

Autumn 2005



SCIENCE IN PARLIAMENT

**State of the
Nation**

Plastic Waste

**Private
Finance
Initiative**

**Visions of
Science**



Airbus Launches the New A350

THE STATE OF THE NATION 2005

An assessment of the UK's infrastructure by the Institution of Civil Engineers



PUBLISHED 18 OCTOBER 2005

About the Institution of Civil Engineers

As a professional body, the Institution of Civil Engineers (ICE) is one of the most important sources of professional expertise in road and rail transport, water supply and treatment, flood management, waste and energy – our infrastructure. Established in 1818, it has over 75,000 members throughout the world – including over 60,000 in the UK.

About the report

The State of the Nation Report is compiled each year by a panel of civil engineering experts. The report's aim is to stimulate debate and to highlight the actions that ICE believes need to be taken to improve the UK's infrastructure. It has been produced since 2000.

This year, six regional versions of the State of the Nation Report – covering Northern Ireland, Scotland, Wales as well as the North West, South West and West Midlands of England – are being produced, in conjunction with the UK-wide publication.

For more information on the background to the State of the Nation Report, contact ICE External Relations:

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SCIENCE IN PARLIAMENT

The Journal of the Parliamentary and Scientific Committee.

The Committee is an Associate Parliamentary Group of members of both Houses of Parliament and British members of the European Parliament, representatives of scientific and technical institutions, industrial organisations and universities.

Science in Parliament has two main objectives:
a) to inform the scientific and industrial communities of activities within Parliament of a scientific nature and of the progress of relevant legislation;
b) to keep Members of Parliament abreast of scientific affairs.



Michael Dixon's NHM inspires public engagement with science, as our planet's future depends on a better understanding of nature. Robert Key says politicians must recognise that Britain's success depends on our scientists, technologists and engineers. Paul Wiles promotes identity verification using ID cards and the National Identity Register. Peter Davis's plastics are recycled or burnt to help close the energy gap. Graham Hearn's electrostatics sort waste plastics



into clean, single polymer streams, prior to melting and reforming. Lee Clayton's UK plastic recycling plant makes a profit and Roger Morton's research on novel plastic separation techniques reduces plastic disposal in landfill.

The Royal Society of Chemistry's Parliamentary Links Day is "the foremost scientific gathering in the Parliamentary calendar" according to the Prime Minister, while Hilary Benn unites scientists and policymakers in the fight against poverty and disease in Africa. Paul Chivers' industrial revolution replaces metals with composites in the Airbus A350 wing. Gordon Masterton presents the State of the Nation, with radical solutions for infrastructure problems. Visions of Science emphasise diversity of technique and mode of expression. Bill McGuire discusses early warning for tsunami that could prevent a hazard becoming a disaster. Lord Warner believes that PFI will underpin the NHS new build, while Allyson Pollock argues that PFI is built on sand. Aftab Khan's geophysicists are a declining resource requiring attention. The Committee is stimulated by a visit to the Genetics Knowledge Park, while Philippa Rogers develops the UK/Japan S&T relationship, John Freeman considers codes of conduct for weapons scientists, Michael Bode's Spaceport locates on the Mersey and Robert Freer engineers sustainable development. Following this edition I hand over the reins (ie chair of the Editorial Board) to Dr Brian Iddon, MP for Bolton South East. I have enjoyed my stint in charge of Science in Parliament immensely and I wish Brian every success. I also want to thank Annabel Lloyd and Peter Simpson whose hard work and inventiveness contribute so much to our journal.

Dr Douglas Naysmith MP
 Chairman, Editorial Board,
 Science in Parliament

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Front cover photo: A computer-generated impression of the new Airbus A350

The Natural History Museum: Inspiring public engagement with science

Michael Dixon, Director

At the Natural History Museum we believe the future of the planet depends on a comprehensive understanding of the natural world. We share knowledge, engage people's curiosity and encourage their enjoyment of the planet with a sense of responsibility for its future. Any organisation delivering such lofty ideals is bound to be complex and the mix of skills, facilities and endeavour enshrined by the Museum is rarely visible. The NHM is a world class collection of natural history specimens and artworks, a centre of scientific excellence, a learning resource, a place of public engagement with science, and an iconic building as well as one of the UK's leading visitor destinations. Our work also contributes to the delivery of strategic priorities of several government departments.

The Museum is a non-departmental public body (NDPB) and receives grant-in-aid from the Department for Culture, Media and Sport, supplemented by a range of income generating activities that are necessary to fund the activities we undertake. The biggest contributors are scientific grants from the Research Councils and other grant awarding bodies, retail and catering businesses for our 3.3 million visitors, a conference and events business utilising the buildings and gardens and consultancy services based on our scientific and exhibition design expertise, and many other activities also make profitable contributions.

Our Science Group is responsible for the curation of collections of over 70 million biological and geological specimens. Items are loaned for both research and exhibition purposes, with as many as 70,000 being offsite at any one time. Scientific staff publish over

500 peer reviewed articles annually and many are world leaders in their field. We also house about 70 PhD students, for whom there is co-supervision with scientists in UK universities, and MSc students on courses that we run jointly with Imperial College. Our scientists also provide access to information on the world's biological and geological diversity, principally through our library which probably holds the world's greatest natural history collection, and by providing identification for specimens collected worldwide. We handle around 45,000 enquiries annually from professionals and the public.

Our Public Engagement Group operates at South Kensington and Tring¹ and through outreach, touring exhibitions in the UK and overseas and our website, which attracts almost a million visits monthly. Annual visits have doubled from around 1.65m to 3.3m since the reintroduction of free admission in December 2001 and we have programmes to attract a more diverse audience. Over 95% of our visitors consider their experience good or excellent. We have established a design consultancy from our touring exhibition business that has worked on high profile, overseas projects and co-designed the UK pavilion at the Expo in Aichi, Japan this year. We also support primary and secondary school curricula and engage in organised educational activities with around 400,000 children annually.

Over 40 years ago the British Museum Act formally created the Natural History Museum as a scientific organisation with the public side run by the Public Services Agency. Nowadays our role in providing education, information and entertainment for our visitors



has taken on greater prominence, which is dependent on the extent and quality of our scientific work and the collections that we hold. We recognise that this must be relevant to the issues that concern the general public and provide evidence to inform public debate. Our Darwin Centre provides state-of-the-art conditions for storage of our collections and world-class facilities for our scientists and is used in bringing scientists and the public closer together. Visitors can see our scientists at work on our collections that are used to address new questions about the natural world and engage with them in interactive sessions that are web-cast on a daily basis.

Our public services are closely aligned to government policy. This includes our sponsoring department, DCMS, the DTI/OST 10 year framework for investment in UK science, the UK's obligations under the convention on biodiversity (CBD) overseen by DEFRA, the commitments to the next generation inherent in DfES policy and overseas capacity building via the British Council/FCO, with whose support. DCMS and the NHM are training the next generation of curators in post apartheid South Africa.

It is an exciting time to have taken over as Director. Our economic value to the taxpayer is proven. For every £1 invested, we generate £4 for the UK economy². The future of the Museum is also about inspiring the scientists of the future. We have been onsite in South Kensington for almost 125 years but our role has never been more relevant or necessary.

¹The NHM also operates the Walter Rothschild Zoological Museum at Tring

²Travers, T, Glaister, S and Wakefield, J (2003) *Treasurehouse and Powerhouse: An assessment of the cultural and economic value of the Natural History Museum*

A call to arms...

Robert Key MP

Deputy Chairman of the Parliamentary and Scientific Committee



Britain's future depends more than ever before on the success of our scientists, technologists and engineers. Historically, our influence in the world and our prosperity have always been greatest when we have stretched and exploited our intellectual and skills-based advantages in these fields of human endeavour.

It was neither the language of Shakespeare, nor our constitutional and legal arrangements, nor our Westminster model of democracy that caused the people from a group of small islands to rule an empire on which the sun never set and which became the fourth largest economy in the world. No, our global industrial and military might and wealth depended on our pre-eminence in science and engineering and on our financial acumen.

At the start of the twenty-first century we observe electronic engineering and manufacturing processes growing most strongly in China and the Pacific Rim, British university science departments closing, "hard" science subjects struggling in schools and universities because they are "more difficult" than new soft options. Bioscience companies and the research they sponsor are being forced to leave our country in the face of political extremism. All this, while our economy is increasingly dependent on wallowing in our past and on imported energy that we hope will see us through.

It need not be like this. It must not be like this. Parliamentarians can take a lead and make a difference. Of course, neither individual MPs or Peers, nor our Parties, nor the Government will all agree on policies as diverse and ethically difficult as human reproductive technology, energy sourcing, nanotechnology, genetic modification, or climate change. But there are two key ways in which Parliament can promote informed public debate and help our Government and our nation reach sensible policy conclusions.

For one romantic moment, I invite you to set aside the motives of the Party Whips in helping us decide how to vote (for they only act on orders and there is an urgent need to change the timid way all our political parties handle "science"). The truth is that very few of us go through the division lobbies with fully-developed intellectual analyses on the tips of our tongues, eager to justify our votes on stem-cell research or GM crops to our local papers and radio stations.

