

# Journal of the Institution of Environmental Sciences

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## FEATURE ARTICLE

# The Government's vision of science in the knowledge driven economy

**Lord Sainsbury of Turville**

I believe that science has a key role to play in the Government's objective of modernising the economy and modernising government, but I do not fool myself that the task is an easy one. Therefore, I welcome the opportunity to describe our vision for science, the targets we have set ourselves, the problems we face, and the progress we have made.

Why is science so important for our competitiveness? A few years ago Professor John Kay remarked: 'Competitive advantage is based, not on doing what others already do well, but on doing what others cannot do as well. We know that this is true for us as individuals. We can see – with greater difficulty – that this is true for firms; that real corporate success is based on distinctive capabilities, not on imitating the successful. It follows that the focus of industrial policy should not be on what we do worse than other people but on what we do better.'

One of the things we do outstandingly well in this country is scientific research. The levels of scientific education and achievement in British universities are as high as any in the world and this is reflected in the success of British firms in industries which depend on elite science, like pharmaceuticals, defence electronics, biotechnology and computer software. In designing policies to enhance competitiveness we need to recognise we are very good at science, and find ways of encouraging our science and engineering base to transfer its knowledge into industry.

### **How to build competitive advantage: the central principle**

The problem with industrial policies in the past is that they have pursued the opposite of Kay's dictum. British industrial policy was based not on picking winners, but perversely on picking losers.

Losers that we would have liked to be winners. Attempts to revive British Leyland, for example, through state intervention turned out to be a sorry failure, and predictably so. But while we should not seek to pick winners, we at the DTI should be vitally concerned to back successful British companies. The key is to focus on areas of activity where we know how to succeed, where Britain and British firms have real competitive advantages and understand the markets, and then to support them with the flows of skills, knowledge and entrepreneurial talent which they need if they are to build on the successes which have already been achieved. The list of Britain's leading sectors is not particularly controversial; they include pharmaceuticals, chemicals, aerospace, telecommunications, hydrocarbons, biotechnology, electrical engineering, computer software, financial services – all unequivocally knowledge intensive activities.

In seeking to create a successful, knowledge

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creating economy, where should we look for lessons? I believe that California offers a better and more accessible model than many others. California has been amongst the most successful of western economies in restructuring away from old manufacturing industries into the industries which will dominate the first part of the 21st century – software, Internet products, multimedia, entertainment and biotechnology. Similarities in the structure of its economy and culture should make it easy for us to learn from them. California offers not only an exciting model of the future but one which should be attainable by us.

A few years ago the Californian economy was in recession, but it has recovered because it has had the agility to respond to downturn by building its position in the range of high-tech, high growth industries which will underpin its economy in the next decade and beyond. It is at the forefront of the new economy in which soft assets such as knowledge and ideas, creativity and branding will play a far more important role in generating growth than the physical assets of land, manual labour and machinery. Clusters or networks of supporting companies which often collaborate and share information as well as competing ferociously have grown up. In areas such as Silicon Valley, in Hollywood and in the biotechnology sector, staff are highly mobile, and as they move from firm to firm they carry ideas which in turn are cross-fertilised.

Some of California's creative culture has undoubtedly been promoted by political decision-making and public investment. Certainly in the 1990s, the state is reaping the rewards of a heavy investment in public university education in the 1960s, and many of the original firms which created Silicon Valley were spun out of Stanford University – and the nearby Xerox research park. Mutually supportive networks of companies, research bodies and educational institutions are now the basic building blocks of its competitive economy. The edge in the activities in which California has taken the lead comes quite simply from the quality of ideas, and it is the capacity to generate ideas which we must strive to nurture in our society.

In this country we are very good at science, both in absolute terms and in terms of the cost effectiveness of money spent in this area. With 1% of the world's population, we do 6% of the world's science, produce 8% of the world's scientific papers and receive 9% of the world's citations of scientific papers. In terms of internationally recognised scientific prizes, scientists in the UK have steadily claimed around 10% of all awards throughout the century. The Cambridge Newton Institute's recent tally of two Field Prizes has helped keep our percentages up. If this total is rescaled for population size, the UK has been the leader throughout the century. We are very good at science and we should exploit it to create competitive advantage for our companies.

But we haven't been backing it as strongly as it deserves, or indeed as we should in terms of our economic interests. An analysis by Robert May in *Science* of the twelve countries together accounting for 80% of the world's total investment in R&D, put the UK among the bottom four in terms of science spending relative to GDP.

In recent years while Governments elsewhere have been increasing the amount they spent on science, the British Government has been reducing it. The Conservative budget of 1995 imposed swingeing cuts across the science base – capital funding for university research was cut by 30% in 1996, projected to become 50% in 1998. On entering office, Labour inherited a science budget that was due to fall by 5% over the next two years. It was immediately clear that if the situation was not reversed we would soon see a decline in the excellence of our science base. We needed to increase our spending on science, and in particular increase our spending in some of the new areas which will underpin the performance of successful British companies in the future.

### **Science in the Comprehensive Spending Review**

The comprehensive spending review, therefore, gave science the largest percentage increase of any area of public finance – a public/private package with the Wellcome Trust of £1.4 billion over three years. The government's contribution alone has the result, in real terms, of increasing the 2001-02 science budget by some 15% above this year's level. There is £600 million for repairing as quickly as possible the research infrastructure within the universities – so that we can produce first class science from first class laboratories. There is £400 million additional funding for high priority new programmes, for example in the biosciences, where it is vital to exploit the information coming from the decoding of the human genome. There is an extra £300 million to finance university research through HEFCE. And the minimum stipend for PhD studentships through the Research Councils has been increased by £1,000 over and above the adjustment for inflation – the first increase in real terms since 1966.

The CSR also reflected the fact that we are on the verge of a new era in the life sciences and it is a field in which British science is especially strong. The recent rapid advances in genetic analysis and manipulation techniques, together with the major advances in information technology, novel synthetic and combinatorial chemistry, and in other areas, has opened up major new opportunities. Specifically, it anticipated that the human genome will be fully sequenced by around 2005, although it looks as if we will have a rough draft by next year. That is why we were particularly keen to direct CSR money into molecular, biomolecular and biomedical research. The Medical Research Council received an extra £90 million – a 6.8% income increase; and the Biotechnology and Biological Science Research Council an extra £52 million – a 4% increase. The Wellcome Trust funded £100 million high intensity x-ray source will provide an additional research aid in many of these fields.

In addition to increasing the amount of public spending on science, the government also believes we need to improve the mechanisms of knowledge transfer. There has been an improvement in recent years with more spin-offs from universities, and the appearance of more business angels, but we still need to capitalise fully on the strength of our science base and our venture capital industry.

This does not, however, necessarily mean spending more on applied rather than basic research. The proportions of responsive and directive research funding are I believe broadly correct. The reasons for this are simple. First, there are many examples of revolutionary applications arising out of advances in basic research – lasers, x-rays, and semiconductors are obvious examples. A belief in the value of pure research is one of the factors behind Microsoft's extraordinary success story. According to Richard Needham, head of Microsoft's new European research laboratory in Cambridge, the guiding principle behind the project is not directed, applied research for the Microsoft market. Rather it is the pure research interests of the scientists themselves – which the Microsoft corporation will then try to apply for the company's commercial projects.

