet, sustainable design and construction, air quality and energy all make reference to climate change impacts and objectives. Thus a mainstreaming of climate change across policies occurs, rather than dependency upon one programme to deliver objectives.

5. What future policy priorities across different sectors should be pursued to enable Scotland to meet appropriate targets?

- 5.1 A key issue in future policy direction is “mitigation versus adaptation”. The Council believes that both approaches are equally important. However recent flooding and storms tend to focus activity on the adaptation issue. Rightly, considerable resources are being invested in this area. However, the issue of mitigation is crucial in the longer term and investment in this area needs to be at a higher level. Also, there is some concern that carbon sequestration projects such as tree planting are being promoted where it is suggested that these can “balance out” emissions and assist in mitigation.

- 5.2 The Council's view is that policy priorities must be matched to where the greatest reductions in emissions can be achieved. For example in the case of the public sector, although it has a role in reducing its own emissions the actual impact is much less compared with other sectors. The Scottish Executive should target the high impact sectors if any real progress is to be made. The building and construction industry and land developers (which contribute nearly 25% of greenhouse gas emissions) as well as the residential sector, are prime examples. Issues such as use of construction materials, life cycle analysis, procurement and supply chain management are all areas that should be being addressed.
- 5.3 Where local authorities can try and have an impact is through their partnership and awareness raising roles i.e. working with the other sectors where emissions can be reduced significantly. Partnership working should be a key policy priority and government agencies should be made to work in partnership with local authorities to achieve climate change objectives, where it should be part of the community planning agenda.
- 5.4 The current Scottish CCP does not adequately cover the issue of education, awareness raising or changing behaviour other than references to "Do A Little Change a Lot". There seems to be evidence that the public is more aware of the growing connection between extremes of weather and climate change. However it is not clear that the public is moving beyond this connection and actually changing behaviour. The Council believes that there should be a move away from advertising campaigns to more pro-active awareness campaigns, to stress how important this issue is. These are important in terms of tackling the behavioural changes necessary for reducing emissions. In the longer term it will be important to tackle consumption and final user behaviour. Policies supported with the wide participation of well-informed stakeholders are better targeted and sustainable.
- 5.5 Policy tools and existing mechanisms need to be used more pro-actively in achieving emissions reductions. The use of planning and strategic environmental assessment may be useful although the Executive needs to clarify how these can be used. Existing directives such as the EC Energy Performance Directive should be integrated into all building and renovation projects, public and private sector. Public sector PPP projects should have a much greater emphasis on energy performance as a requirement for funding.

SUBMISSION FROM THE MORAY FLOOD ALLEVIATION PROJECT

Introduction

This written evidence concerns principally how local authorities might adapt to the effects of climate change rather than reducing contribution to climate change. It concentrates on direct experience rather than simple repetition of guidance publications and the like.

Moray's Recent Experiences

Moray experiences relatively low annual average rainfall but a combination of topography and local climatic conditions has resulted in a long history of extreme flooding events. The Scottish Climate Change Programme (2001) suggested that the rainfall gradient between east and west Scotland would increase and that there would be an increase in extreme events. When considering the east/west split, Scotland has several rivers that receive rainfall in the west and flow to sea in the east, e.g., Tay, Spey, Ness, Findhorn.

Elgin has suffered four significant flood events since 1997. The communities of Lhanbryde, Rothes and Forres have also suffered severe flooding. The cost of these events is difficult to assess accurately but it is conservatively estimated to be over £150 million. It would be speculative to suggest that increased flooding is attributable to climate change rather than statistical chance. Nevertheless, it is a pattern we are seeing more and more across Scotland and indeed the UK. The incidence of local flash flooding, often resulting in surcharging sewers, also appears to be increasing. Numerous reports support the likelihood of increased flood events. It also seems that we can expect greater incidence and severity of coastal flooding from increased storms and sea level rise.

Adapting to Climate Change

Mitigating the effects of flooding, broadly speaking, is a local government function through the Flood Prevention and Coastal Protection legislation. A number of factors affect councils' ability to prepare for and adapt to the risk of increased flooding predicted by climate change experts. The key challenges for local authorities are: -

1. *Managing and Maintaining Watercourses*

Authorities are required to assess watercourses from time to time and carry out maintenance works to reduce flood risk to non-agricultural land. Moray Council treats such watercourses as "assets" in the sense that an asset management system is an appropriate approach, despite the Council rarely being the riparian owner. Over the last eight years the database of watercourses that might flood non-agricultural land has grown as more problems are reported and public expectation grows. In Moray, flood alleviation is high on the political agenda – a key priority in Corporate Development Plan – resulting in a threefold increase in revenue funding for watercourse maintenance (to around £350,000 per annum) and an increase in staff dealing with flooding from two to five.

The Council has the support of partners, the consultants Haskoning UK, whose principal role is in developing our flood prevention schemes but, being based in Elgin, they provide specialist advice on watercourse maintenance from time to time, especially with assessing flood risk and providing environmental advice from time to time. These are areas where I suspect councils are traditionally weak and Moray is fortunate to have access to these resources in such a convenient, flexible and cost-effective manner.

2. Flood Prevention Schemes

The type of work that can be considered maintenance in terms of the legislation is very restricted. Councils are prohibited from carrying out *any* work to improve flood defences, no matter how small, without a Flood Prevention Order (FPO). Where the work required is obvious, straightforward and low cost, the time and cost of obtaining a FPO is disproportionate. Councils face a dilemma as to whether they should risk exceeding statutory powers – and proceed with the works, or enter into the protracted and bureaucratic process of FPO. If councils were allowed to carry out minor improvements with landowner agreement and where they can demonstrate that the work will not lead to flooding elsewhere it would improve considerably their ability to deal with minor flood prevention issues.