Along the way we will have been lobbied by postcard campaigns and Early Day Motions promoted by self-justifying single-issue pressure groups and perhaps by a score of serious constituents acting from deep conviction. Please spare me the MPs who tell us their postbags have been groaning with hundreds of letters supporting the way they will vote anyway! I think only once in 23 years have I had more than 100 personal letters about any issue at all, including abortion and the Iraq war.

The first thing each of us can do in debating policy options, in scrutinising legislation and in deciding how to vote is to understand and to properly assess risk. You don't have to be a scientist to do that. But it makes a mockery of science and of logic if we ignore or distort the nature of risk. Is anything at all risk-free? I doubt it. Yet gullible public opinion and understandable prejudice are easily led by tabloid headlines and focus groups. But who is sillier – the consumer who won't shop at a supermarket if they sell GM food or Governments who tell us food containing up to 0.9% GM ingredients is "GM-free"?

Our second mission must be to ensure that policy is based on evidence – for science is politically neutral. Where an issue is overlain by moral or ethical considerations (as in the case of human reproductive technology) the decision on where to draw the line should be taken by Parliament as a whole, not by the loudest pressure groups nor by Whitehall Ministers. To be pro-science is not to be anti-green any more than good Greens are anti-science. Yet that is too often the assumption in the UK – but not, it seems, in Finland or France (new nuclear power stations) or the USA (commonplace GM products), where science is still respected and debate more rational. Are we Brits really any different? What has gone wrong? It is time for British politicians to take a lead, not run for cover when science is on the agenda.

Robert Key has been Conservative MP for Salisbury (which includes Porton Down) since 1983. He served in the Governments of Margaret Thatcher and John Major. In the last Parliament he was a Member of the Science & Technology Select Committee and until the 2005 General Election he was Shadow Science Minister. He is now a Member of the Defence Select Committee.

ID Cards and the National Identity Register

Professor Paul Wiles, Chief Scientific Advisor, Home Office



Introduction

The UK plans to move to the introduction of ID cards and the creation of the National Identity Register, subject to Parliamentary decision, with the aims of reducing the opportunity for ID theft, simplifying immigration procedures and supporting stronger verification of identity in the use of public and commercial services, both on- and off-line.

ID cards are not a new concept; indeed an ID card was introduced in the UK during the Second World War, and most EU countries have them. However, better ways of securing the card, both when issued and in use, are needed. Biometric technologies are already used with identity cards for these purposes in other countries such as Malaysia and Hong Kong. Also, ID cards using international standards are becoming available for the first time, and the proposed UK identity card could benefit from these and the experience of other countries.

The key components of the proposed ID cards scheme include:

- i) a strong enrolment process to ensure that the credentials supplied by the applicant have been checked thoroughly and that he or she has not attempted to enrol previously;
- ii) the creation of a National Identity Register (NIR) which will store basic personal information about the person in a secure manner;
- iii) the ID card itself which could be used as a stand-alone card for proving a citizen's identity; and
- iv) a verification service to confirm the identity of the cardholder or of the person whose biometric feature is registered on the NIR.

A number of technologies are required to ensure that the ID card operates in a robust way over many years of use. These include long-lasting material from which the card is made, a secure electronic data link between a card and the reader (eg by a contactless method such as in the new range of passports and in the Oyster card in use on the London tube), a Public Key Infrastructure which will ensure the integrity of the data stored in the card chip and finally, the application of

biometric authentication to assure that the user has only registered once into the NIR, and that in subsequent use for high integrity transactions, the identity of the bearer of the card is indeed correctly confirmed.

Biometrics

Biometrics may be defined as automated methods of identifying people using a physical, physiological or behavioural characteristic. Some methods have been around for a long time (fingerprints have been a key tool for police forces for over a century), while others have been introduced very much more recently (for example, iris recognition was proposed just over 20 years ago).

All biometric systems start with the stored image of the biometric, which is normally recorded at an enrolment session. Subsequent verification of an individual's identity relies on comparing a presented biometric feature with this initially recorded biometric, typically using a proprietary pattern-matching algorithm that compares the characteristic elements in that biometric image with similar features stored at the

enrolment. Because of the ever-changing ways in which people respond to the biometric terminal (for instance, they may smile or frown in a facial biometric system), this comparison will never be identical. Hence the need for a criterion for an acceptable degree of matching – the threshold value – which treads a fine line between security and usability. Allied to the selection of this criterion is a requirement to handle those exceptional cases where the individual hasn't quite been able to reach the threshold for acceptance.

The use to which biometrics are put affects the requirements put on the technology. For over a century, experts have compared the fingerprint marks left at the scene of crime with those obtained from previously arrested criminals. The collection of fingerprints on arrest involves a traditional ink and the rolled finger method with trained police officers guiding the fingers of the person to achieve the best impression. For the past 15 years or so, computer matching systems have been available to support the expert fingerprint examiners. However, a different approach is required for automated biometric systems. For example, optical imaging and even silicon chip sensors are used with the finger placed flat on a glass surface without the need to roll it from side to side. In many of these newer – biometric – systems the image is scanned to identify points where the individual fingerprint ridges either stop or branch into two separate ridges. The supplier of a biometric system will then use these 50-100 characteristic points (called minutiae) on each finger to create a template for that individual's fingerprint, and use proprietary

algorithms to make a comparison between the set of points picked out when the person first enrolled and those identified at the time when their identity is being checked. A matching score can be derived using information from more than one finger and a threshold set based on the risk analysis. Procedures are needed for those people with missing fingers, where the surface ridges have been scarred, etc.

Different biometric technologies provide varying levels of matching performance and are suitable for different uses. Indeed, more than one biometric method can be used to decrease the number of people unable to provide a satisfactory verification; for instance, iris and face recognition can support the use of fingerprint technologies. Iris recognition relies on specialised algorithms working on the fine detail in the coloured part of the eye, in a way that keeps the information constant in spite of the changes in pupil size following changes in ambient light levels. One of the main approaches for automated face recognition uses a merging of a number of base facial images to approximate the image of the individual's face; the percentage of each of the base images is adjusted to optimise the accuracy of the resulting image. Another approach focuses on distinctive groupings of features relating to specific regions of the face.

The proper application of biometric technologies is at least as important as choosing the correct technology – or mix of technologies. For example, a high quality user interface and an optimised capture environment is necessary to put the person at ease to ensure that the best image is obtained. Security issues need to be addressed so that the

biometric system will not accept plastic fingers with an impressed fingerprint or a photograph of a face. Of course, the needs of the elderly and disabled have to be taken into account as well.

Biometrics is an evolving field and we must be aware of what the future may hold for biometric technologies. Although the underlying biometric technologies are mature, commercial systems are constantly being improved with developments in increased usability, higher security against spoofed artefacts, and refining the underlying algorithms. For example, in facial recognition, three-dimensional imaging may reduce the impact of subjects not facing straight-on towards the camera. A key theme of much of this development is in fusing the results from more than one approach, whether it is just in taking two fingerprints or adding the scores from separate iris and fingerprint systems to give more confidence to the verification process.

Summary

Biometric authentication is at the heart of the proposed ID cards. Should the legislation be approved by Parliament, people in the UK will have a method of confirming their identity in a secure manner. The biometric technologies which are under consideration, using face, fingerprint and iris recognition, have been developed over several decades, although improvements are constantly being made. The key, however, will be to ensure that these are introduced in a standards-compliant system, which is secure, easily used by the vast majority of the population and in applications that provide clear benefits to the citizen, the foreign visitor and public and commercial organisations.

MEETING OF THE PARLIAMENTARY AND SCIENTIFIC COMMITTEE ON MONDAY 11TH JULY 2005

Plastic waste can be recycled and re-used almost indefinitely or could be incinerated to provide up to 17% of our requirements for electrical power, thereby reducing damage to the environment and the need for landfill, which is much more stringently regulated and is filling up very rapidly. There is currently no alternative on the planners' horizon to a very greatly increased reliance on waste recycling if we are not going to be buried in rubbish.

Plastic Waste: Toxic Rubbish or Strategic Resource?

*Peter Davis OBE,
Director General, The British Plastics Federation*



This presentation demonstrates that used plastics are a strategic resource that has a life extending beyond their first use. This overview of our Federation shows how much plastic is produced and the very wide range of applications to which it can be put. A summary is also presented of the British Plastics Federation's views on the priorities for recycling and recovery of used plastics.

The British Plastics Federation (BPF) evolved from the British Plastics Moulding Trade Association (1929-33) and was founded on 21st December 1933, in the same year that an ICI scientist called Gibson discovered polyethylene. This was the starting point for the plastics industry in the UK as a commercial enterprise.

The BPF has a shared-cost approach to managing the national plastics industry. We have over 300 member companies with a wide range of commercial activities related to plastic manufacture, ranging from raw materials and additive producers to plastics processors and distributors and machinery suppliers and recyclers. We also have 20 Business Groups

and four Market Sector Groups. A brief statistical overview (see page 12) shows the scope and range of the UK plastics industry, and demonstrates the importance of this sector to the national economy.