The second argument for the value of basic research is that there is plenty of evidence which suggests it generates high returns. America's Committee for Economic Development has calculated that returns to R&D investments in the US, taking account not only the private return but the 'spill over' benefits from improvements to productivity in other industries, have been of the order of 20-30%, or roughly double the average historical return to stock market investments. The profound economic benefits arising from a strong research base are recognised around the world. In America, the land of less government, a bipartisan National Research Investment Act has secured the doubling of federal funding for basic scientific, medical, and precompetitive engineering research over the next ten years. In Japan, despite recent economic difficulties, the Government is giving a 12% rise in public funds for basic research in the financial year 1999-2000.

Finally, if we look at the USA we see that many of the universities which have been most successful in basic research have also been very good at generating spin-off companies. MIT, Stanford, and Berkeley are three obvious examples. MIT has had a major impact on the economy of greater Boston, where numerous knowledge based companies are located. There are now estimated to be more than one thousand MIT-related companies located in Massachusetts with world-wide sales of \$53 billion. About 125,000 workers are employed by these companies in Massachusetts, and almost 353,000 world-wide. In the UK, all the new activities around Cambridge show that we are starting to follow the US example in this respect.

While we don't need to change the ratio of basic and applied research, we can do more to improve the mechanisms of knowledge transfer. A first class science base is not enough, we also need world-beating scientific entrepreneurs. We have, therefore, taken some important steps to encourage knowledge transfer, though this is an area where I think much remains to be done.

The most significant of these initiatives is University Challenge. The very early stage of turning research outcomes into marketable products, processes and services is a critical and particularly difficult phase, and the University Challenge Fund is targeted very specifically at providing support at that point. We expect it to help scientists and entrepreneurs develop their ideas, ease

their path to commercialisation and ensure that their products and processes are successfully exploited for the benefit of the UK.

The Fund was set up in July 1998 and in March I announced the award of £45m to 15 university based consortia spread across the country which included £4.5m to the White Rose Consortium of Leeds, Sheffield and York, £3.7m to a consortium of Bath and Bristol and £1m to Aberystwyth and the Institute of Grassland and Environmental Research. The quality and strength of the bids was so great that the Chancellor announced extra money in the Budget to allow more bids to be supported in the first round, and to fund a second round of the scheme.

I have also launched the Science Enterprise Challenge, a £25 million competition, to establish up to eight centres of enterprise in UK universities. The centres will be world class establishments for fostering the commercialisation of research and new ideas, for scientific entrepreneurialism and incorporating the teaching of enterprise into science and engineering curricula. We have received 28 stage one bids which involve 55 Higher Education Institutions and I expect to announce the winners shortly.

There will be some people who will say that it is impossible to teach entrepreneurialism, and in one sense that is, of course, true. The ability to sense opportunities and take risks, to pursue an idea tenaciously in spite of overwhelming difficulties, and to persuade people that they should back what seems a maverick idea are not skills that can be taught in the classroom\*. At the same time anyone who wants to set up a new high-tech business would be well advised to learn how to write a corporate plan, the basics of corporate finance, how to read a balance sheet, and to know something about intellectual property rights before they started.

A third important initiative which the Government has taken is the creation of the Higher Education 'Reach Out' Fund to provide incentives and reward universities for interacting with business. For me, one of the strengths of the 'Reach Out' Fund at this stage is the freedom it affords institutions to come forward with innovative proposals for establishing links with business – everything from a programme of staff exchange to the development of business incubator units. I do not want to overdo the expectations for the 'Reach Out' Fund. The level of funding in the first phase is modest, certainly in comparison with the level of funds available for teaching and research. But nor should we underplay the significance of what the fund is trying to achieve; a sustainable, systemic change in the culture of our knowledge base, in which the value and esteem accorded to working with business is comparable with the recognition academics receive for research and teaching. With 'Reach Out' we are talking about a sustained programme of funding. This is not a 'one-off' scheme.

We also plan to increase the number of Teaching Company Scheme programmes running at any one time to over 1,000. TCS have been shown to be highly successful in facilitating the transfer of technology and knowledge between the science and engineering base and business, and has also been shown to be highly suc-

cessful in helping to forge lasting collaborative partnerships. The key to achieving this new target is the willingness of even more academics to participate.

A national network of Faraday Partnerships will also encourage universities to work with companies on innovative projects. The original Faraday Partnerships which were established in 1997 were supposed to be funded with DTI and EPSRC money. But only EPSRC money was forthcoming, and as a result they have tended to focus more on research than knowledge transfer. We will now be providing them with money from the DTI so that they can introduce 'technology translators' who can work with SMEs on problem-solving and the introduction of new products and processes.

I also believe that the Foresight Programme has a key role to play in knowledge transfer. Foresight promotes collaboration, not just between industry, scientists and government, but between firms in the same sector and across sectoral and disciplinary boundaries. It brings together people who know about markets with people who know about technologies. The latest round of the programme began in April and the current panels will run until November 2000. We are broadening the basis of participation, drawing in views from different age groups – particularly younger people – all regions and the widest possible range of organisations.

Finally, in the March 1998 Budget, the Chancellor announced a package of tax reforms to encourage enterprise, including the introduction of the Capital Gains Tax taper, and an enhanced Enterprise Investment Scheme. And in the most recent 1999 budget, he announced his intention to introduce a new R&D tax credit for SMEs next year. This is currently the subject of consultation in which we are proposing that it should take the form of a 150% allowance for eligible current expenditure on R&D against corporation tax. But it goes further than this. We are proposing that SMEs not yet in profit would be able to claim a discounted tax credit equivalent in value to the tax saving they would probably have made when eventually profitable in the future. This should help such 'tax exhausted' companies to sustain their R&D efforts and exploit the results achieved. Treasury and DTI estimates suggest that the R&D tax credit will lead to additional R&D spending of £150 million per year by thousands of small firms.

The third area I would like to discuss this afternoon is the public's confidence in government use and regulation of science. This is I think the most difficult part of my job, but arguably one of the most important. If Britain is going to prosper in the knowledge-driven economy of the future, it is essential that the public have confidence in government's use and regulation of science, and that they believe that science is vital for wealth creation and improving the quality of their lives.

In this area as in others we have taken some important steps but we have a long way to go. I am therefore highly encouraged that the House of Commons Science and Technology Committee is conducting an inquiry into the advisory system and I look forward to their findings. I am equally interested in the findings of the House of Lords Science and Technology Committee which has been considering public confidence as a part

of their inquiry into Science and Society.

The advisory system in this country is based upon a straightforward set of commonsense principles which were issued by the Chief Scientific Adviser – Sir Robert May – in March 1997. These guidelines, which have now been adopted by all departments, advocate a progressive, open, and objective approach to commissioning and evaluating scientific advice, and are based on the following basic principles:

1. Individual departments and agencies should ensure that their procedures can anticipate as early as possible those issues for which scientific advice or research will be needed, particularly those which are potentially sensitive.
2. Once a potentially controversial issue has been identified departments should ensure that they draw on a sufficiently wide range of the best expert sources, both within and outside Government (hence the need for a high quality science base).
3. There should be a presumption towards openness in explaining the interpretation of scientific advice.

The guidelines were designed primarily to provide guidance when evidence is inconclusive or controversial, and in this respect they complement the Regulatory Impact Unit's ongoing work on risk.