The greatest concern expressed to me from councillors, the public and other stakeholders affected by flooding is the length of time taken to implement flood prevention schemes. Flood prevention is essential to affected communities to promote sustainable development – Planning Advice Note 69 (PAN 69) states that flooding existing properties is not sustainable. There are concerns as to the funding of schemes also. These issues are discussed below.

Flood Prevention Schemes – Consents and Approvals

The process of obtaining a FPO is time consuming, costly and requires a meticulous approach both technically and administratively. If everything goes well it will take seven months from making the Order to starting work. If any objections are received it takes much longer. Every decision has to be carefully thought through, every option appraised in detail so that the case for the scheme can withstand the rigorous scrutiny of a Public Local Inquiry.

It may be appropriate to reconsider the balance between rights of individuals to object to a scheme and the rights of the community to be protected from flooding. The Flood Prevention (Scotland) Act 1961 allows three months for objections to a FPO and requires Ministers to “cause” a Public Local Inquiry if there are objections that cannot be resolved, no matter how trivial they may be. It is accepted that the powers granted to authorities through a FPO are considerable (including the right to enter into other people’s land to carry out the operations) so there must be appropriate facility for objection. But are the current arrangements too onerous on councils? Perhaps a one-month objection period would be reasonable.

There is a further safeguard in that six weeks is allowed for appeals to the Court of Session after an Order has been confirmed. This relates only to the correct process having been followed.

Councils also have to obtain planning consent through the Notice of Intention to Develop (NID) procedure where a good deal of the detail contained in the FPO is duplicated and expanded upon. This can lead to further delay and possibly another Public Local Inquiry. Objectors therefore have another bite at the cherry. Might it be possible to combine these processes into one? It is recognised that PAN 69 mentions a conjoined Inquiry, but this would combine the processes only at a late stage. PAN 69 suggests that FPO and NID procedures should run in parallel, but with FPO involving a seven month process – much longer than NID – there is an incentive to promote FPO earlier.

Schemes will shortly require licensing by SEPA under the Water Environment and Water Services Act. It is unclear at this time how this will operate but it is potentially a third significant hurdle for flood prevention schemes. There is a risk that amendments to suit one consent may infringe upon another. It would be helpful to Councils if the process could be streamlined. Meantime the uncertainty surrounding how licensing will tie into the other consents is of concern to Councils.

Typically it is taking councils around eight to twelve years to progress a significant scheme to completion . If climate change increases flood risk then the risk of repeat flooding increases while schemes are held up in cumbersome processes. This has already happened to Elgin – severely flooded in July 1997 and again in November 2002 (though not specifically as a result of the foregoing type of delays), aside from two lesser floods in the same period.

Funding

A number of flood prevention schemes have been constructed in recent years in Scotland. Moray Council is progressing six such schemes with an overall capital cost estimated at around £130 million. One scheme (Lhanbryde) is under construction and a FPO for the second is scheduled for publication coincident with this Committee's meeting on 2 February 2005.

Flooding is indiscriminate and affects councils differently depending on many factors, population being only one of them. Arrangements recently introduced by the Executive increased grant assistance from 50% to 80% and the recent spending review increased the total available grant assistance over a three year period from £29 million to £89 million. Schemes have to be economic to meet grant assistance rules. But they must also be affordable to small councils who may find it hard to meet their 20% contribution. In the case of Elgin, Moray Council anticipates having to find £19 million contribution to a £95 million scheme.

The disproportionate effect on councils such as Moray is amplified by the risks that have to be taken, and the considerable costs involved, in promoting schemes. Grant funding is only approved at a very late stage in the process – immediately pre-construction at best. For schemes such as Elgin, Moray Council may have to find around £6 million to take the scheme to this stage – with no guarantee that it will achieve the necessary consents to implement the scheme. Councils would find it less burdensome to promote schemes if the up-front risk was shared with the Executive, rather than recovering development costs retrospectively, i.e., after completing all statutory procedures and meeting grant assistance criteria.

Grant assistance is payable for schemes at 80% of eligible costs. However the rules for calculating eligible costs are anachronistic. They do not adequately reflect the huge consultative exercise required nowadays, or changes in legislation since the rules were first introduced. Such factors affect cost significantly. Neither do the rules take account of Councils' in-house project management costs – apparently because costs of the staff involved are considered to be costs that would be incurred in any case. But government guidance on managing major construction projects recommends that client's become more actively engaged in project management in partnership with the private sector. The current grant assistance rules are therefore perverse in this respect. Moray Council has had to employ two additional staff purely to manage the project, and will deploy one further person imminently.

Adaptability

The Executive requires that councils will “future-proof” schemes for climate change by designing to higher standards or designing in such a way that schemes can be easily improved upon at reasonably low cost. How climate change is taken into account has been the subject of various reports and guidance. However there is no clear methodology for applying climate change allowance consistently. Close consideration should also be given to how schemes perform should an event exceeding design capacity occur.

Planning Policy

Linked to the above, it is now accepted that building in flood plains should generally be presumed against – especially for green field sites. However there will be pressure to allow

development in areas protected by new flood prevention schemes, despite guidance against. Any such proposals should be treated with caution given climate change and the attendant increased risk of events greater than schemes were designed for. Other ways of considering future-proofing are considered below.