Resource Efficiency of Plastics

Plastics are extremely resource efficient and make very economical use of the world's oil production. For example, only 4% of this is used for plastics production, whereas 86% is used for transport and heating. Over the past 10 months plastic material prices have increased by 50-65% as they are directly affected by increases in oil prices. In May 2005 the London Metal Exchange opened a Futures Market in two plastic materials PP and LLDPE. Plastics confer major environmental benefits. They are both durable and lightweight, which minimises waste and helps to save energy in several different ways since the cost of energy used is less than 3% of the cost of a manufactured product and in making transport more energy efficient, for example. The use of 100kgs of plastic in a car to replace heavier materials saves 750 litres of oil over the lifetime of the vehicle.

However, although plastics are taking weight out of cars and thereby providing the potential for more miles per gallon in fuel economies, car manufacturers are adding weight in the form of extras such as air conditioning, electric windows and MP3 players. Plastics packaging prevents wastage by keeping food fresh. Consumers are more upset by spoilt food than they are by over packaging.

Plastics Recovery: Waste Management options

Plastics can be recovered either as material or as energy with five possible options for their ultimate disposal: recover the energy as recycled materials; recover the energy as energy; recover the energy as material and energy; compost biodegradable waste – losing the energy to the environment; and landfill – burying (and losing) the resources.

Landfill is the worst possible option as used plastics are a valuable resource that should not be wasted in this manner. In the UK only 9.3% of recovered plastics are recycled, with only 7.7% used for recovering energy. The equivalent average figures for Western Europe

are 16.5% and 22.5%. In 1985 only 84,500 tonnes of plastic packaging was recycled. Following implementation of the EU Packaging Wastes Directive, this rose to 344,243 tonnes in 2004. We still have a long way to go. The possible recycling methods available for plastics include the following: mechanical recycling; chemical recycling; feedstock recycling; organic recycling (composting); and energy recycling.

Several examples of important areas of plastics recycling are briefly summarised here.

Expanded Polystyrene Recycling

The BPF's Expanded Polystyrene Packaging (EPS) Group is working with Original Equipment Manufacturers (OEMs) such as Panasonic and Hitachi and retailers such as Comet and Dixons to take material back and reuse it. Recycling fish boxes is more challenging due to contamination. We are planning to work with major supermarkets in future. See www.eps.co.uk and www.bpf.co.uk for more information.

Bottle Recycling

There has been a 100% increase in the past two years with 10.5% of bottles (48,000 tonnes) collected from the household waste stream – 68% from the kerbside and 32% from return schemes. Collection facilities for plastic bottles are offered by 73% of all local authorities who also benefit financially.

Bio-plastics/Biodegradables

These are increasingly fashionable and some retailers have adopted them. They are not the correct solution for products such as pipes however. Claims made for the products need to be checked and bio-degradables can contaminate plastics recycling streams.

Farm Plastics

The Government is currently focusing on agricultural waste, including plastics waste such as silage film, in order to implement a European Directive. 162,000 farms generate one tonne of plastics waste a year. Currently this is stored, burned or buried. The BPF is involved with the Government in

looking at a national mandatory scheme associated with local delivery, for the collection, recycling and recovery of farm plastics. This presents both logistical and economic challenges!

The Markets for recycled plastics in the UK

Some typical uses for recycled plastics material are: pallets; underground storage tanks; drains; film and bags; fabrics and fibres; garden furniture; office furniture, stationery; road barriers and cones; and street furniture. Many more applications are under development.

Energy Recovery – an urgent UK need

The BPF believes used plastics should not be landfilled as they are a valuable resource. When used plastics cannot be economically recycled with environmental benefits they can perform a valuable role as feedstock in mixed waste for energy from waste incineration. The UK lags far behind Western Europe in energy recovery capacity and in its attitude to energy recovery. The UK has only 19 Energy-from-Waste incinerators for a population of 60 million, whereas Denmark has 32 for a population of only 5 million. "Nimbyism" in Denmark is directed at landfill as it produces methane and can pollute groundwater. The City of Copenhagen landfills only 4% of its waste whereas London landfills over 80% and landfill tax is increasing. London faces a looming crisis since many of the landfill sites it currently uses for waste disposal, particularly in Essex, will close in 2007. The Mucking landfill alone takes 15% of London's waste, about 650,000 tonnes. Its closure will generate 100 extra lorry movements a day, taking the waste elsewhere.

The DTI Secretary of State has recently reopened the public inquiry into the Belvedere Energy-from-Waste Incinerator on the Thames, after the Inspector had given it the green light to proceed. This delay is frustrating when London urgently needs about eight more Energy-from-Waste incinerators in addition to the

current two. The Mayor of London wants 80% of London's waste managed within its boundaries by 2020 rather than having to export it. This target is completely unattainable without major increases in both recycling and energy recovery.

Dispelling the myths on energy recovery

The European experience shows that increasing the energy recovery capacity does not prevent recycling rates also increasing, as waste is thereby diverted from landfill. UK plastics recyclers are much more threatened by the export of plastic waste to China. Energy recovery does not cause pollution or emit dangerous levels of dioxins. There is stringent Environment Agency control of energy recovery plants and dioxins have an air emission limit of 1 nanogram per cubic metre, equivalent to existing background dioxin levels in urban soils. The annual dioxin emissions for all UK incinerators are one tenth of the dioxins released from bonfires and fireworks on Guy Fawkes night.

Energy Recovery – growing support

The UK is now a net importer of energy with shortages predicted if we have a hard winter. The Institution of Civil Engineers and the Renewable Power Association in a joint report in April 2005 said that half of the 30 million tones of household rubbish sent to landfill in England could be incinerated and generate enough power to light 2 million homes each year. By 2020 17% of our electricity needs could be generated by energy recovery. Energy recovery provides clean, renewable power, and reduces demands on fossil fuels. Used plastics are "frozen fuel" with a higher calorific value than coal.

In conclusion, used plastics are a strategic resource and should not be landfilled but be recycled. However, if it is uneconomic or impossible to recycle for environmental reasons, the energy should be recovered by waste incineration.

Techniques to Identify, Sort and Recycle Mixed Plastics Waste

Graham Hearn,
Wolfson Electrostatics, University of Southampton



Introduction

The importance of effective, practical and economically viable recycling of consumer products and industrial materials is widely recognised. The proliferation in everyday life of plastics in their various forms, including mouldings, fabrics, packaging materials and films, presents a particular challenge in respect of recycling. In many products plastic often constitutes the largest single mass of material. A crucial stage in recycling plastics is identification and if possible the sorting of waste plastics into clean single polymer streams. This is important for the following reasons:

- Different polymer types are often incompatible in remould/re-extrusion
- Specific plastics are chosen for their mechanical/physical properties
- Toxic and banned additives may be present in some plastics eg BFR, Heavy metals
- Pure polymers command higher prices

If separation cannot be achieved prior to melt and reforming, the effective recycling of materials cannot be undertaken. In recent years the need to identify, sort and stream plastic waste has been given extra impetus by directives such as "End of Life Vehicles" (ELV) and "Waste Electrical and Electronic Equipment" (WEEE).

Two of the most successful techniques for plastics identification

are spectroscopy and electrostatics. The spectroscopic system uses the fact that wavelengths in the infra-red region are absorbed differently by different polymers giving each plastic a unique fingerprint. The electrostatic technique measures the magnitude and polarity of charge generated by the plastic and how quickly it decays from the surface. These techniques complement each other: the system based on spectroscopy gives precise identification but is relatively complex and expensive whereas electrostatics provides a cheap and simple means of streaming basic polymer groups.

Waste packaging

During 2000-2002 the Onyx Environmental Trust sponsored a project at Southampton University to develop an automated pilot-scale system using electrostatic techniques to identify and separate different species of plastics from a mixed waste stream. The objectives were to:

- Separate plastics from non-plastics (cardboard etc)
- Segregate different polymer groups
- Identify presence of toxic and banned substances
- Simple reliable technique and suited to automated line
- Handle the required throughput
- Handle variations in size, differences in shape, contamination, moisture, labels etc.

The pilot rig features a conveyor belt which can be loaded with mixed packaging materials such as plastic bottles, food tubs etc. Plastics are first separated from non-plastics by measuring charge decay time (natural materials such as paper, cardboard and wood exhibit a much faster charge decay rate than plastic). The five main plastics found in packaging; polyethylene (HDPE), PET, polypropylene, PVC and polystyrene are then streamed using a phenomenon known as "triboelectrification" (derived from the Greek verb *tribo*: to rub).

Triboelectrification describes the electrical charge that is generated when two unlike surfaces are brought into contact and then separated, for example the sole of a shoe and nylon carpet. Positive (+) charge is generated on one surface with negative (-) charge on the other. Depending on their position in the triboelectric series (fig. 1), polymers have their own natural electrical characteristics with some tending to + and others -. When the unknown plastic packaging is brought into contact with a triboelectric probe then depending on the probe head material and the polarity of the static charge produced, the unknown plastic may be identified. A mixture of polyethylene (PE) and polypropylene (PP) for example, which are incompatible polymers in recycling, can be distinguished between using a probe with a PVC head because PE charges + and PP charges -.