In order to increase people's confidence in government's use and regulation of science we have taken a number of important steps:

- The setting up of Cabinet sub-committee MISC 6.
- Review of biotechnology advisory committees and biosciences consultation.
- The establishment of the Human Genetics Commission and the Agriculture and Environment Biotechnology Commission.
- The formation of the Ministerial Science Group.

These are, I believe, valuable steps but we should not underestimate the size of the task ahead of us. The impact of the BSE scare on public opinion and the difficulty of the issues thrown up by the revolution in biology currently taking place means that our task is immense.

Finally, it is essential that the excellence of our science is recognised abroad. The extent to which the UK is viewed as a nation still capable of producing top rank science and technology for today's markets is vital. It influences key decision makers in the fields of procurement and overseas investment and, at another level, the millions of people overseas who buy products in our shops. For too many people, Britain has a proud science and technology heritage. We need instead to build up knowledge among trading partners of contemporary British high tech achievements, and this is an area where Sir Robert May and I are working hard.

I hope I have given you an understanding of the Government's vision of science and convinced you that we are systematically putting in place the practical policies and programmes to turn that vision into a reality. I have not sought to minimise the size of the task we have set ourselves, but I hope you feel that we are moving forward rapidly and with a common purpose.

- *Reprinted from Science in Parliament, Vol 56 No 4, with the kind permission of the publishers.*

# New Government guidance updates waste management planning policy

New policy guidance which provides a framework for waste planning authorities to provide updated waste management facilities was published by the DETR in September.

The new guidance, *Planning Policy Guidance Note 10: Planning and Waste Management* (PPG10) will help authorities to plan for new facilities that will meet the requirements of the EU Landfill Directive. This requires progressively reduced reliance on landfill over the next 20 years. It relates primarily to the management of 'controlled wastes' which covers household, commercial and industrial wastes.

Commenting on the new guidance, Nick Raynsford, the Planning Minister, said:

'This is a major challenge for local government and the waste management industry. Proper, more sustainable waste management is essential for environmental protection, but new facilities to deal with waste are often very contentious locally. Local and regional government need the help which PPG10 provides in setting out for the first time a comprehensive framework for drawing up policies in waste local plans and in taking good land-use planning decisions on the siting of these facilities. It is the essential tool for putting into prac-

tice the principles set out in our draft waste strategy *A Way with Waste*, published last June.'

The new PPG10, which is an integral part of the Government's campaign to modernise the planning system, provides for stronger regional arrangements. It recommends the setting up of Regional Technical Advisory Bodies (RTABs) to advise on planning strategies for waste management in the regions. Waste planning authorities can no longer just consider the needs of their own areas in isolation. Modern waste management solutions may require facilities serving areas which cross local authority or even regional boundaries.

RTABs would provide objective technical information and commentary when regional planning bodies prepare the waste elements of new Regional Planning Guidance.

Most regions have anticipated PPG10 and have already put these technical advisory groups in place.

The existing Planning Policy Guidance on waste management forms part of PPG23 *Planning and Pollution Control* published in 1994. It is now out of date because of the Environment Act 1995, the creation of the Environment Agency and subsequent European legislation and new Government thinking on

waste management issues following the 1997 election.

Consultation on replacing those parts of PPG23 which dealt specifically with waste management issues began in late 1996. Following the election, further consultation was undertaken in February 1998. Since then an extensive debate has taken place with a wide range of consultees.

In June this year the Government published its draft waste strategy for England and Wales, *A Way with Waste*. PPG10 builds on this strategy by providing advice about how the planning system can assist in the provision and proper siting of the waste management facilities required. It is however entirely neutral between particular waste management options and facilities, which remain matters for the waste strategy itself. That depends on the Best Practicable Environmental Options within each waste planning area.

Planning Policy Guidance Note 10: *Planning and Waste Management* (ISBN 1 851123 18 0) is available, price £10.00, from the Publications Sales Centre, Department of the Environment, Transport and the Regions, Unit 21, Goldthorpe Industrial Estate, Goldthorpe, Rotherham S63 9BL. Tel: 01709 891 318. Fax: 01709 881 673.

## A study of environmental planning

**The following is the text of a response by the Institution of Environmental Sciences to a consultation paper from the Royal Commission on Environmental Pollution (October 1999):**

We believe that there are three critical issues to be addressed, all of which bear on the effective implementation of environmental planning.

These are:

- the methods of democratic control
- the knowledge base
- economic viability.

The first two are referred to in the consultation paper but the third and vital

component is not.

### **Democratic control**

Initiation of development is nowadays almost exclusively commercially based. The purpose is profit and environmental considerations are observed at the minimum level permitted by statute. This level is being steadily raised, not least as a result of EU legislation.

Control of development is primarily by local authorities at county and district council level. They operate on a political basis and are made up of lay persons often with very little knowledge or training in environmental matters. Environmental situations have varying

boundaries and range from very specific and local to regional or national significance. The smallest are often beyond the notice of a district council, many others require cross boundary consideration. A democratic structure that can control development or activity at *all* levels from micro to macro is essential. Control, however, is not enough and this structure must also be capable of the initiation of activity that is considered necessary for the public benefit.

### **Knowledge base**

For the democratic structure to function adequately and effectively, an informed and competent knowledge base is

required. There are two elements to this. There is the professional and technical planning support and there is the leavening of public interest and opinion. Widely based planning teams of qualified professionals are needed at both county and district level incorporating environmental experts in varying fields. These should be supplemented by advisory groups on regional matters and local issues (also by inter-authority co-operative action) and leavened by open consultation with the public at local level.

Training in environmental subjects is relatively new in the UK and few admin-

istrators in senior positions have such experience. The majority of environmentally qualified graduates do not obtain environmentally related employment and the skill base is thereby depleted. This problem could be addressed in parallel.

### **Economic viability**

During the 1970s, the heyday of the planning profession, many excellent and expansive development plans were produced by planning departments and consultants teams. Regional, sub-regional, district and local plans abounded.

Outside of the New Town Corporations few came to fruition (except in truncated and less effective form) due to economic factors. They could not be afforded!

The same fate awaits environmental plans unless a modified strategy is adopted. Environmental planning teams should include economic, financial and cost advisors and all plans should be thoroughly tested for economic viability. This may involve quite sophisticated techniques of cost benefit as well as social benefit analysis. Issues can be complex, conflicting and controversial!

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## **Climate change: early action needed to buy time to adapt**

The need for speedy international action to ratify the Kyoto protocol for cutting greenhouse gas emissions was given fresh impetus with the publication in July of new research.

Published by the renowned Met Office Hadley Centre, the research by top scientists was commissioned by the DETR. It shows that failure to act now could mean the Amazon rainforest is devastated; large sections of the global community go short of food and water; many heavily populated low-lying coastal areas are flooded; and deadly insect-borne diseases such as malaria spread across the world.

The report appeared just before the international community met in Bonn to make progress on implementing the legally binding Kyoto protocol. The protocol is recognised as the first step on the long road to stabilising greenhouse gases in the atmosphere.

It predicts that, by the 2080s, if action is not taken to tackle climate change:

- global temperatures will rise by about 3°C
- large parts of northern South America and central southern Africa could lose their tropical forests
- some three billion people could suffer increased water stress: Northern Africa, the Middle East and the Indian subcontinent will be worst affected
- around 80 million extra people could be flooded each year due to rising sea levels: Southern Asia, South East Asia and island states in the Caribbean, the Indian Ocean and the

Pacific Ocean will be most at risk

- about 290 million extra people could be at risk of malaria – China and central Asia will be most affected

- the risk of hunger in Africa will increase due to reduced cereal yields.