Catchment Management Planning (CMP) and Coastal Zone Management (CZM)

There are areas affected by flooding that will not meet the economic criteria for grant assistance for schemes. Yet flooding will impact upon society, the environment and the economy, for example, by disrupting transport or damaging the environment as well as affecting a small numbers of homes.

Where flood prevention schemes have been constructed, climate change may degrade their effectiveness.

CMP and CZM consider the wider issues within whole catchments (or coastal zones) and enable flooding to be ameliorated by understanding and managing land use better. These initiatives will not prevent severe flooding such as we have seen in Elgin, but they do have a role to play in reducing the effects of climate change after schemes have been commissioned, and reducing flood risk to properties and infrastructure elsewhere. Many environmental bodies support this approach.

Council Buildings

Councils own many properties, not least council housing stock. Moray Council has provided flood protection measures to individual council houses. This will not be effective in all situations, and is sometimes not worthwhile unless all attached properties are also flood proofed. Where some in a properties block have been bought by tenants flood proofing may not be possible.

Where properties have been flooded there is an opportunity for repairs to include better flood protection, such as flood resistant floors and walls, and locating electrical apparatus above flood levels.

Emergency Planning

My experience of a major flood event left an impression that there is considerable scope for improving flood warning and contingency planning.

I am aware of several initiatives to improve flood warning including the efforts of the ESPRC funded Flood Risk Management Research Consortium and Project Moses, possibly involving a number of Scottish agencies and for which a bid for Interreg IIIC funding is likely to be made. It is important to make sure these efforts are co-ordinated to save on duplication of effort and transfer knowledge. In the meantime, although there have been improvements in flood warning with the introduction of Floodline there is room for better communication between SEPA and authorities, especially in catchments where rivers react quickly to weather changes.

In November 2002 Elgin was flooded. Rainfall in Elgin itself was unremarkable, but upstream it had been exceptional. Close working relationships between Moray Flood Alleviation and SEPA enabled rainfall figures to be input to the River Lossie hydraulic model and the flood extent predicted. The exercise was hampered by very poor weather forecasting (Moray is traditionally seen as a very challenging place for forecasters). In these particular circumstances not much could be done to reduce the impact of such a massive flood, but on another day or in another place it might have been possible. Hydraulic models of the main rivers, linked to better weather forecasting and real-time rain gauging could improve flood warning and inform emergency planners so that resources are deployed more effectively.

SUBMISSION FROM SEPA

The Scottish Environment Protection Agency (SEPA) is pleased to offer its input to the inquiry which will examine the policies of the Scottish Executive for addressing the challenge of climate change.

Since the publication of its first environmental strategy (SEPA Environmental Strategy, Feb 1998), SEPA has regarded climate change as the greatest environmental threat facing Scotland and the world. This position has been confirmed again recently in an opinion survey of SEPA's professional staff on current environmental priorities, undertaken as part of our future visioning exercises to underpin our corporate planning.

There is no doubt that climate change will seriously threaten Scotland's infrastructure through flooding and increased storm damage, and will fundamentally disturb our biodiversity to such an extent as to threaten the functioning of the ecosystem. We have recently conservatively valued Scotland's direct ecosystem services to man at £17Bn per year, quite apart from their own intrinsic value. Impacts will be even more severe in other parts of the world. The scale of the threat is highlighted by Retallack's proposition concerning increasing global storm damage that "by 2065 the world would become bankrupt, as damages would outstrip global earnings" (Retallack, The Ecologist Report, Nov 2001). Displacement of people in many countries will possibly lead to mass migrations and stress on food and water supplies will all add to a potential for economic and social conflict.

As the principal environmental regulator, SEPA has a number of roles (some ten identified here) in relation to tackling climate change in Scotland:

1. SEPA is the competent authority for the **Emissions Trading** Scheme in Scotland which began in January 2005. The scheme covers approximately 120 industrial sites, hospitals and universities throughout Scotland, allowing them to trade in CO₂. This is done by allocating allowances from the UK's emissions cap which can then be traded on the open market. The current UK allocations will provide for a 5% reduction in emissions during the first phase (2005 to 2007). Later phases will build on this and will include other sectors and 5 other greenhouse gases. Phase 2 of the scheme will run through the period in which the UK must deliver its Kyoto Protocol commitments.
2. SEPA is the competent authority for the implementation of the **Integrated Pollution Prevention and Control** (IPPC) Directive in Scotland. The directive has been incorporated in domestic legislation through the Pollution Prevention & Control (Scotland) Regulations 2000 (the PPC Regs) that will replace the previous Integrated Pollution Control (IPC) and the Air Pollution Control (APC) regimes in Scotland. Following full implementation in 2007, around 780 Part A installations (generally larger and potentially more polluting operations) will be licensed, with a further 3000 installations under Part B. The licensing procedure does not demand control of CO₂ directly, but the IPPC Directive requires SEPA to ensure that installations (comprising the majority of the 780 Part A installations) are operated in a way that energy is used efficiently. It is worth noting that the regulation of energy efficiency is a reserved matter under the Scotland Act, so SEPA does not have the powers to insert conditions directly in PPC licences to require energy efficiency or greenhouse gas control.
3. The targets for **reducing landfilling of biodegradable waste**, set out in the Landfill Directive and in the National Waste Strategy for Scotland will together reduce the amount of biodegradable waste that Scotland disposes to land which, in turn,

reduces the emissions of methane – more than 20x more potent as a greenhouse gas than CO₂. SEPA also normally expects gases at landfill sites to be collected and either flared (to reduce methane content), or used to drive electricity generation. There is now 35MW of landfill gas electricity generation in Scotland. It is estimated that landfill methane emissions have reduced 60% in Scotland since 1990 (Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2002, DEFRA, 2004).