Positive End
Polyamide (Nylon)
Polycarbonate
PMMA (acrylic)
ABS/PS.HIPS
<i>Metals</i>
<i>PBT</i>
Polypropylene
PVC
<i>PVDF</i>
Polyethylene
PTFE (Teflon)
Negative End

Figure 1. Triboelectric series containing some materials of interest in recycling. The materials in bold italics are metals and speciality plastics which have been investigated as probe head materials.

Waste electrical & electronic equipment (WEEE)

The European WEEE directive requires certain percentages by weight of all categories of domestic electrical equipment to be recycled. In many cases this involves dismantling of equipment followed by identification and segregation of plastic parts – primarily casings.

Wolfson Electrostatics latest project is in collaboration with the Hampshire Natural Resources Trust and others to produce the UK's first WEEE recycling plant in which plastics are fully characterised. In order for this to be successful, rapid identification of basic polymer types and the presence of brominated flame retardants and other contaminants and banned substances is essential. This is currently being achieved by a combination of the techniques described below.

Tribopen

The use of the electrical or electrostatic properties of a material as a basis for identification and sorting was pioneered at the University of Southampton some years ago. The Tribopen was originally developed at the University with the sponsorship of the Ford Motor Company and uses electrostatic techniques to divide materials into two streams. It is

simple in operation, relatively inexpensive to produce and has a number of proven and potential applications. The Tribopen won a Millennium Products Award from the UK Government in 1999.

The Tribopen, which is currently commercially available, is essentially a small battery-operated hand-held device which, when rubbed across the surface, will distinguish between two different plastic types. It indicates the plastic type by illuminating a small red or green light. It has a single detachable sensor head that can be simply removed and replaced and choice of sensor will depend on the plastic materials to be identified. A typical application would be to separate a mixture of three unknown plastics, say polyethylene (PE), polypropylene (PP) and ABS into three individual streams. In this case, two pens would be required. The first pen could be used to pick out PE (PE giving a red light and PP and ABS giving green). A second pen (with a different sensor head to the first) would split PP and ABS. If there are four unknown plastics in the initial stream then three pens will be required, and so on.

Obviously if a large number of unknown materials are present in the initial stream, the Tribopen application becomes impractical and a device such as the PolyAna (see below) may be more appropriate. Picking out a single material, such as PVC, from a variety of unknown plastic types would require just two single pens or a double-headed pen (a design for a double-headed pen is under consideration).

PolyAna

Like the Tribopen, the PolyAna plastics identification system was developed at the University of Southampton in a collaborative project funded by the Ford Motor Company some years ago and also won a Millennium Product Award from the UK Government in 1999.

The key to the PolyAna is an optical cell design and front-end software that enables a laboratory spectrometer to be used on an industrial recycling line by non-technical personnel. It can be used

on large items (eg car panels) and small objects down to about 10mm. The 3-second measurement is non-destructive and does not usually require modification or treatment of the sample in any way. The optical cell design directs the IR beam to the sample by means of a series of mirrors. The computer then compares the spectrum of the reflected light with a database or "library" of pre-programmed spectra stored within the computer. Different libraries are available for different applications, and can be easily set up by the user in order to deal with specific materials of interest. This technique has also shown promise in the detection of brominated flame retardants in waste electrical and electronic equipment (WEEE) which are currently being phased out in the EU.

An important aspect of the PolyAna technology is that it enables the user to develop custom databases. This is critically important for the recycling industry because more often than not recycled materials are not pure polymers and a custom database is essential.

Sliding Spark

This instrument is essentially a more sophisticated derivative of the old-fashioned burn and sniff techniques used some years ago as a crude identifier of polymers. A high energy spark is used to burn the surface to be identified. This is done by means of a hand-held probe but may be used with an automated probe. The fumes from the burnt surface are then transferred by means of a vacuum line to a spectrometer chamber where they are analysed and the material under test identified. The primary use for this instrument on a WEEE recycling line is for detection of banned or potentially hazardous materials such as PVC, heavy metals and brominated flame retardants.

Further information on the activities of Wolfson Electrostatics can be found on the web at www.soton.ac.uk/~wolfson. Email: wolfson@soton.ac.uk

Used plastic – resource for the future

Dr Roger Morton, Director, Axion Recycling Ltd

Axion Recycling Ltd (www.axionrecycling.com) was founded in 2001 to develop new projects in the waste recycling sector. Since then Axion has developed a process design for pyrolysis of mixed waste plastics to produce a hydrocarbon liquid fuel – "Plasoil" and has conducted a great deal of self-funded research and development of novel plastic separation techniques. The business has also carried out consultancy work in related sectors. Clients include:

- UK PVC Recycling Consortium - practical trials of novel recycling methods and implementation of the Recovynyl PVC recycling initiative for the UK PVC industry.
- Hampshire Natural Resources Trust – an ongoing, practical pilot project to test de-manufacturing and separation processes for small WEEE items.
- Stockport Council - kerbside collection trials for mixed plastics from 1800 homes and tests of advanced separation processes for mixed household waste plastic.
- WRAP – major project to develop a process to extract brominated flame retardants from WEEE polymers.
- Greenergy Fuels – practical trials and business planning for production of biodiesel from a range of waste and new feedstocks.

Axion is currently developing a plant of its own to process waste electrical equipment plastics in Sheffield.

This paper is based on Axion's practical experience of plastic recycling in the UK. It makes the political and environmental case for

recycling a wide range of sources of waste plastic in the UK and provides pointers for how legislators can change the way they work to encourage investors in this sector.

People hate wasting plastic

Politicians are well aware that most people in the UK really dislike throwing away plastic.

Axion recently conducted large scale segregated kerbside plastic collection and separation trials in collaboration with WRAP (www.wrap.org.uk) and Stockport Council. As part of these trials we conducted a survey of the residents in the target collection areas. Participation in the survey was very high and the overwhelming response (99%) of residents was that they would be prepared to segregate their plastic for collection on a permanent basis.

Anecdotal evidence indicates that similar opinions prevail regarding other sources of waste plastic such as electrical equipment and construction.

There is plenty of it

There is a huge amount of valuable plastic going to landfill in the UK. Axion's estimate of the recoverable quantity is:

Waste source	Recoverable plastic in the UK (te/yr)
Electrical equipment	300,000
Construction	200,000
Vehicle and related waste	200,000
Household waste	900,000
Total	1,800,000



Recycling plastics is complex

There are many different types of plastic and most are not compatible with each other. They contain a wide range of additives and colours. Some of the additives used in older products are no longer permitted in new items.

Complex separation processes are therefore required to separate plastic from other materials with which they are often combined such as metals, wood and paper and then to separate within the plastics by polymer type and additive content or colour.

These technologies are developing rapidly. It is now technically feasible to recover and separate most sources of waste plastic in their original form at reasonable cost without resorting to incineration or other thermal techniques.

Life cycle analysis

Mechanical recycling is separation and purification of plastic particles without changing their chemical form by incineration or other chemical transformation.

Life cycle analysis demonstrates that for the great majority of plastic products mechanical recycling is by far the best environmental option. An environmental impact comparison was completed recently for Axion and WRAP by Huisman Recycling Research in the Netherlands. Huisman compared

the environmental impacts of a range of disposal and recycling options for plastics from waste electrical equipment that contain brominated flame retardants. These options included solvolysis, mechanical, feedstock, incineration and landfill and confirmed mechanical recycling as the best option.

Although recycling processes for plastic create some environmental impact themselves (unlike landfill where plastic is assumed to have minimal environmental impact because it does not degrade) the fact that they create useful material which can substitute new polymer saves all of the environmental impact of creating that new polymer.

People are doing it in the UK

There is already a vibrant plastic recycling sector in the UK. For example 40,000te/year of rigid PVC is recycled in the UK. However, with a few notable exceptions, the existing recyclers concentrate almost exclusively on scrap from industrial processes.

It would be a relatively small step for these recyclers to move into reprocessing dirtier, more co-mingled materials such as household plastic or waste electrical equipment. They are deterred by a combination of legislative factors which could easily be solved with a bit of political will.

Firm action needed from legislators

The basic legislative framework for encouraging plastic recycling in the UK is already in place. It is just not working effectively. The following legislation is most relevant:

- Landfill Directive
- Packaging Waste Directive
- End of Life Vehicle (ELV) Directive
- Waste Electrical and Electronic Equipment (WEEE) Directive

Legislators in the UK need to enforce this legislation much more boldly, consistently and firmly than they have to date. If they do, existing plastic recyclers will quickly develop the confidence to invest in the technologies required and the UK sector will quickly become the pride of Europe.

J F C Delleve Plastics Ltd

Lee Clayton, General Manager

I am the manager of the UK's only commercial scale plastic recycling plant. The company is primarily in business to make a profit for our shareholders from our expertise in processing plastic waste. However, in order to do so we have to be internationally competitive due to the flourishing offshore market for plastic waste with which we must be able to compete effectively.

I am also personally responsible for the following activities: management of the plant, development of new processes, material procurement, overview of Government legislation, product sales from the St Helens plant and polymer utilisation.