However, compared with the predictions above, the report concludes that if carbon dioxide in the atmosphere was stabilised at 550ppm the worst impacts of climate change could be avoided or delayed by up to 100 years. This would provide valuable time for our society and the environment to adapt and:

- delay a 20°C global temperature rise by over 100 years
- avoid significant losses to the Amazon rainforest and delay loss of the carbon sink by 100 years
- cut by two billion the number of people experiencing increased water stress by the 2080s
- delay a 50cm sea-level rise by 55 years and reduce by 75 million the number of people experiencing annual flooding from rising sea-levels by the 2080s.

Environment Minister Michael Meacher said: ‘This work highlights the urgent need for international action to limit levels of greenhouse gas emissions. If we don’t act now, many parts of the world will suffer severely within the lifetime of people alive today.

‘We have to make Kyoto work – we owe it to our children and their children. So we will be pressing hard to maintain political momentum and make progress at the Fifth Conference of the parties.

‘Even so, Kyoto is a first step. In the

long term the world will need to cut emissions substantially to avoid some of the worst effects of climate change.’

### **Background**

In 1998 the average global temperature was the highest since records began 140 years ago. The 1990s was the warmest decade recorded, at 0.6°C higher than at the end of the last century.

The UK has played, and continues to play, a leading role in international climate change negotiations. Under the Kyoto Protocol, the EU and 11 other countries (mostly in Eastern Europe) agreed to cut greenhouse gas emissions by 8%, based on 1990 levels, over the period 2008-12. The EU’s target was subsequently shared out between member states – the UK agreed to a 12.5% cut. The UK also has a domestic goal to cut UK carbon dioxide emissions (CO<sub>2</sub>) by 20% below 1990 levels by 2010. The UK is well on track to meet its (UN Framework) Convention (on Climate Change) target to return emissions to 1990 levels by 2000. In 1997 the UK’s greenhouse gas emissions were 7% below 1990 levels and CO<sub>2</sub> levels were 8% lower.

Recognising the importance of assessing the threat of future climate change and its impacts, the DETR has commissioned a series of linked research projects. This report is the third to explore the global impacts of the latest climate predictions from the Hadley Centre models. The previous reports (*Climate change and its impacts*), in December 1997 and November 1998

(available from the Hadley Centre, address below) described the global impacts of climate change resulting from the 1995 IPCC 'business-as-usual' or 'unmitigated' emissions scenario.

In 1997 the IPCC suggested two scenarios of reduced emissions which lead to stabilisation of carbon dioxide in the atmosphere at 750ppm and 550ppm. The EU propose that stabilisation at 550ppm should guide global limitation and reduction efforts. These levels are approximately twice present-day and twice pre-industrial levels respectively. The latest report is the first assessment of the global impacts of climate change resulting from these stabilising emissions scenarios and is a contribution to the international debate on interpreting 'dangerous' climate change, as required by the UN Framework Convention on Climate Change.

The Fifth Conference of the Parties to the UN Framework Convention on Climate Change, Bonn (25 October to 5 November), was aiming to maintain political momentum and make technical progress. The latest results of climate predictions were to be presented at the meeting.

Climate scenarios for this study have been generated by the second Hadley Centre coupled ocean atmosphere climate model, HadCM2. For each of the

three emissions scenarios, predictions of surface temperature, precipitation, sea-level rise and ocean circulation are made. These predictions are then used to make assessments of the global impacts in the following areas: natural vegetation; water resources; world food supply; sea level rise; and human health. Impacts resulting from emissions leading to stabilisation of CO<sub>2</sub> in the atmosphere have been compared with those from unmitigated emissions, concentrating on changes between the present day (defined as the period 1961-1990) and 30-year periods centred on the 2020s, 2050s and 2080s.

By the 2080s predicted impacts include: increased vulnerability to water stress in northern Africa; severe coastal

flooding in southern Asia; and increased risk of malaria in China. It also predicts that, long after CO<sub>2</sub> levels are stabilised, sea levels will continue to rise because of melting land ice and thermal expansion of the oceans.

The report also gives clear indications that the stabilisation of CO<sub>2</sub> at 550ppm not only substantially reduces the magnitude of many changes and impacts over the next century but may even prevent some of the more serious impacts in certain regions. For example, with unmitigated emissions the tropical rainforests of South America are predicted to suffer significant rapid losses after the 2050s. Under stabilisation at 550ppm these losses are substantially reduced, even by the 2230s.

**Copies of the report are available from:**

**Dr Geoff Jenkins, The Hadley Centre for Climate Prediction and Research, The Meteorological Office, London Road, Bracknell, Berks, RG12 2SY.**

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## ENVIRONMENTAL INFORMATION

# The Natural Step: business networks and sustainable development

**Stephen Martin<sup>1</sup>, David Cook<sup>1</sup>, Penny Walker<sup>2</sup> and Arnie Vetter<sup>2</sup>**

### Introduction

In a recent survey<sup>3</sup> of almost 500 senior business executives, 94% said that sustainable development is important for business. Moreover 82% believed companies derived real business value from sustainable development. Consequently, sustainable development is no longer an unrealistic and passing fad. However, it still has overtones of a too fuzzy concept for many businesses. Sustainable development is probably one of the most important but frustrating concepts to confront the business sector in recent years. Frustrating, because the concept has increasing support at all levels, but

few understand how to implement it in practice.

This is why Forum For The Future<sup>4</sup> – a solutions-orientation, sustainable development charity – set up The Natural Step UK (TNS) in 1997. TNS slices through the confusion and frustration surrounding sustainability by providing companies with a scientifically rigorous set of rules (see appendix 1) and using learning and consensus techniques specifically fashioned for the business environment. It provides businesses with an effective strategic framework for tying together a wide range of existing environmental initiatives, allowing companies to broaden their

definition of environmental management beyond clean up and control to environmental quality and social responsibility.

The Natural Step was pioneered in Sweden through a programme of high profile education, learning and promotional activities with business, local authorities and the general public. It is a well documented<sup>5</sup> process for achieving consensus on the fundamental issues which underpin sustainability. TNS has been adopted by a number of key businesses in Sweden including Electrolux, IKEA, McDonalds and Scandic Hotels. In all some 60 corporate organisations currently use The Natural Step. It has

also been adopted by over 60 local authorities in Sweden. The first organisation to adopt TNS in the UK was the Co-operative Bank plc<sup>6</sup>.

The purpose of this paper<sup>7</sup> is to describe how TNS UK has trialled The Natural Step as a means of promoting sustainability within business. The paper describes how a national Pathfinder programme was implemented with nine major businesses<sup>8</sup>. It also describes the role and impact of a sustainable development business network created to develop a learning forum to share good practice.

### **The Pathfinder Programme**

The Pathfinder programme commenced in 1997 and involved working with nine companies on a range of different projects:

- social housing construction
- hospital construction
- packaging
- energy
- chemical life cycle/strategic planning
- learning programmes
- strategic audit
- industry awareness
- paper.