4. The Scottish Executive has funded SEPA significantly over the past few years to enhance its flood responsiveness as part of the Executive's overall strategy to deal with **flood risk** - we now provide a continuously manned enquiry centre, a web-based and 'phone based flood warning system for communities at greatest risk from riverine and coastal flooding in 42 specific areas – there have been around 0.5 million flood enquiries since 2001. The effective operation of SEPA systems was highlighted recently. We are also discussing with the Executive and partner bodies how best to secure integrated flood management services for the future. Further we are developing new warning systems in three locations and undertaking feasibility studies at a further 4 sites. National strategic flood risk maps have been generated and our staffing complement has been strengthened with six flood risk specialists who can better advise planning authorities on inappropriate development sites. There will be over 300 planning enquiries relating to flooding in 2004/5.
5. The **Water Framework Directive**, through the Water Environment & Water Services Act 2003 in Scotland, will provide SEPA with control over abstractions from surface and groundwaters in April 2006. An integrated catchment management procedure is being developed to provide equitable access to resources but also to ensure the maintenance of water systems (base flow in rivers, wetlands, aquifers) in the face of anticipated increased likelihood and severity of summer droughts in future years. The Act also requires SEPA and other responsible authorities to promote sustainable flood management in anticipation of increasing flood risk in future.
6. We believe that the introduction in 2004 of the **Strategic Environmental Assessment** (SEA) Directive in Scotland, and the Scottish Executive's intention to extend its scope in 2005, can offer real potential to introduce much improved climate change mitigation and adaptation into public programmes and policies in future. However, questions remain concerning the adequacy of funding for the proper delivery of these aspirations. In addition, it is imperative that, having identified the most effective plan or programme to deliver CO₂ minimisation through the SEA process, there is then full commitment to implementation.
7. Coinciding with the publication of our report on Scotland's soils (State of the Environment: Soil Quality Report, SEPA, April 2001), SEPA, jointly with SNH, formally requested the Scottish Executive to consider preparing a **soil sustainability strategy**. One of our concerns then, as it remains today, is the fragility of Scotland's soils and, due to their relatively high carbon content, their potential for release of very significant amounts of CO₂ if not managed appropriately. Subsequently, work has begun on the European thematic strategy on soils, in which SEPA is participating, and Common Agricultural Policy (CAP) reform has provided opportunities for Scotland to promote environmentally sound management of its soil resource. We are pleased that the Executive seems to be approaching this opportunity very positively. SEPA through the National Waste Strategy is also involved in initiating early research into the potential for soil remineralisation using quarry rock dusts as a means of sequestering carbon into soil systems.
8. SEPA has repeatedly tried to raise the importance and extent of the threat of climate

change over the past years in the Scottish **media**. Numerous press, radio and TV briefings have been given. Public lectures and speeches have been given and SEPA has attempted to integrate climate change into many of its activities: for example, the waste strategy, the water framework directive, and responses to formal consultations on a range of relevant subjects. In particular our routine liaison with planning authorities emphasises the potential, in our view, for the planning system to provide positive responses in terms of mitigation and adaptation to climate change: for example in the design and layout of buildings, the planning and management of water in catchments, the distribution of services to reduce transport demands, coastal management to reduce erosion/flood risk.

9. SEPA itself maintains an **internal environmental policy** to reduce its own direct impacts on the environment. We publish our performance targets and our achievements (Eview 2000/1, 2001/2, 2002/3, 2003/4). In June 2005 we will seek certification to the international environmental management system standard ISO 14001 for all our sites and all our activities. We believe it is important to act, and to be seen to act, as an exemplar to others. So far we have achieved a 20.4% reduction of CO₂ emissions against our 1998/1999 baseline, despite both limited control over sub-optimal rented properties, for example, and a growth of around 25% in staff numbers since that time. We have also set absolute targets for emission reductions from our business travel (3% for 2004/5) and targets for a reduction in our energy usage (2% per unit floor area).
10. SEPA, with others, has commissioned **research** into some aspects of climate change:
 - Publication of land and sea temperature indices for Scotland since 1860.
 - Investigation of the need for climate change to be factored into water pollution licences to account for future changes in river flow.
 - Review of climate change risk to our business, currently underway in partnership with SNH, Scottish Water, Visit Scotland, Forestry Commission - funded by the Executive.
 - A protocol for assessing catchment yield, jointly developed with Scottish Water, which allows climate change impacts to be assessed.SEPA has, from the start, been on the steering group of the UK Climate Impacts Programme (UKCIP) and is now also supporting the creation of a Scottish Climate Change Impacts Partnership - an initiative prompted by the Executive.

It is a major concern that Scotland's headline national CO₂ emission data do not present a very positive image and performance is poor compared to England. Total emissions, ignoring the component from land use change, has only declined by around 4.3% over the period 1990 to 2002, less than half the reduction achieved in England. This appears to be an inadequate contribution to the UK's domestic target of a 20% reduction by 2010.

We believe there is substantial evidence for the progress and impact of climate change world-wide. Our own temperature indices for Scotland show an increase in terrestrial temperature of 0.69°C since 1860, and an increase of up to 0.3°C for sea temperatures over the last 100 years - both entirely consistent with global climate change models (An Update and Reexamination of Temperature Indices for Scotland and Northern Ireland, Sniffer Report, 2004).