The present company was originally called Reprise Ltd and as a result of a recent development involving the relocation of the factory in St Helens costing £4 million, it became the first plant in the UK to recycle polyvinyl chloride (PVC), polyethylene terephthalate (PET) and high-density polyethylene (HDPE) bottles. However, the plant is still underfunded and underdeveloped with respect to the rest of Europe. In the UK 450,000 tons of bottles are produced annually but only 45,000 tons are collected, resulting in wastage of plastic raw materials. This is an indicator of the potential for expanding the business in the UK.

A new partnership project costing £3.5m over three years has therefore been developed with the Waste and Resources Action Programme (WRAP) with the objectives of improving the efficiency of sorting. This enables the plant to handle mixed waste streams derived from waste collections which are now changing to mixed plastics. The new sorting procedures are less labour intensive, are more accurate than and twice the speed of manual sorting and include a new bottle sorting and washing plant.

The capacity of the plant is 20,000 tons per annum and the primary feedstock is mixed bottles. The materials processed include segregated HDPE and mixed bottles. The plant produces feedstock such as PET flake and coloured HDPE flake, with products made from feedstock such as PET non-woven fibre and natural HPDE compound.

The demand for recycled plastics is 7000 tons per year for HDPE pipe and 2000 tons per year for HDPE compound, 6000 tons per year for clear PET flake and 2000 tons per year for multi-coloured PET flake. New recycled products for 2005 include bollards, decking and fencing.

So why do we recycle? The economic benefits are clear: cheaper feed stocks are obtained, competitive advantage is gained, and end-use manufacturers are not at the mercy of resin producers. In addition there is a legislative drive from Government on green procurement and businesses that fail to recognise this will lose out.

The public benefits of the St Helens plant can be briefly summarised as follows. The plant provides a convenient UK-based facility as a practical alternative to export for Local Authorities. It is the only plant in the UK equipped to process batches of mixed bottles thus reducing the need for prior segregation of waste streams. There is increased throughput of segregated materials, and for manufacturers a 50% saving on costs of primary raw materials. It also provides an alternative source of supply for other manufacturers of recycled products.

An outline specification of the St Helens plant provides some idea of the economic and social importance of this activity in helping to reach UK and EU eco-environmental targets at the same time as running a profitable business from a site with a relatively small footprint.

The annual throughput is now 20,000 tons of mixed bottles. Forty staff are employed to maintain the continuous operation of the plant for 24 hours a day, seven days a week, which is the target for 2005. The whole plant covers only 100,000 square ft. It is fully registered as a site for handling domestic waste. It is also certified to ship processed material to the Far East and is registered with the

Environment Agency to issue Packaging Waste Recovery Notes (PRN'S). These are designed to ensure that industry takes full responsibility for packaging wastes generated as a result of their commercial activities.

The achievements of Delleve so far include the diversion of 1000 tons of bottles from export to the UK for processing here; 120 million bottles have been converted into products

sold in the UK; 15.2 million bottles have been imported from Europe for processing here to compensate for the shortage of plastic waste resulting from export of UK bottles to the Far East. This is a successful business doing a valuable job in reducing waste delivered to landfill which is increasingly restrictive, and in helping to maximise the re-use of valuable and expensive raw materials.

In discussion the following points were made:

The UK has now become a net importer of energy for the first time, hence plastic waste could provide a source of high quality fuel to help fill the gap. Plastic waste can be mixed with lower grade waste to provide an effective fuel for incineration. Battersea Power Station could become London's incinerator. Dioxins generated from plastic incineration are only one tenth of the amount generated on Guy Fawkes night. This view was vigorously contested as a dreadful waste of a valuable resource. It might soon be economically desirable to commence mining landfill to recover polymers, methane and plastics. Plastic waste should be buried as remanufactured pipe having 100 years of useful life, not as rubbish. It is a finite resource and just takes some effort to process.

So what do we do now? More recycling should be encouraged, aided by identification of the plastic type used at the manufacturing stage to enable better separation of waste streams. The current practice of exporting most of this product overseas may solve the problem of disposal for local authorities, but may not be in the longer term national interest. Fraud has impacted negatively on the market for waste. Post-consumer plastic waste is a strategic resource with many valuable end uses.

UK Plastics Industry basic statistics			
Material processed	4.8 million tonnes		
Processing sales turnover	£13.6bn		
Value of direct exports	£3.6bn		
People employed	190,000		
Total number of firms	over 5,000, most very small		
UK Plastics Consumption by Market Sector			
Packaging	36%		
Building & Construction	23%		
Electrical & Electronic	11%		
Automotive and other transport	8%		
Furniture	5%		
Leisure	4%		
Housewares	3%		
Agriculture	3%		
Medical	2%		
Mechanical Engineering	2%		
Clothes & Footwear	1%		
Others	3%		
UK Plastics Consumption by Polymer Type			
ABS	235kt	PET	235kt
EPS	57kt	PP	764kt
HDPE	544kt	PS	260kt
LDPE	1002kt	PVC	777kt

Overview of UK Plastics Industry – the British Plastics Federation (see page 6)

Blair Praises "Thriving" Links Day



The PM speaking from the podium at Links Day

On Wednesday 22nd June the Prime Minister, Rt Hon Tony Blair MP, praised the Royal Society of Chemistry's Parliamentary Links Day as a "thriving all-party occasion" which he had been "delighted to attend" during exchanges in the Chamber of the House of Commons at Prime Minister's Questions.

The day before the Prime Minister had attended the annual Parliamentary Links Day in Parliament which was co-hosted by Dr Brian Iddon MP and Dr Andrew Murrison MP.

The theme was Science and the G8 Agenda which concentrated on the Government's twin priorities of Climate Change and Africa at the G8 Summit.

"Science will be particularly important in dealing with killer diseases in Africa," said Mr Blair at the Despatch Box "and the science and technology behind dealing with climate change is also crucial."

He added: "That is why it is so important that science forms a strong part of what we do in the G8" and on this point all the UK science community agreed with him.

PM's Unprecedented Appearance

The Prime Minister's appearance at Links Day, introduced by Dr Brian Iddon MP, was unprecedented and the Attlee Suite was overflowing with MPs, Peers and scientists.

Dr Iddon thanked the RSC for its leadership role in Parliament and observed that no sitting Prime Minister had addressed such an

audience of Parliamentarians, scientists and engineers in the House itself in a generation. From the very start it was standing room only.

For his part the Prime Minister praised Links Day calling it "the foremost scientific gathering in the Parliamentary calendar." He added: "This theme you have chosen for this year – the contribution of science and engineering to our policy priorities at the G8 Summit in Gleneagles – could not be more timely. These two issues are, as you know, very important to me and to the government. But most of the problems faced by modern governments cannot be solved by governments alone. Tackling these issues also depends crucially on you: our scientists and engineers."



The Rt Hon Hilary Benn MP, Secretary of State for International Development

Science and Engineering Working Together

The Prime Minister's acceptance of the invitation to attend Links Day was recognition of the importance that this Parliamentary event now has for science and engineering.

The growing success of Links Day has enabled the most important scientific societies in the UK to work closer together. The Prime Minister himself recognised this when he thanked the RSC's "partner organisations".

Speakers this year came from the Institute of Physics, the Institute of Biology, the Royal Society, the Royal Academy of Engineering, and the Royal Society of Chemistry. Other organisations that have always given strong support to the event include the Campaign for Science and Engineering [CaSE].

"Science Teachers of the Year" Awards

The Prime Minister also presented awards to "teachers of the year" in physics, biology and chemistry to highlight their vital role:

"It is our teachers on whom we depend for inspiring, encouraging and training the next generation of scientists. Progress now depends on knowledge to a degree unmatched in any previous era. Unless we reward and value the people who transfer knowledge from one generation to the next we

will suffer the consequences in declining prosperity. And that is why I am delighted to be here, to recognise the excellent work that you have done."

The Prime Minister's contribution to Links Day followed that of the Secretary of State for International Development, the Rt Hon Hilary Benn MP, and preceded contributions from the Government's Chief Scientific Adviser, Sir David King, the Minister for Science and Innovation, Lord Sainsbury of Turville, and other distinguished scientists and engineers.

The Political and Scientific Contributions

In his keynote address Mr Benn spoke about the partnership of scientists and policymakers in the fight against poverty and disease – especially in Africa – and described some of the initiatives being pioneered by the Department for International Development. He paid tribute to the role of Dr Ian Gibson MP's Select Committee in the establishment of a Chief Scientific Adviser at DfID.

Mr Benn also emphasised the role of science in solving the problems that humanity faced and DfID's key role in building up the scientific capacity of countries to deal with them and concluded that the G8 represented a real opportunity to make progress.

RSC President Dr Simon F Campbell drew attention to the terrible death toll from malaria (which far exceeds HIV/AIDS) and drew on his direct personal experience as Chair of the Expert Scientific Advisory Panel of the Medicines for Malaria Venture which had built up a strong R&D portfolio of over 20 drug projects involving academic and industry partners.

The succeeding series of scientific presentations was begun by Professor Alan Thorpe, chief executive of the Natural Environment Research Council, speaking on behalf of the Institute of Physics. With 40 years' experience of weather models, he said, it can now be demonstrated unequivocally that the climate changes that have occurred can only be accounted for by including human activity and it is the developed world that has caused this problem. He said global warming in the first part of the 20th Century was mainly attributable to solar variation whereas in the latter part it was mainly due to increasing CO₂.