The broad objectives of the Pathfinder programme were to:

- assess the business implications of sustainability at a strategic level;
- trial ways of communicating and learning about sustainability using The Natural Step model, fitting in with the organisation's needs;
- develop, in partnership, effective organisational approaches to sustainability;
- learn from each other about how best to promote sustainable development within business.

### **How The Natural Step works**

There are a number of basic steps in the application of The Natural Step to an organisation:

- Step 1: Introduce the science and systems concepts underpinning The Natural Step.
- Step 2: Apply The Natural Step approach to a tangible project or activity.
- Step 3: Reflect on the understanding of the ideas and situations.
- Step 4: Generate general theories and analyse ideas.
- Step 5: Test concepts in new situations or practical applications.

In each case the following three stage

exercise was undertaken, as part of the overall aim to demonstrate how new thinking and new approaches will be required to attain the goal of sustainable development.

1. An examination of the extent to which the company, or a particular activity within it, could currently be regarded when assessed against TNS System Conditions – a sustainability gap analysis.
2. What would the company look like in 25 years time, if it had progressed to sustainable development as defined by the System conditions?
3. Having built that vision, what obstacles need to be overcome to attain it? Hence providing a framework for an incremental plan and a clear set of directions based upon a vision of sustainability.

The main focus of each pathfinder project was based on one or more workshops involving many of the stakeholders. The main purpose of these was to raise awareness and understanding of sustainability, by promoting a sound knowledge base of science and systems thinking applied to the Earth's biophysical resource flows, as well as the social and ethical issues of sustainability.

A number of important general outcomes were achieved from these projects. These included:

- improved understanding of project management within a clearly understood sustainability framework
- improved understanding of the behavioural changes required to implement sustainable practices
- improved ability to understand many sides of a complex issue, to resolve conflict and to achieve consensus
- improved decision making within a common framework
- new opportunities to assess future scenarios.

In a large number of instances the trial led to the development of a detailed sustainable development action plan, as well as leading to ownership and implementation of the plan. Whilst it is too early to assess to what extent the TNS process has led to tangible and longer term change within many of the organisations, there is evidence in a number of the organisations, that it is now beginning to influence specific organisational or structural changes. In several of the companies the TNS approach is now being extended into supply chain activities, as well as to activities with joint

venture organisations. Some are now more seriously considering the wider sector specific implications of sustainability.

### **Pathfinder Business Network**

A novel product of the Pathfinder programme has been the establishment of a sustainable development business network. The network comprises representatives from all participating companies, TNS UK, and a small number of observers. The main aim of the Network is to promote and support genuine commitment to sustainable development by all organisations and individuals and to act as a learning forum by acting as an information exchange for materials and the dissemination of best practice. The Network convenes three times a year, with a number of smaller working groups meeting to achieve specific tasks (e.g. review of the learning materials).

One of the key objectives of the Network is to support the introduction of TNS into society in the shortest possible timescale by:

- identifying what supports and hinders change at all levels of organisations, because individual and social settings have to change to be effective
- identifying common patterns of change
- identifying effective responses to change and sharing them between companies

Whilst the Network has yet to fulfil all of its objectives, there are good signs of interorganisational links beginning to evolve, for example, between companies, schools and local authorities; between companies and Government departments; between universities and companies; and companies and professional bodies. One of the first Network events was a national conference on The Natural Step, which attracted almost 200 delegates from both the public and private sectors. The event was particularly successful in exploring the use of TNS processes in designing learning events. The Network is also actively considering developing a mechanism of 'peer assist' to support the Network's capacity to serve its own development needs.

### **Conclusions**

The Pathfinder programme of The Natural Step has pioneered a new approach to partnership between an



NGO and the corporate sector. It has created a number of innovative and challenging sustainable development education and learning activities, as well as a business network to support the wider implementation of the principles of sustainability. At an individual level, The Natural Step approach has made an important contribution because:

- its explanation of sustainability acts as a powerful motivator
- its basis in science and systems thinking demonstrate the essential importance of environmental limits to sustainability
- the system conditions provide a simple but powerful framework for non-experts to use
- it provides a shared language and set of concepts, which is essential both for the project team and when rolling out actions to a wider circle of suppliers and other stakeholders
- the time spent creatively and imaginatively agreeing a vision of a sustainable future generates optimism, enthusiasm and team spirit, as well as helping people question their assumptions about what's possible for their business
- the use of a 'live' project focus not only demonstrated senior management commitment in the project but crucially made the learning practical and relevant
- the use of the approach to question, review and develop strategy (as well as generate practical, small steps for implementation) has great potential
- the partner organisations are able and increasingly implementing learning from each other and sharing their

experience through the business Network.

## References

- 1 Director of Learning and Chief Executive respectively of The Natural Step UK.
- 2 Penny Walker and Arnie Vetter are accredited TNS facilitators and work independently from Caleb and Penny Walker Associates.
- 3 *European Chemical News*, June 1999.
- 4 Established by Jonathon Porritt, Sara Parkin and Paul Ekins in 1996, it seeks to place greater emphasis on best practice and pioneering innovation in response to the crisis undermining the Earth's life support systems.
- 5 Brian Nattrass & Mary Altomare, 1999, *The Natural Step for Business*, New Society Publishers.
- 6 The Co-operative Bank adopted TNS as the foundation of its ecological mission statement in 1996. It is also the basis on which it is developing its ecological management system. To this end it has no plans to implement BS 7750 or ISO 14001 because it does not see these as 'added-value'. *The Co-operative Bank – the Partnership Report*, 1999.
- 7 This is an abridged version of a paper presented at an international seminar, held at the Ifo Institute for Economic Research, Augsburg, Germany in September, 1999.
- 8 The Pathfinder companies include: The Co-operative Bank plc; Yorkshire Water; Interface Europe;

DuPont (Nylon); Air BP; Sainsbury's; Papercom Europe; Tarmac Special Projects; Tarmac Contract Housing.

## Appendix 1

The Four System Conditions

- **System Condition 1**  
Substances from the Earth's crust must not systematically increase in nature. *This means that fossil fuels, metals and other materials are not extracted at a faster rate than their slow redeposit into the Earth's crust.*
- **System Condition 2**  
Substances produced by society must not systematically increase in nature. *This means that man-made substances are not produced at a faster pace than they can be broken down by nature.*
- **System Condition 3**  
The physical basis for the productivity and diversity of nature must not be systematically diminished. *This means that nature's 'green spaces' are not diminished in quality, and renewable resources are only harvested at rates that ensure constant natural regeneration.*
- **System Condition 4**  
We must be fair and efficient in meeting basic human needs. *This means in the sustainable society basic human needs must be met with the most resource-efficient methods possible, including a just resource distribution.*
- The Natural Step UK, 9 Imperial Square, Cheltenham, GL50 1QB; Tel: 01242 262744; E-mail: gill.morris@tnsuk.demon.co.uk

# Exploiting the potential of low carbon technology

A quarter of all UK carbon emissions into the atmosphere could be saved by the end of the next decade through the development and use of low-carbon technology, according to a report by the Advisory Committee on Business and the Environment (ACBE) published in October.

The report *Carbon Trusts – Exploiting the Potential of Low Carbon Technology* indicates that up to 50 million tonnes of carbon, or some 25% of all UK emissions into the atmosphere,

could be saved by 2010.