However, we are very concerned that present predictions of climate change, despite the UK hosting some of the highest performance models at the Hadley Centre, may be underestimating the potential rate and severity of change and impact. The global models are only just beginning to take account of the global carbon cycle feedback system. It is apparent that a warming and drying of the Amazon basin, for example, will cause die-back of

the forests and both remove a sink of carbon in the natural tree growth and potentially also release carbon as the trees die and decay. Equally, the melting of the permafrost soils in northern America, Europe and Asia may release carbon from the soils. In addition, the warming of the oceans and the possible reduction in the strength of thermo-haline circulation may reduce the extent to which the seas can dissolve and absorb CO₂. Initial modelling studies undertaken at the Hadley Centre indicate that both atmospheric CO₂ concentrations and climate change accelerate when these factors are taken into account (eg a predicted temperature rise of 8°C under a “business as usual” scenario by 2100, compared to the previous prediction of 5°C). It now appears possible that the positive feedback could be sufficiently strong that climate change will become self-sustaining, effectively completely out of control, within a few decades. Allied to the fact that we are committed to an element of climate change for the next 20 years, almost irrespective of what we do immediately on emissions, then we face the possibility of a requirement to reduce emissions to a greater extent and at a greater rate than has been suggested previously, or indeed has been set as the UK’s longer-term target (60% reduction by 2050).

As a crucible of the industrial revolution, which initiated the developments which have led to climate change, as a nation with a world outlook, as a people who are inventive and innovative, and as a country endowed with considerable natural and renewable resources, we believe that Scotland must take decisive and inspirational action to stop climate change before irreversible and catastrophic damage is inflicted on the world’s ecosystem and peoples.

There are many areas in which Scotland could build on, and improve, its performance:

Business/industry: This sector has performed best in reducing CO₂ emissions - although some industrial closure has contributed. It shows that regulation can deliver real benefits, particularly when allied to the self-interest of business in reducing its costs of natural resource use (energy, water, materials). In our response to the Scottish Executive’s Green Jobs Strategy (Towards a Green Jobs Strategy, Scottish Executive, 2004) we suggested that Scotland could legislate for all businesses to undertake in-house environmental assessments, on a rolling programme to fit with business and investment cycles, undertaken in collaboration with staff, as for health & safety legislation, and lightly audited within normal financial auditing. These assessments have been shown repeatedly, in voluntary initiatives, to provide improvements in business profitability of between 5% and 10%. This would stimulate Scottish productivity, lead to increased business activity and jobs, and at the same time achieve an increase in awareness by around 2.5 million people in Scotland of their environmental impacts and, hopefully, inspired to undertake some changes also in their domestic lifestyles. We strongly urge the Scottish Executive to consider this significant stimulus to sustainable development.

Transport: This sector is particularly worrying since emissions continue to grow rapidly. In our response to the DTI consultation on air transport within the UK (The Future Development of Air Transport in the United Kingdom, DTI, 2002) we expressed our deep concern at the lack of integrated thinking in this sector with an almost complete absence of holistic environmental awareness being evinced. Internal air travel in the UK could be significantly reduced through an effective transport policy. Indeed it is vital that transport emissions are tackled robustly on all fronts: electrifying of rail links; introduction of electric trolley buses or tram routes, once common in major cities; heavier fiscal charges for road use and/or fuel or vehicle licences with the increased income being used for public transport support; improved land use planning to reduce the need for commuting and freight movement; an integrated approach to lifestyle/exercise/health and environmental issues.

Domestic: Performance in the Scottish domestic sector has been indifferent. Our proposal under the business sector above would help to address the awareness and understanding of energy, emissions and climate change within society. It is essential, however, to make

environmentally concerned consumption/purchasing more readily available to people; product standards must be more transparent and prevalent. CAP reform provides opportunities for the Executive to financially support improved peri-urban services to urban markets through, for example, direct marketing of farm produce - thereby reducing food miles. The Executive must continue to push higher building standards to improve our building stock energy efficiency and to ensure optimal design for capture of passive solar energy. There is scope for encouraging the use of building materials with low embedded carbon intensity and for the integration of energy generation through small solar panels, wind generators and heat pumps. Ways must be sought to encourage and facilitate retro-fitting in existing buildings.

Government: More needs to be done to give an exemplary lead by Government and its agencies. All government and local government buildings and purchasing should attain the highest environmental standards. The public sector is large in Scotland and this would achieve much in itself, as well as inspiring others and showing how it can be done. Inevitably this action will require investment, but it is investment which will be likely to pay off, even in simple accounting terms, over the medium term - for example in reduced energy/water/waste bills. Affirmative action here will naturally lead to much increased availability of advice, support, materials and services for the private sector as well. Allowing SEPA to demonstrate good practice might even be a small step in the right direction.

Agriculture: It is worth reiterating the opportunities currently in terms of soil management and sustainability and the re-targeting of public funding assistance under CAP reform. No opportunities should be missed to encourage carbon capture in soils and vegetation and to reduce emissions from food transport and processing. There is also scope in Scotland for the development of energy crops which will benefit diversification in rural communities as well as reduce overall carbon emissions.