He was followed by Professor Monique Simmonds from the Institute of Biology who described the vital role of PROTA (Plant Resources of Tropical Africa) and other seed bank initiatives carried out at Kew Gardens. Examples of potential research and environmental applications include the loss of biodiversity in the dry sands of South Africa, and restoration following the impacts of mining in tropical West Africa where a detailed knowledge of plants is needed to help reclaim the land.

Dr Stephen Cox, Executive Secretary of the Royal Society, explained the joint initiative taken by national science academies of all the G8 nations (and other key countries like India) entitled "Joint science academies statement: Global response to climate change" which advocated the building up of scientific capacity, especially in Africa, to train its own scientists

and technologists and build its own scientific equipment.

Professor Ian Fells, speaking on behalf of the Royal Academy of Engineering, pointed out that by 2023, under present arrangements, there will be only one nuclear power station left in the UK. He made a robust contribution to the morning session advocating a nuclear component to the UK energy mix (as outlined in the Energy White Paper) as well as an increased emphasis on renewables as part of a concerted effort in CO₂ reduction. Concluding the scientific presentations Dr Andrea Jackson of the Royal Society of Chemistry and the University of Leeds used current research to describe the complexities of the carbon cycle in nature.

Sir David King concluded with a survey of the scientific debate on climate change and the narrowing areas of scientific uncertainty on the



Dr Andrea Jackson, the Royal Society of Chemistry

key issue of global warming caused by human activity and outlined the evolving process of international discussion on climate change – of which the July G8 summit was only one part. The February 2005 conference at the Hadley Centre in

Exeter demonstrated a large number of environmental impacts, such as plankton blooms, loss of cod off Scotland, and acidification of the oceans. The high temperatures from the 1940s and 1950s are now our average summer values.

Climate change creates further stress, such as life expectancy in Africa, which already has the lowest life expectancy in the world. And it is possible that climate change poses a greater threat to wildlife in Africa than poaching. Sir David also urged all scientific societies to work with the Chief Scientific Officers across Government Departments and with the Select Committees.

Dr Andrew Murrison MP, in winding up, praised the positive impact of such a high profile Parliamentary Links Day and the large number of MPs who had already signed Early Day Motion 328 which noted "the Society's continuing commitment to serve the public interest" by improving the access of all MPs to scientific information and a better understanding of science which its pioneering Parliamentary Link Scheme had been set up over 20 years ago to provide.

Meanwhile the scientists and engineers at this year's Links Day showed that they stand ready to help deliver the solutions needed to fulfil the ambitious G8 Agenda.



Sir David King, Chief Scientific Adviser

The advent of a new industrial revolution and the Airbus A350 wing

Paul Chivers, VP Head of A350 Wing, Airbus UK

A new industrial revolution is under way as composite materials increasingly replace traditional metals in engineering applications ranging from automotive to marine and construction to aerospace. The attraction is the increase in both strength and stiffness to weight ratios offered by composite or "non-metallic" materials.

Composites are produced from two or more materials, a "reinforcement" material brings the strength and stiffness to the composite, while the resin binds the reinforcement and transfers loads and often protects it from abrasion and impact.

This brings direct benefits in the form of: high strength to weight ratio; high stiffness to weight ratio; corrosion resistant materials; and impact resistant materials. These bring other indirect benefits by decreasing weight, for example, which increases fuel efficiency that has the potential to reduce running costs and aircraft noise.

Fibre reinforced composites were invented in the UK several decades ago. It would therefore be a regrettable industrial own-goal not to seize this opportunity to move into the "composite manufacturing age". Airbus' newest aircraft model, the A350, represents that opportunity.

Technology and innovation, as well as a market-led approach, are the foundation of Airbus' success as a European aircraft manufacturer, resulting in its current position as the world's leading aircraft manufacturer. Airbus, since its creation over 30 years ago, has been progressively increasing the ratio of composite materials in each new

aircraft model, whilst gaining direct operational experience. It has also played a key role in the research and development of these materials.

As Airbus' Centre of Excellence for wing design and manufacture, Britain, through Airbus UK, has studied the application of composites to wing technology and invested substantially in this field. The DTI supported R&D programmes since the mid 1990s involving many other British companies and specialist bodies that have provided advances and several "demonstrators". These include the study of structural properties and development of low-cost manufacturing and assembly of increasingly larger components. This led to the opening, earlier this year, of the Composite Structures Development Centre at Airbus UK's site in Filton, Bristol, which forms part of the UK's National Composites Network. The centre also provides capacity for use by other industries.

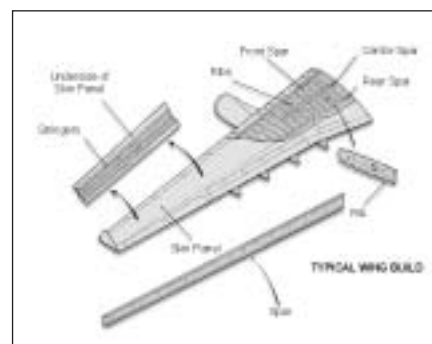
Airbus is preparing to introduce the new A350, available in two versions, for entry into service in 2010 in response to a demand from its customers for a new aircraft with more range and more seats than its successful and popular A330. The A350-800 will have a range of 8,800 nautical miles, typically seating 253 passengers in three classes and the A350-900 has a range of 7,500 nautical miles, seating 300 passengers, providing the efficiency and economic benefits airlines expect from Airbus. Flight deck commonality brings the crew training and operational efficiency of Cross Crew Qualification (CCQ) and Mixed Fleet Flying (MFF) and the aircraft will have significant

spares and maintenance commonality with the A330, whilst new systems will bring more savings in maintenance costs.

The A350 has surpassed expectations since marketing commenced some nine months ago, having already achieved commitments for 130 aircraft from eight customers. With A350 in its product range Airbus expects to win half of the market for 3,000 aircraft in the 250-300 seat aircraft category during the next 20 years. The A350 has 13 per cent more seats, more range, lower fuel burn per seat and lower Cash Operating Costs per seat than its competitor, Boeing's new 787. Early orders received by Airbus have reinforced the company's approach for long range aircraft for the future.

Airbus has been refining the design of the A350 since the start of this year and the aircraft will have 90 per cent new part numbers and 60 per cent of the structure will be of advanced materials, including composites, and third-generation aluminium lithium.

The A350 will be the first Airbus commercial airliner to have composite wings, marking a turning point from metals to composites. This is significant for Britain, the



Typical wing build

home of Airbus wing design and manufacture. Carbon fibre reinforced plastic (CFRP) will replace traditional aluminium alloy for the spars and upper and lower surface covers of the wings for the first time. This is a step forward in the application of composites to wings, where composites have previously been used mainly on the leading and trailing edges, with that application extended on the A380 where some of the ribs are of carbon fibre.

The A350 wings represent a springboard for accelerated development of new skills, techniques and expertise in composites and the application of many years of research and development work. The composite components will be made up of several layers of lamina plies with each ply orientated in a particular direction to give a structure optimised for strength, weight and stiffness. "Laying up" is performed with an automated tape layer, requiring minimal manual intervention whilst using unidirectional fibre impregnated with epoxy resin in a "soft" uncured condition.

When the lay-up is complete the component is cured in an autoclave using heat and pressure to produce a "hard" component. This process ensures that each ply is consolidated to produce a monolithic structure during the curing process. The component is then ultrasonically tested using a non-destructive test (NDT) that checks for flaws within the laminate. Some limited machining is then performed, if necessary, to trim the component to size and at interfaces with other components, so ensuring appropriate tolerances are achieved when the parts are assembled.

For the A350, each upper and lower cover will be manufactured as a single piece laminate with a span of 30 metres and a chord of six metres at its widest point. This will be the largest single composite structure ever manufactured for a commercial

aircraft and provide the lightest solution. The technology selected will use a two stage curing process due to the size of the component and to overcome the complexities of the wing surfaces that have double curvature. The first stage will produce a "hard" skin upon which stringers in a "soft" condition are then positioned. The second stage will cure the stringers to the skin in a process called co-bonding.

Each spar is C-section in shape and will be attached to the upper and lower covers using fasteners. The front spar is a single component with a 30 metre span from wing-box rib one to rib 39 and will taper from 1500mm at the root to 200mm at the tip of the wing.

The maximum takeoff weight (MTOW) for the aircraft will be 245 tonnes. This induces high loads in the Main Landing Gear (MLG) support structure in the wings; distributing the MLG loads into the covers and inner rear spar. Research and design trade-off studies have shown that when subjected to high input loads, metal structures currently offer the best solutions in these areas.

The wing also acts as a fuel tank and the mass of the fuel acting downwards offsets the air-loads acting upwards. This simple law of physics results in a complex trade between aircraft weight and lift for various points in the flight from take-off to cruise and landing. The A350 tank arrangement is optimised for the composite wing with a new wing fuel tank arrangement. This will consist of a tip-to-tip simple three tank arrangement, compared to the five tank arrangement on the A330.