Following its last study on climate change, this ACBE report sets out critical measures for government and business to reduce carbon emissions through faster take-up of low carbon technology. Probably the most significant recommendation to come out of the report is the development of a Climate Change Technology Centre that would help to bring promising climate change technology research quickly to the attention of the business community as well as

co-ordinating existing national and international climate change technology efforts.

- Other important measures include,
- comprehensive employee awareness of energy issues
  - commitment to collaborate and integrate on strategic research
  - energy performance standard based procurement of goods and services.
  - fiscal and public expenditure support for market enablement, including tax credits for selective investment in

new technology;

- independent business led carbon trusts, supported by recycled tax revenues.

ACBE Chairman, Chris Fay said: 'This report covers a number of major issues and provides 12 main recommendations for business and government on awareness, research and procurement, all of which can play a major part in achieving these strategic objectives.'

'Fiscal incentives like the Climate Change Levy are most likely to work if the revenue is clearly recycled into carbon reduction measures in business, and the business view is that it is essential to target the environmental objective directly in this way.'

'There is enormous potential for the development and take-up of low carbon technology which represents a great commercial opportunity for the UK. But the right incentives must be put into place to demonstrate, trial and build consumer acceptance of new products.'

'To be effective, the process has to be close to the market and business led with businesses able directly to recycle tax revenues.'

Today's report includes an illustration of how a trust-funded Low Carbon Technology Centre might work, saving at least between two and three million tonnes of carbon annually for around £3 million recycled tax revenues.

The report contains 12 principal recommendations:

1. Targets for sectors including domestic and transport. A UK National programme with targets and supporting policy measures is needed to reduce global warming gas emissions from all sectors and this should include proportionate savings from the domestic sector and transport.
2. Meeting demand with new products and services. Policies are needed to stimulate the market transformation process, and to encourage manufacturing sectors to enter into voluntary agreements to achieve increased levels of energy efficiency through new products and services. Government should put in place a consistent, long term policy framework for innovation which gives business the confidence that investments will be rewarded in the market place.
3. A stronger business focus on energy efficiency and carbon saving. Much has already been achieved, but there is significant scope for further CO<sub>2</sub>

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savings through increased efficiency in all sectors. Business should report on carbon consumption, on a basis which allows sectoral comparison and relates to output measures. Business should also seek information on fuel breakdown from energy suppliers and report on energy derived from Combined Heat and Power and renewables.

4. Voluntary agreements. Every business sector should consider whether it is practicable to reach a voluntary agreement, with targets set in terms of efficiency improvements, so that the potential of this approach can be clearly demonstrated. Sector voluntary agreements should be defined by the end of 1999, so that it is clear which sectors can adopt this approach.
  5. Negotiated agreements. For the medium term, business and Government should give further consideration to the option of negotiated legally-binding sectoral agreements, accompanied by appropriate incentives.
  6. Regulation – Integrated Pollution Prevention and Control (IPPC). IPPC should be the preferred instrument for achieving energy savings in major installations and energy intensive industries. It should apply a requirement on the energy intensive industries which is commensurate with that applied to other business sectors by other means. IPPC should be implemented in a way which maintains the option of carbon trading
- between installations, and which maintains the option of access to international trading.
7. Economic instruments – a Carbon Tax. ACBE believes that in order to help secure a change in the approach to energy and to meet the Government's targets, an economic instrument in the form of a tax may be necessary. However if adopted, such a tax must be part of a comprehensive programme of measures and introduced on the basis that it does not lessen UK business competitiveness, that is revenues are fully recycled by encouraging low carbon technology and by being otherwise revenue neutral, that it is targeted to achieve changed behaviour and should not fall exclusively on business. This should be supported by clear parliamentary undertakings with regard to fiscal neutrality and the recycling of revenues in particular.
  8. Trading and joint implementation. Flexible international mechanisms such as trading should be established as soon as possible on a business to business basis. The UK should take an active role in establishing these mechanisms, and stay closely involved in the international negotiations on trading and joint implementation. The structural arrangements necessary to enable trading to take place and to ensure a strong business input into the design of trading arrangements should be the subject of a further ACBE report for consultation within 12 Months.
  9. Combined Heat and Power (CHP) and Renewables. Government should take action to ensure that the regulatory barriers to the wider use of CHP continue to be tackled. There should be a new voluntary Business Commitment to Renewable Energy, set at 1% rising progressively to 10% by 2010, providing Government maintains and increases NFFO funding, and providing the cost of such energy is and remains competitive with prices currently obtainable. Government and the Regulator should also increase incentives for domestic take-up of solar power, for example through the Regulator allowing domestic PV installers to sell surplus electricity back to the grid at the same price as they have been charged for non PV purchases.

# Government welcome for proposed UK emissions trading scheme

An Initiative by over 30 UK companies participating in the Emissions Trading Group proposing the establishment of a UK emissions trading scheme, open to all UK companies, has been welcomed by Government Ministers.

The Government was represented at a meeting of the chief executive officers of the participating companies by Environment Minister Michael Meacher MP. He presented a letter from Ministers representing the Treasury, DTI and DETR which read as follows:

‘The Government welcomes the initiative of the participating companies in proposing the establishment of a UK Emissions Trading Scheme, and in developing principles for a scheme that would be open to all UK companies.

‘The Government congratulates the businesses and organisations involved on the very considerable progress which has been made since we gave our backing to this initiative on 30 June. The Emissions Trading Group set up at that time has addressed the key issues relevant to the design of a trading scheme. it

has reached some very helpful and constructive conclusions which we are considering in some detail. It is of great benefit to know the principles supported by this group.

‘The work done has moved us significantly along the road to the establishment of a full UK Emissions Trading Scheme. But there is a lot of further work which needs to be done. Within Government, we will now be paying particular attention to the public policy issues and the role for Government put forward in the proposals. We wish to continue working alongside business on the detailed development of the draft proposals, to draw out the implications and to co-ordinate with developments at the international level. We share business’s aim of having a UK emissions trading scheme operational as soon as possible.

‘Our support for this Initiative reflects our clear recognition that emissions trading has a key role to play in the long term solution to reducing greenhouse gas emissions. A domestic trading

scheme would complement other climate change measures in the business sector by offering cost-effective and flexible options for achieving emissions reductions. It will also open the way to international trading opportunities and will enhance UK expertise in this field.’

The UK Emissions Trading Group (ETG) was established on 30 June at a meeting of Chief Executives organised by the CBI (Confederation of British Energy) and ACBE (the Advisory Committee on Business and the Environment). The work of the ETG relates primarily to the establishment of a carbon emissions trading scheme within the UK. In the longer term, the Kyoto Protocol to the Convention on Climate Change also sets out the basis for an international emissions trading scheme.

A carbon emissions trading scheme enables businesses to buy and sell carbon emissions in meeting an emissions target. Businesses can choose to reduce their own emissions, or they can choose to purchase permits from others in order to meet their own commitments.

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## Public transport statistics

Just as John Prescott was receiving an even worse press than usual for his handling of transport and planning issues, coinciding with the publication of the government’s Transport Bill, his department was publishing statistics for ‘1999’, seemingly a little prematurely, as there was still a full month of the year to run at the time of their release.