Energy: In SEPA's response to the UK Government's white paper on energy (Energy Review, Cabinet Office, 2001 and Energy Policy – Key Issues for Consultation, DTI, 2002), we proposed an energy hierarchy, analogous to the waste hierarchy. We suggested energy efficiency as the most attractive proposition, which should be maximized, and we then advocated support for various ranked renewable energies. It is clear that Scotland has potentially great renewable energy resources in wind, wave and tide and it is essential that every effort is made to capitalise on these energy forms - even though they will, at least initially, be expensive. Equally we placed gas, oil and coal at the bottom of the hierarchy. We believe that every unit of carbon-low or carbon-free energy must be grasped at the moment to reverse our accelerating progress to potential climatic disaster. It is likely that this will include the need for nuclear energy, in the interim, to be sustained as a low carbon emission source of electricity. A publicly acceptable resolution to waste storage must be found with urgency and then, perhaps for some decades, nuclear energy can be maintained, in our current view, as the lesser of evils until climate change is under control and more environmentally benign and reliable sources of energy have been brought on-stream. It appears to us that a resolute drive to a low emissions scenario (60% cut or more) will inevitably lead to much greater consumption of energy in the form of electricity, and that all of this electricity must be generated using low emission technologies. There may be demand for 3, 4 or 5 x more electricity (consider the substitution of all gas/oil/coal domestic and business heating; increased transport electrification; even a hydrogen economy requires electricity to drive the relatively low efficiency electrolysis process). In the medium term we may need to accept significant intrusion of wind farms, grid connections, hydro-power and pump storage developments into the landscape and maintenance of a nuclear capacity as a lesser risk than uncontrolled climate change. Many of the impacts of wind farms and grid interconnections are local and reversible; climate change is not.

Adaptation: It is essential that adaptation to the inevitable consequences of already

committed climate change is undertaken. We believe the SEA Directive can play a part in this. We are relatively pleased with the progress made in confronting the anticipated increase in frequency and severity of riverine and coastal flooding in Scotland. We have worked hard with Executive colleagues to raise awareness and provide tools for assessing risks. Similar actions are needed across the spectrum of climate impacts and “no regrets” actions should be encouraged - particularly relevant would be increased waste water drainage/treatment capacity, diversified water resource capture, wider use of sustainable drainage techniques and improved storm resistance in built structures.

In conclusion, SEPA believes that the very highest priority must be placed on the mitigation of, and adaptation to, global climate change. It threatens to destroy our global ecosystem and to destabilise society and the world economy. Scotland must play a leading role and has much to do.

SUBMISSION FROM SCOTTISH NATURAL HERITAGE

Introduction

1. Scottish Natural Heritage welcomes the opportunity to give evidence to this inquiry. SNH is a non-departmental public body sponsored by the Scottish Executive. Our remit is to conserve and enhance the natural heritage of Scotland, to facilitate its enjoyment and understanding, and promote its sustainable management. Scotland's natural heritage comprises its wildlife, habitats, landscapes and natural beauty. We are a statutory adviser on natural heritage to Government and local authorities. We provide advice on how climate change and associated areas of policy such as energy and land management affect the natural heritage.
2. In this submission we discuss the causes of climate change, its effects on the natural heritage, tackling the global problem, reducing emissions, responding locally and outline responsibilities for a variety of bodies. In each case we set out our headline points and then provide further points for consideration.

The causes of climate change

3. Although the world's climate has always changed, human activities over the last 250 years are having an increasing effect by changing the rate at which carbon is released to the atmosphere. The use of fossil fuels and changes in land use are increasing the amount of carbon in the atmosphere and oceans hence intensifying the greenhouse effect. This leads to an increase in average global temperature and to sea level rise. More energy is stored in the atmosphere, leading to more frequent and more intense extreme weather events, especially storms and drought. The severity of these problems in particular places will depend on a variety of local factors.
4. Globally, around 75% of emissions of greenhouse gases result from the use of fossil fuels; land use change such as forest clearance is responsible for the rest of the emissions. In the UK slightly more of the emissions are due to burning fossil fuels, but Scotland is closer to the global average because of the extent of peaty soils which are rich in carbon (20% of Scottish emissions result from land use change).

The effects of climate change on the natural heritage

SNH views climate change as the most serious short- to medium-term threat to Scotland's natural heritage.

5. The impact of climate change on Scotland's biodiversity will be far-reaching and has the potential to disrupt many of the ecosystem services we currently use. The key issues are:
 - the rate of climate change
 - the potential loss of synchrony between species populations in a food chain
 - changes in the overall mix of species in particular places
 - barriers to natural dispersal
 - other physical and chemical changes in ecosystems.The following paragraphs offer some examples:
6. Springtime events are now earlier and autumnal events are later than they were, for example:
 - many bird species, for example corn bunting and chiffchaff were laying eggs 10 days earlier in 1995 than they were in 1970, although some other species have only shown a 2-3 days shift;
 - the first appearance each year of 13 butterfly species is 2-10 days earlier than in the 1970s;
 - in Scotland, some spring-flowering species flowered up to 3 weeks earlier in 2004 than they did in 1978; and,