The new wing is being investigated using extensive aerodynamic testing in a wind tunnel. This includes shaping the wing surfaces to optimise aerodynamic performance resulting in fuel-saving, which together with close-coupled GEnx engines and a wing droop nose device, similar to that used on the A380, will enhance performance



A350 Wind Tunnel Testing at Filton

and help to reduce the aircraft's noise footprint. In Britain the low-speed wind tunnel tests are conducted at Airbus UK in Filton near Bristol. The high-speed wind tunnel tests are conducted at ARA in Bedford.

The aircraft surfaces are optimised to cruise at Mach number 0.82 with flexibility to fly up to Mach number 0.85. This is achieved by introducing a new winglet and some re-profiling of wing surfaces, including a leading edge extension (LEX) combined with the droop nose inboard of the engine pylon. Whilst the droop nose was introduced to improve lift, the droop nose and LEX also decrease high-speed drag and reduce the fuel burn penalty from increasing the Mach cruise speed.

The A350 will create 10,800 jobs in the UK aerospace sector and a further 21,600 jobs in the wider economy from induced employment, with Britain playing a full and important role in the programme. As more composites replace metal in future aircraft and the application of composites increases elsewhere, the A350 wing represents a vital step forward in the development of composite industrial technology in Britain.

An assessment of the state of the UK's infrastructure by the Institution of Civil Engineers

Gordon Masterton, ICE Senior Vice-President



The Institution of Civil Engineers (ICE) is one of the most important sources of professional expertise in road and rail transport, water supply and treatment, flood management, waste and energy. Established in 1818, it has over 75,000 members throughout the world – including over 60,000 in the UK.

The 2005 ICE State of the Nation report will be launched on Tuesday 18 October. This annual examination of the UK's infrastructure is compiled each year by a panel of experts drawn from the various fields of expertise across ICE's membership.

This year, six regional versions of the State of the Nation report – covering Northern Ireland,

Scotland, Wales as well as the North West, South West and West Midlands of England – are being produced, in conjunction with the UK-wide publication.

The State of the Nation report is an opportunity for politicians and the public to join the debate about the future of the UK's infrastructure.

Civil engineers are thinking radically about the future of infrastructure, such as turning residual waste into energy and the introduction of road user pricing. The window of opportunity to effect remedies, repairs and renewals is rapidly closing, if society is not to suffer. Some of the key findings of this year's report include:

Transport

Transport has made little

improvement this year, since the quiet demise of the "Ten Year Transport Plan". Sustainable transport may have become better understood, but while the feelings of guilt and worry amongst the public may have increased, spending and decision-making by government has not.

Rail: Network Rail should be commended on the 16% reduction in delays due to infrastructure repairs and maintenance, but its reported underspend in 2004/2005 by about £800 million is worrying.

Roads: Congestion continues to be a major concern of road users in towns and cities across the UK, with delays occurring due to accidents and road works still causing the most frustration. The situation is unlikely to change while car journeys continue to rise and local roads across the UK need maintenance. Journeys on roads are increasing and congestion has to be tackled to create shorter journey times. It is time that a national debate on road charging begins in earnest.

Local Transport: Travellers have to be persuaded that their journey by public transport will be comfortable, affordable and seamless to shift away from our car-first culture. The report supports the encouragement being given to Passenger Transport Executives to improve the safety and security of local transport services, and the important part that integrated local transport is playing in Regional Spatial Strategies.



Sellafield, BNFL

Aviation: The last 12 months have seen air travel from UK airports continue its climb back to levels before 9/11. The steep growth is adding to the pressure for more runway capacity in all parts of the country but most immediately in the South East. Delivery of road and rail access infrastructure has continued to be hampered by funding and programming delays, threatening efforts to achieve a shift by passengers and airport employees onto public transport.

Seaports: British seaports are as essential to the national economy today as they have always been. 97% of the goods that enter and leave the country do so by sea. The current lack of deep-sea container ports in the UK is already forcing trade to northern Europe, making the goods we buy more expensive. We must start to regard planned new ports as parts of a national network moving goods in and out of the country and not purely as separate commercial entities without any effect beyond their immediate area. Concentrated in the south east, the new major ports will put enormous extra strain on the region's road and rail networks.

Water & Wastewater

The water we drink in the UK has never been cleaner or safer. But it is also becoming scarcer. Our water supply is being put under pressure by factors ranging from climate change, low rainfall and ageing delivery structure, to changes in the population, urban population growth and the increasing use of appliances such as power showers. The job of renewing the distribution network could take at least 200 years, even at today's unprecedented rate of investment.

Energy

Another year has gone by without any significant new generating capacity being built. Upgrades to the electricity transmission and distribution networks are taking place at a slow pace. As the UK becomes more dependent on imported gas, the prospect of the nation losing control of its energy supply, and with it a grip on prices and carbon emissions looms ever



Wastewater Treatment Facility, Bury, Greater Manchester, United Utilities/MHW

larger. The only real alternative is to invest very soon in a mixed range of domestic fuel sources, in which nuclear, clean coal and renewable power sources each play a significant part.

Flood Management

The total investment in flood management has increased significantly year-on-year, reaching around £560 million in 2004/2005. The target of providing improved protection to 80,000 properties in the three years up to the end of 2005/2006 is in sight. However, this still leaves many thousands more at significant risk.

Recognising the seriousness of the issue, the Government has invested heavily in recent years to repair and improve flood defences, widen coverage of flood warning schemes and produce new flood maps.

Waste

In this country, waste is seen as an end – a dead end – rather than a means. That view has to change. Waste is an energy resource, and at a time when the UK's own existing sources of energy are dimming, it could help fill the fuel gap, just as it is doing in other European states. National and local government need to assess the technical and economic scope for reprocessing and treatment facilities, and opportunities for communities and businesses to make best use of the resources these facilities produce.

Communities for the future

Affordability of housing continues to be a concern. In 1995, the average house price was three times the average annual salary. 10 years later, it is five-and-a-half times the average salary and out of the reach of most key workers. The Government's competition, as part of its Homes For All strategy, to design and build "the £60,000 house" is a step in the right direction, as is the decision to allow rural local authorities to set aside land purely for affordable housing to meet local needs.

Sustainability and the environment

A few more admirable initiatives, sound strategies and good intentions – that is as far as progress on sustainability has gone in 2004/2005. Although measures to put sustainability policies into practice are being felt, there has not been much evidence of cultural change at the level of individuals, communities and businesses. Changes to financial incentives can help, but there are obstacles barring progress that can only be broken down if everyone understands that they must play a part in protecting our health, quality of life and prosperity. The UK must overcome the "why bother" mindset to put sustainability at the heart of our infrastructure decisions.

The report can be viewed and downloaded at: www.uk-infrastructure.org.uk

For more information about ICE or the report, you can contact the ICE External Relations team on 0207 665 2151

VISIONS OF SCIENCE PHOTOGRAPHIC AWARDS

Diversity in Science

The winning images from this year's **Novartis and The Daily Telegraph Visions of Science Photographic Awards** are an extraordinarily diverse and intriguing set of images.

Not only is the subject matter of the winning images wide-ranging – including a view of a hatching mosquito, a close-up of salt and pepper, an artist's impression of a migraine attack and care of a premature baby – but once again the images have the ability to intrigue people with their unusual depiction of everyday occurrences and objects.

It is this ability to capture people's interest and attention through creative imagery that lies at the heart of Visions of Science.

Organised by Novartis, the competition is run with the specific aim of reminding viewers of the breadth, depth and wonder of science. Often, a caption is vital in finding out the story behind the captivating images.

Taken by entrants with a wide range of backgrounds, including professors, doctors, researchers, scanning electron microscopists, artists, photographers and students, we are given a privileged insight into their private worlds of research, discovery and creativity.

The images have been captured using many different techniques from state-of-the-art scientific and computer imaging, to standard and digital cameras, and it is this diversity of technique that allows us to see a view of science that perhaps we have never seen before.

With entry numbers up by 60 per cent this year to over 2,200, judging was as lively as ever, with fierce debate about some images – whether over the content, quality or impact value! As judge and television presenter, Adam Hart-Davis says, "The variety of subjects and styles was splendid and picking the winners was, as ever, extremely difficult, with judges noisily



Surface tension by Robert Anderson – Einstein Year Award - winner

The surface tension of water can support even a metal paperclip. By photographing it using a grill in front of the light source, the deformation of the water caused by the clip's weight can be seen.

Eggs by Dr Christian Laforsch – Art – highly commended

Each of these empty pockets once held a Culex mosquito larva. The eggs are laid in rafts on the surface of still water. Culex is the most widespread mosquito in the world, and can transmit several diseases.



championing a particular favourite photograph."

The creation of a set of such diverse images comes about in part through

the categories that people are invited to enter. The main categories encourage a view of science in various forms including:

Close-up, Action, People, Concepts and Art. Special awards include **Medicine and Life** and **Einstein Year Award**. A very popular new award, **Art meets Science**, was added this year, looking for photographs of artists' work that has been inspired by science – whether a painting, sculpture or installation. The judges were in agreement that the painting of a barn as seen during a migraine attack was a clear winner, produced by artist and migraine sufferer Debbie Ayles.