The figures are in fact mostly for 1998-99, and indicate that the number of passenger journeys made by all rail transport increased by 5% in Britain to 1.9 billion journeys. This figure can be broken down into national heavy rail (5% increase), London Underground (4%), and light rail and supertram systems, such as those of Glasgow, Tyne and Wear, Manchester and Sheffield, on which there was a passenger increase of 7%. The latter figure should be enhanced in the next annual report with the opening of the West Midlands system in May 1999 and the Croydon Tramway hopefully early in 2000. The London figure should also increase with

the opening of the Jubilee Line extension and the passenger activity associated with the Millennium Dome at North Greenwich.

Bus patronage in England declined by 1 per cent, although mileage continues to increase. Local bus passenger journeys in South East England outside London rose by 6%, while the DETR says that London’s buses are carrying 6% more passengers than a decade ago. The trend in patronage tended to flatten out in the second half of the 1990s, following a 40 year period of decline which deregulation in the 1980s only helped to exacerbate.

Over 1,800 new or improved bus services were generated in 1998-99 as a result of rural bus grants paid to local authorities. During that year the Rural Bus Grant and Rural Bus Challenge provided £25.7 million funding for rural England.

Domestic air travel has continued to increase, fuelled both by business travel and the role of ‘no-frills’ airlines such as

Ryanair, easyJet and the BA subsidiary GO, helping to expand the market for relatively cheap air travel. A 4% increase in passengers for 1998 was recorded, although subsequently one or two airlines, such as Debonair, have fallen by the wayside as competition at the lower end of the market has intensified. The obvious trade-offs between increased personal freedom and mobility and the environmental impacts of increased surface and airborne transport activity merit serious debate at ministerial level. Yet the government’s philosophical position appears to currently sit, or rather fidget, rather uneasily between the Thatcherite sentiment that increased travel (and particularly car ownership and use) is an indication of a healthy economy, and being seen to be serious about the UK’s commitments made at the Rio Summit.

*Derek Hall*

■ Source: *Bulletin of Transport Statistics: Great Britain 1999*, DETR, London.

THE INSTITUTION OF ENVIRONMENTAL SCIENCES

# PROFESSIONAL INDEMNITY SCHEME

The Institution of Environmental Sciences, in conjunction with Marsh UK Ltd, is always looking for new ways in which to improve the existing cover offered under your professional indemnity insurance facility. For this reason we keep our files open and the facility under constant review.

Over the last three months your Institution and our team of insurance brokers have been working together to develop enhancements and changes that go a long way to improving the overall coverage of your professional indemnity insurance.

We are delighted to advise that our Underwriters have agreed to provide some overall improvements to your existing policy wording. Please find a summary below:

The enhancements to your standard wording are as follows:

**Contractors Pollution Legal Liability Cover:** This special endorsement provides cover for all sums which you become legally liable to pay as damages for pollution conditions arising out of the performance of your professional services.

**Self-employed Person Extension:** Although this extension has always been included in the cover we have agreement from the Underwriter that you no longer need to declare, up front, the use of these persons. Therefore your insurance will cover you for negligence as a consequence of the use of employed or contracted persons in connection with your professional business.

**Defence Costs:** Cover will extend to any costs and expenses incurred by the Underwriters in the investigation, defence or settlement of any claims.

**Collateral Warranty or Duty of Care Agreement:** You will now have indemnity in respect of liability assumed by you under any Collateral Warranty or Duty of Care Agreement.

#### **Other improvements:**

**Premiums:** These have recently been reviewed and Underwriters have reduced them substantially. A fairer rating system has been implemented which is effective immediately. We have come up with a new premium schedule which we feel is more equitable. Once approved by Underwriters it will become effective immediately. There will be significant savings for most members if not all.

**Summary of Cover:** We are currently in the process of publishing a 'Summary of Cover' which explains in plain English the terms and conditions of the policy. These will be available from January 2000 on request from the Institution or our Edinburgh office.

**Excess:** Except where you are already subject to a minimum excess, all other excesses borne by currently insured members will be reviewed, for each and every client, on renewal, with a view to a reduction in each case where and when possible.

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# The management of nuclear waste

## **Lord Flowers FRS**

The waste problem is very much with us now. Neither contraction nor expansion of nuclear power production will make much difference to the scale of the waste problem to which we are committed.

British policy is fragmented. Different approaches are envisaged for intermediate level waste and for high level waste, and for waste likely to arise in future, such as from decommissioned submarines. Most of our spent fuel is reprocessed, which is where much of the waste arises, but the fuel from the PWR at Sizewell is neither reprocessed nor regarded as waste. There is also an excess of materials in store for which there is no foreseen use, especially plutonium which requires special treatment. Thus, even the total amount of waste and its characterisation are not properly defined. Clearly, they should be before facilities can be sensibly planned for. We concluded that an integrated strategy is needed for all long-lived nuclear wastes, and an early decision on just what should be regarded as waste.

## **Higher level wastes**

For higher level wastes, only two disposal methods may be seriously considered for the foreseeable future. The majority view of the scientific and technological community, here and abroad, is to emplace suitably packaged waste in deep geological formations.

There is a minority view that it should be stored indefinitely at or near the surface in the hope that research will eventually find some better solution.

High level waste will in any case be surface stored for 50 years or so, until its heat production no longer hinders underground emplacement. If longer storage is required, the waste will probably have to be repackaged and stored again in new facilities, an expensive and potentially dangerous operation.

## **Geological disposal**

There is nowadays wide acknowledgement that deep geological emplacement should not yet take the form of irretrievable disposal. A period of monitored underground storage is desirable before the store is finally back-sealed. The depository should be so designed that even after back-sealing the waste could

be removed at a later stage if that should prove desirable. But in any case, back-sealing would take place only when a long-term programme of monitoring had shown that it was safe to do so, and that might take 100 years or more.

‘Phased geological disposal’ is a period of surface storage, followed by retrievable and monitored geological emplacement, and back-sealing when it is judged safe to do so. It is the process we strongly favour, because it allows decisions to be taken in a considered and progressive fashion as experience and confidence grow, and avoids premature actions that might be difficult to reverse. But we believe that sufficient technical assurance can now be given to allow the process of preliminary site selection to begin.

## **Public acceptance**

The fact that some nuclear waste must remain isolated from people and the environment for hundreds of thousands of years means that technical assurance, necessarily based on prediction rather than demonstration, is not enough: public acceptance of that assurance is also required in a field that the public finds very difficult to understand and is unique in its demands. What must be sought through proper democratic channels is majority acceptance and that in two stages. The first stage is national acceptance that a particular process of waste management should be used. The second is to agree that one or more particular sites may be chosen for disposal.

Agreement on the first count is necessary, but it by no means guarantees the success of the second in the inevitable planning inquiry phase that follows. However, the process should be simpler if the issues of national policy have been separated from those of locality

## **A 25 year programme**

In our report we have set out a sequence of decisions and actions which will occupy at least 25 years, and quite likely much longer. We suggest that the Government should first announce in the form of a Green Paper that they are developing a comprehensive policy, and that they are minded to pursue phased geological disposal. This paper is intended for the widest possible consultation before Parliament takes any decisions. We hope that the Green Paper may appear this year.

In the second year, in order to conduct the ongoing public consultation in an orderly, expeditious and fair manner, there should be appointed a broadly based Nuclear Waste Management Commission without, at this stage, statutory powers. Its work would be open; it would consult widely, and recommend site selection policies and procedures. At the same time the Government would begin to draw up a complete inventory of all long-lived wastes, which implies that it must also develop a policy for plutonium stocks.