- across Europe, by the 1990s trees came into leaf 6 days earlier and leaf colouring and leaf fall occurred 5 days later than in the 1960s.
7. While warmer temperatures extend the growing season, species respond at different rates and this could lead to disruptions in food chains, for example by the loss of synchrony between species and their food supply. An example is the decline of great tit numbers in England because the caterpillars on which the young feed are appearing earlier than when the eggs of the great tit hatch.
 8. In general the climate that particular species depend on will move northward and upward; but in detail these changes are unpredictable. The rates of change may exceed the capacity of natural processes to respond to them: for example slow-growing plants like trees will not be able to disperse beyond their current ranges fast enough or will not be able to adapt physiologically to new climates. Some northern and upland species in Scotland will be lost while other species may extend their ranges into Scotland from the south. For example, the northern limits of 34 butterfly species have extended northward by up to 240 km over the last 100 years. The mix of species in some habitats may change; for example Scots pine forests could be colonised by non-typical tree species.
 9. Barriers to dispersal of plant species include:
 - built structures such as transport routes, towns and cities;
 - reduction in size and more fragmentation of suitable semi-natural habitats;
 - the coast, where a rise in sea level forces coastal habitats inland and in some places this is prevented by the use of land or sea defences;
 - the tops of mountains, where arctic-alpine species are likely to see a reduction in suitable habitat; and,
 - the north, where the sea may pose a barrier to the northward movement of some species, such as the Scottish primrose.
 10. An increasing frequency and intensity of extreme events such as droughts, floods and gales is likely to cause physical damage and/or structural changes to ecosystems. This could impair some of the environmental services that ecosystems provide, like soil productivity and drinking water resources or could irreversibly alter the characteristics of some nature conservation areas.

Tackling the global problem

We strongly support the Government in seeking a 60% reduction in carbon emissions by 2050.

11. To reduce energy use and emissions of greenhouse gases, all sectors of society using fossil fuels (petroleum, gas and coal) are relevant. This is because fossil fuels make up around 90% of the UK fuel mix for energy, and the emissions are spread more-or-less evenly across all sectors.
12. Changes in energy consumption can be considered in terms of:
 - how a sector has grown over time (the 'output' effect); and,
 - how efficiently energy is used to produce a unit of output (so that 'more is done with less' - the intensity effect).
 Both need to be addressed to reduce overall emissions of greenhouse gases. For example, if over a given period of time, energy efficiency measures lead to a cut of 50% in the intensity effect, but the sector doubles in size, the overall effect is no change in energy use. The output effect currently dominates increasing energy use in the transport and domestic sectors.
13. Most policies seek to address intensity effects. Addressing output effects can raise apparent conflicts of interest between economic growth, energy consumption and emissions of greenhouse gases. While initiatives such as the '*do a little, change a lot*'

campaign from the Scottish Executive are valuable by encouraging people to use less energy, further initiatives to tackle the overall level of outputs will be required to allow the government to achieve the challenging target of reduced emissions of greenhouse gases it has set for 2050.

14. Clearly if growth in overall energy demand is not controlled, emissions are likely to increase whilst the main response in relation to energy generation may be to secure more and more energy from renewable sources on both land and at sea. This could lead to potentially undesirable consequences for the natural heritage especially if the developments are in the wrong place.

Good stewardship of carbon-rich soils is needed to make sure they act as sinks rather than sources of greenhouse gases.

15. In Scotland the large volume of peat-rich soils means that the land use and forestry sector accounts for 20% of emissions of greenhouse gases – more than the transport sector (16%). These emissions are largely a legacy of past management, for example by felling and draining peaty soils to plant new forest. By far the majority of stored carbon is in the soils. It is important therefore that carbon-rich soils remain as sinks rather than turning to sources of greenhouse gases which occurs when they are drained or damaged.
16. The Scottish Executive is inviting comment on whether Scotland should continue to make an equitable contribution to reduce emissions of greenhouse gases in the UK. Given the above, we suggest:
 - Scotland could make a more than pro-rata contribution in reducing energy-related emissions, to make-up for the legacy effect in the land use sector;
 - good stewardship of carbon-rich soils should play a key part of both mitigation and adaptation responses in the Scottish climate change programme.

Reducing emissions

Generally, direct measures to reduce emissions of greenhouse gases, like energy efficiency and reducing overall demand for energy, have little or no adverse effect on the natural heritage: these measures should take a high priority in any strategy to reduce emissions. Other measures, like the development of renewable energy are important, but are likely to have greater impacts on the natural heritage. They should be pursued in a planned and measured way, to minimise adverse effects.

17. Some measures taken to address climate change may have little effect on the natural heritage, others have indirect effects, and others have direct impacts. Measures such as better information on energy consumption, addressing energy efficiency, more widespread use of better building design and product labelling would help improve efficiency. In the transport sector, there may be some impacts on the natural heritage in building more sustainable transport systems and the development of biofuel crops, but there may also be benefits in terms of fewer emissions leading to reduced acid deposition and, possibly, reduced congestion although the evidence for this can be conflicting. It is in the electricity production sector where there are significant impacts on the natural heritage through renewable energy as a growing use of land and sea. Examples of such impacts include the changes in hydrology associated with large-scale hydro-schemes, and the changes in landscape associated with some wind farms.
18. A cornerstone of SNH's support for renewable technologies is that their development should lead to real cuts in emissions of greenhouse gases, rather than compensating wholly or partly for increasing emissions overall. To avoid any impression that action on climate change is piecemeal, all policies should be adapted to take account of climate change and assessed in terms of:
 - their carbon savings including the way they deal with energy use per unit of production (the 'intensity' effect) and overall growth (the 'output' effect);

- whether they are likely to help or hinder measures that people and nature need to adapt to the effects of climate change.
19. A notable anomaly is the *Future of Air Transport White Paper*, which sets out a variety of ways to accommodate the expected growth in air transport over the next 30 years. This expansion is likely to lead to the rapid increase in emissions of greenhouse gases from air transport. These emissions are especially problematic, because emissions at altitude have 2.7 times more 'greenhouse warming potential' than the same emissions at ground level.
 20. Finally in this section, evidence in the UK consultation paper on its Climate Change Programme makes it clear that over the period 1990-2010 renewables are expected to substitute largely for nuclear power rather than fossil fuels in electricity generation (with gas continuing to expand relative to coal), and that the nuclear contribution is likely to fall even more in the period to 2020. This scenario could conflict with the stated goal of encouraging the growth of renewable technologies to reduce emissions of greenhouse gases. SNH recognises the very contentious issues in this debate. In terms of measures to address climate change and good stewardship of the natural heritage, a possible hierarchy could be:
 - i. measures to encourage reduction in the overall use of energy (addressing the 'output effect'), aimed at securing a 'zero demand growth' projection.
 - ii. continued expansion in the proportion of electricity generated from renewables, but subject to a strategic approach which minimises adverse impacts on the natural heritage;
 - iii. a commitment to reduce emissions and other environmental problems associated with non-renewable electricity generation.

Responding locally

Reducing emissions will only limit the degree of change, therefore adaptation policies need to be progressed alongside such reductions.

21. There is a time lag between the emission of greenhouse gases and their effect on the world's climate, but their effect may last for centuries. Whilst Government should retain mitigation (reducing emissions of greenhouse gases) as a priority, it is also important to identify the means to adapt to a level of climate change. These responses should not be in conflict.
22. Working with the grain of local change - such as approaches to flood management at the catchment scale that use soft engineering techniques - is likely to be relatively low cost although this approach may require significant changes to aspects of agriculture, forestry and other land use, transport (infrastructure), business and housing (developments), engineering and development planning. Other measures – such as hard engineered flood defences - are likely to require substantial and ongoing investment. Evaluating the alternatives must include the value of all environmental costs and benefits.
23. There are significant opportunities for the Scottish Executive to progress mitigation and adaptation policies that take a holistic approach, because it has responsibility for environment, planning, transport, forestry, farming and economic development. As with all other countries tackling climate change there is a need for policies in these areas to be joined up or 'climate change proofed' to deliver more consistency and coherence in responses to climate change.

Uncertainties should not delay action that can be taken now.

24. There is a need for further research to improve understanding of the likely effects of climate change generally, and specifically of any impacts on the natural heritage and the ways that people and nature need to adapt to change. These uncertainties should not

delay action. Managing such uncertainty requires a willingness to take precautionary action. An example of a precautionary approach is the Thames Barrage, which was completed in 1982 with the expectation of being used in earnest once every 5 years. It is currently used around 6 times a year, each time preventing billions of pounds of flood damage. Action that could be taken in Scotland includes:

- allowing river and coastal flood plains to flood, especially those that are not built upon, to reduce flood risk to communities downstream or along the coast;
- using permeable surfaces and sustainable urban drainage schemes and discouraging the use of culverts in new development and re-development;
- reducing the run-off rates in upland areas, for example by stopping drainage such as moor-gripping and establishing tree and shrub cover.

Many of these steps could link strongly to other objectives such as improving greenspace, regeneration, biodiversity and other aspects of the natural heritage.

25. Decisions taken now or in the near future that fail to take account of the need to adapt to a changing climate are likely to constrain future options for adaptation and/or require more costly responses: the longer we delay action, the greater the responses and impacts are likely to be.

Policies for conserving and enhancing the natural heritage are likely to require re-thinking and revising to meet the requirements of changing climate and the responses by species and habitats.

26. Over the next decade there will be a need for policies relating to the natural heritage to adapt to a changing climate by:

- allowing the mix of species to change;
- on some protected areas the management objectives are currently based on maintaining the presence and condition of species and habitats for which the site was designated, and this may need to become more flexible;
- considering how to deal with colonising species;
- increasing the emphasis on management of the relevant ecosystem, modifying approaches which place a heavy emphasis on the protection of features such as specific species, habitats or landscapes in well-defined areas; and,
- enabling rates of species dispersal to keep pace with rates of climate change across the landscape, by establishing more semi-natural habitat in strategic locations linking similar types of habitat. For example, incentives could be provided for habitat creation and management at the landscape or ecosystem scale rather than individual management units, and better use made of the existing corridors offered by transport and water networks.

Responsibilities

There is public, private and personal responsibility in dealing with climate change, and public bodies especially must show leadership. Dealing with climate change should be placed firmly at the core of decisions on resource allocations. The public sector can influence the private sector by the practices and standards it sets.

27. Climate change is a long-term issue, and taxpayers have to be confident that public funds are spent wisely and fairly, representing value for money. Spending decisions should reflect the full long-term cost associated with a decision, including the social and environmental costs associated with greenhouse gas emissions. It is important not to constrain options for adapting to climate change. For example, low-emission energy systems may have a higher initial cost but are often well justified over a full life cycle. Auditing of public bodies should be done in a way that encourages allocation of resources to be responsive to climate change.

Positive rewards should be available to business and private individuals that adopt practices and lifestyles that are less dependent on fossil fuels.

28. Too often it is cheaper and/or more convenient to use options that rely on fossil fuels. We welcome emission trading which seeks to reduce emissions by exacting an increasing charge for the 'right to pollute'. This or similar schemes need to be extended into the transport and domestic sectors. We welcome the intention to include air transport in the EU Emission Trading Scheme as a first step. There is also a need not only to restrict the over-use for fossil fuels, but also to directly encourage reductions in their use, for example by:
- greater incentives to make more use of options that do not rely on fossil fuels such as off-grid renewable energy; or,
 - introducing a climate change reward card to help to change individual behaviour - consumers earn more points when they purchase products and services that rely less on fossil fuels, and the points can be traded in for things like leisure activities or towards the cost of public transport.