This stage will end with the Government formulating its policy in the light of the Commission’s consultations and recommendations, which it will announce in the form of a White Paper and a draft Bill. The resulting Act will establish policy and give it parliamentary approval; it will relaunch the Commission on a statutory basis; and it will bring about any desirable changes to planning law, including the introduction of a compensation scheme for those communities seriously affected by the long planning process. We imagine that the Bill will be debated and passed during Year 4. Thereafter, the Commission will communicate directly with Parliament through an annual report that should be debated at all significant stages.

It is a key feature of our proposals that Parliament itself should debate and approve the whole development at significant points on behalf of the nation as a whole. A sequence of stages of open and transparent consultation in depth, followed by parliamentary debate and approval, is the way we see democracy working in a matter of this gravity and time-scale.

If the Commission has recommended, and Parliament has adopted, phased geological disposal – and this, in the fourth year, is the first crunch decision – we propose that there will be set up by the nuclear industry itself a Radioactive Waste Disposal Company. This company will be responsible for the final stages of site selection and preparation, and for eventual monitoring and disposal, subject always to the approval of the Commission.

During the following few years the Commission will begin a second round of consultations to establish a long list of maybe 15 possible depository sites. The aim is to reduce this to a short list of

four or five sites by public consultation, desk studies and volunteering. We hope that Parliament might receive the short list around the eighth year and that the company could then begin investigating these sites in consultation with local communities. It is important that there should be in place a generous compensation scheme to balance community benefits, as in France, against 'planning blight' arising from the reservation of candidate sites for eventual waste disposal.

This stage will continue until perhaps the 15th year, when the company will issue an environmental statement and make its choice for one or two sites for the approval of the Commission. The company will then be able to apply for an order for the development of the final choice of site or sites. This question must remain open until there is a full inventory of wastes for disposal and the capacities of the sites are known.

The planning application will undoubtedly be debated by Parliament, but the main action will result from the Government's calling for a local public enquiry, on the outcome of which it will decide whether the company may go ahead with the construction of an actual depository at a particular place. If the decision is favourable, the earliest one could expect waste to be emplaced is the 25th year, and it might well be considerably later.

I would like to end by emphasising that in spite of the long time-scale that we have envisaged, the Government should begin the action soon. The project will take at least 25 years, more likely 50, and cannot be rushed. Extensive public consultations take time if understanding and confidence are to be built up.

But there are other time-scales pressing on us. One I have already mentioned: it is the time-scale of

degeneration of the present surface storage facilities which will need expensive replacement after about 50 years. The second involves the future of nuclear power itself.

### **Future demand**

I believe that there is likely to be renewed demand for nuclear power during the next few decades, arising from global climate change and the realisation that alternative energy sources cannot deliver on scale or in time. If that should prove correct, the nuclear industry will be under very great pressure to show that they can first dispose of nuclear waste. That may well prove to be the determining factor in the future of nuclear power, and therefore of electricity production.

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# *The Hon. Secretary's news desk...*

## **Season's Greetings**

This year being special, may I wish all our members and other readers a happy and prosperous new century! As I noted at this time last year a new business plan will be needed for 2000 onward and this is gradually taking shape. Details are not yet ready for publication, however.

It remains for me, on behalf of Council, to thank all those who have given us their support over the past years and express our appreciation for the continuing interest of our Sponsor Members – Marks & Spencer, Unilever and United Utilities.

## **Environment Industry Yearbook Online**

Anyone seeking information on the UK environment industry can now access the newly re-designed online database of over 4,000 environment industry companies, at [www.eiy.co.uk](http://www.eiy.co.uk)

The aim of the Environment Industry Yearbook Online is to provide useful, relevant and accurate information for environmental professionals in the UK and those needing information about the UK environment industry. The new-look site now enables users to access the database easily, with search options available under location, activity and company name as well as the company

search categorisations.

Company details contained on the database include physical addresses and telephone/fax numbers, through to email and website hyperlinks.

## **Year 2000 subscriptions**

Early in the New Year members will be receiving their subscription invoices. Yet again, may I ask the not inconsiderable number of late payers to make a special effort and return their cheques early. Can you also please ensure that you use our new address: PO Box 16, Bourne PE10 9FB. The mail forwarding service from our old postal address in London is ending on 31st December 1999. Any cheques sent there are thus unlikely to reach us and your membership will not be renewed.

## **The CIWEM Chris Binnie Award for Sustainable Water Management**

The Chris Binnie Award was established by the CIWEM Council in July 1998 as a means of recognising excellence in the achievement of sustainable water management. The funds for the award have been generously provided by Chris Binnie, a Past President of CIWEM and deputy Chairman of Binnie Black & Veatch.

Submissions are invited for the 2000 Award. Entries may relate to projects, research or other relevant work. They should be in the form of six copies of a summary report of not more than five pages, plus related material and photographs if appropriate.

Sustainable water management can include water resources development, improvements in the sustainability of existing sources, management of demand including leakage reduction, water waste minimisation, adaptation of the environment to be more sustainable to water utilisation and such other subjects as the judges consider appropriate.

This is an annual award and the prize comprises a cheque for £500 to be used on a project related to the sustainable use of water, and a framed certificate.

Closing date for receipt of submissions is 1st February 2000. The presentation of the Award will take place at the CIWEM Annual Dinner to be held in April 2000 in London.

To make a submission or for further information please contact:

Sarah Penfold, CIWEM, 15 John Street, London WC1N 2EB. Tel: 0207 831 3110. Fax: 0207 405 4967. E-mail: [spenfold@ciwem.org.uk](mailto:spenfold@ciwem.org.uk) Website: <http://www.ciwem.org.uk>

**RAF**

# New members

The IES is pleased to welcome the following to membership of the Institution:

Mrs B. Aylott	Student, Swansea Institute of HE	Mr D. Lewis	Student, Swansea Institute of HE
Miss R. Begum	Student, Swansea Institute of HE	Mr P. G. Lynch	Student, Swansea Institute of HE
Mr S. L. Bunting	Student, Swansea Institute of HE	Ms J. Matthews	Student, Swansea Institute of HE
Mr G. Cuthbert	Student, Swansea Institute of HE	Miss N. A. McEnroe	Environmental Enforcement Officer London Borough of Newham
Miss R. A. Davies	Student, Swansea Institute of HE	Mr J. D. McNally	Environmental Technician Hyder Consulting
Mrs R. S. Davies	Student, Swansea Institute of HE	Miss S. E. O'Connor	Lead Auditor, BASEC Ltd.
Miss C. E. Eaton	Recent Graduate University of Surrey	Mr P. C. Okeke	Environmental Diagnostician
Mr A. L. Gonzalez-Navarro	Recent MSc University of Strathclyde	Miss C. M. Rees	Student, Swansea Institute of HE
Miss S. Grant	Student, Swansea Institute of HE	Mr S. S. Roberts	Client Adviser Global Risk Division, Marsh UK Ltd
Mr R. J. Greenwood	Software Engineer Electronic Data Systems Ltd.	Ms J. L. Rosser	Student, Swansea Institute of HE
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### Diary dates 2000

10 January	GP Committee	13.00
8 March	Education Committee	10.30
8 March	AGM and Council	13.30
10 April	GP Committee	13.00
5 July	Education Committee	10.30
5 July	Council	13.30
1 November	Education Committee	10.30
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