There were many new winning entrants this year, including Karen Neill, an artist in residence who produced a stunning image of "liquid crystals" from her work on mapping behavioural characteristics of fluid.

Past winners receiving awards again this year include David McCarthy, an electron microscopist (also the 2005 Overall Winner) for his fun image of "salt and pepper", which Adam Hart-Davis described as "delightfully simple – the sort of image that seems obvious when you've seen it, but none of us had."

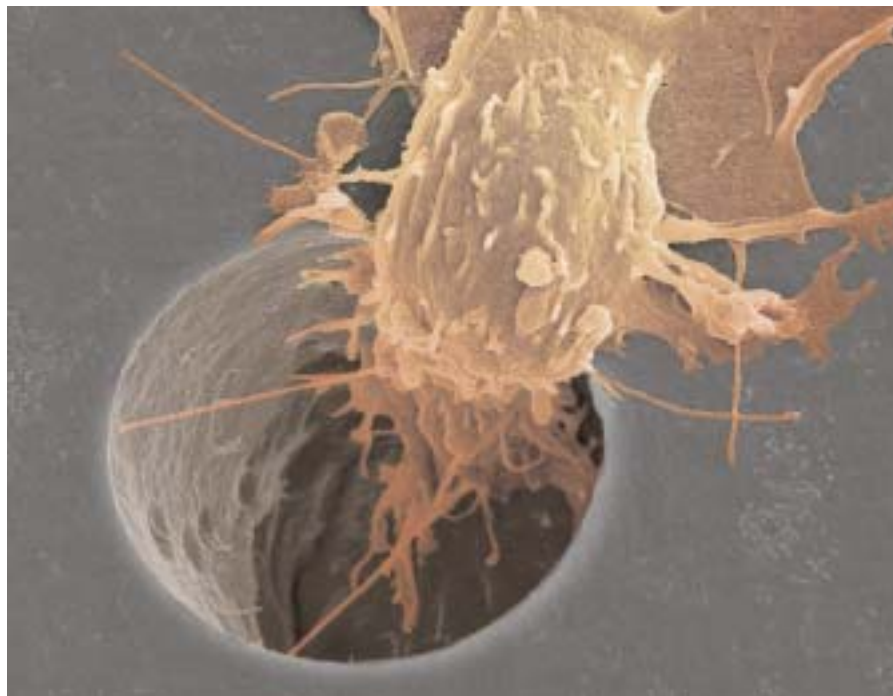
Anne Weston, Scientific Officer at Cancer Research UK, shows us a model of cancer cell migration across a matrix and in this case, through a pore in the filter. As Anne says, "The spread of cancer cells from the primary tumour to form metastasis is vital in the understanding of cancer and this image illustrates a cell in motion."

Amateur photographer Jim Greenfield is retired, and now spends much of his time capturing images of nature close-up, which is especially challenging under water. His "Cleaner prawn" image (on the back cover) really shows us science in action in the natural world.

As Subhanu Saxena, President & CEO of Novartis Pharmaceuticals says, "Visions of Science is one of the only public competitions to encourage links between science and the arts with the specific aim of stimulating public interest in

science. We are delighted with the continuing interest in the awards." Novartis organises Visions of Science as part of its ongoing commitment to science and health education. Every year, sets of the

winning images are produced, which tour science and arts centres around the UK. The main exhibition began its tour at the Science Museum, London on 29 September.



Cancer cell movement by Anne Weston – Medicine and Life - winner

Cancer cells can spread through the body in a process known as metastasis. This cancer cell is moving down a pore in a filter. The image was taken at Cancer Research UK.



Kangaroo care of premature baby – People – highly commended

Kangaroo care is a technique used to help premature babies. The baby is held so that it touches the skin on its parent's chest. This is thought to allow breathing and heart rhythms to be picked up, aiding their regulation in the infant.

Every year, Novartis organises a reception within the House of Commons, giving Members of Parliament a chance to see the images. Details of the reception will follow shortly.

For more information about the touring exhibition and the winning images visit www.visions-of-science.co.uk.

Warning of Catastrophe: the Way Forward

Professor Bill McGuire

Benfield Professor and Director, Benfield Hazard Research Centre,
University College London

More than anything else, the catastrophic earthquake and tsunami of December 26th 2004 taught us that an effective early warning system is a critical element in any package of measures designed to limit the impact of natural hazards and reduce the risk of disasters. At the very least, the existence of an effective tsunami warning system in the Indian Ocean would have provided coastal communities in Thailand, southern India and Sri Lanka with around two hours warning, slashing the estimated 300,000 death toll by at least a third. Combined with a programme of education focusing on tsunami risk, many thousands of lives could also have been saved in Indonesia, even though inhabitants of the worst affected parts of Sumatra would have had little more than 30 minutes to reach safety.

But what exactly is an early warning system (EWS)? Various definitions exist and the term means different things to different people. To seismologists, an EWS is a radio-based technology that provides several to a few tens of seconds warning, *after* an earthquake has happened, that seismic waves are on their way. This short, but vital, respite can permit – for example – the automatic shutting off of gas supplies, the switching on of hospital generators, and the opening of fire and ambulance station doors.

To most people in the hazard and

risk science business, however, the term early warning relates to a longer-term forecast or prediction that provides information about a hazard *before* it happens. Even this definition, however, fosters debate and disagreement. Does early warning relate to the identification of the potential for a particular hazard at a specific location, but without accompanying knowledge about when the hazard will be realised, or is it more specific? For example, a probabilistic prediction about a volcanic eruption two days ahead based upon monitoring data. In fact, both can be considered to be early warnings and both have a part to play in reducing the likelihood of a hazard translating itself into a disaster.

In relation to geological hazards, such as earthquakes, volcanic eruptions, tsunamis and landslides, the ideal EWS would comprise a number of different elements designed to provide information and warnings about future hazards at a range of time-scales.

Threat identification: The first element involves identifying potential threats capable of impinging upon the country or region in question. Such an exercise would pinpoint, for example, "seismic gaps", where major earthquakes are known to be due (northern Sumatra constituted such a gap prior to December 26th 2004), and explosive volcanoes where geological surveys or the historical record have revealed the

potential for another eruption soon. This largely qualitative or, at best, semi-quantitative analysis, however, would not provide any clear guidance on the likely timing of the next earthquake or volcanic eruption.

Probabilistic forecasting: The second element of the ideal EWS would zero in on those threats regarded as most serious. A combination of more detailed surveys of past activity and contemporary monitoring would be used to develop probabilistic forecasts of the timing and scale of the hazard under study. Current examples of such forecasts include a 62 per cent probability of an earthquake of magnitude 6.7 or greater striking the San Francisco Bay region by 2032, and a 32 per cent chance of a large earthquake affecting Istanbul in the next decade. Figures like this can work wonders in terms of focusing attention on disaster preparedness and the whole area of disaster risk reduction. The particularly worrying forecast for Istanbul, for example, has prompted a major initiative to ensure that critical facilities such as schools, hospitals and emergency response centres are able to withstand the expected levels of ground shaking.

Monitoring: The third element of an ideal geological hazard EWS would be an effective monitoring system designed to provide a short-term warning of the hazard in question. No earthquake has ever been successfully predicted, but



recognised precursors, such as the occurrence of foreshocks, changes in water levels in wells, or increased emissions of radon gas may provide foreknowledge of an imminent event. Monitoring ground surface deformation, which often accompanies the strain increase that precedes a large earthquake, can be accurately and precisely measured using the global positioning system. Determining whether or not a submarine earthquake will trigger a tsunami is not an exact science, but once formed tsunami travelling in deep water can be detected using a system of ocean floor sensors such as those that have operated in the Pacific Ocean since 1964. No volcano erupts without precursory signs, notably swarms of small earthquakes and swelling of the surface as magma makes its way upwards. Consequently, the timing of the start of an eruption can be predicted a few days ahead, allowing time for evacuation and other preparatory measures. The science is still not sufficiently advanced, however, to predict the size or duration of an eruption or the timing of the climactic phase, when most destruction occurs. The monitoring of unstable terrain can be undertaken using the global positioning system, which is capable of detecting accelerations in movement that often precede the formation of a landslide, again allowing time for evacuation and some remedial measures.

The tripartite framework described above constitutes the scientific component of an EWS. While essential, the science component on its own, however, is unlikely to save lives. The ideal geological EWS must incorporate a second hazard management component that is concerned with effective warning dissemination, appropriate public education, and risk reduction. It is now planned to have a tsunami warning system up and running in the Indian Ocean by sometime in 2006, comprising a network of

ocean bed sensors capable of detecting tsunamis formed by submarine earthquakes. As in the Pacific, these will be connected by cable to floating buoys that will send warnings via satellite to emergency authorities in the countries at risk. In terms of limiting loss of life, however, such a warning will be worthless unless procedures are already in place to ensure its dissemination rapidly, widely and unambiguously to threatened coastal communities, who have been educated sufficiently about tsunamis to know how to respond. Similarly, without risk reduction measures such as encouraging the growth of protective mangroves and coastal forests, ensuring that properties are set back from the seafront, and designing and constructing buildings better to withstand the impact of tsunamis, the level of damage and destruction will remain very high.

Only when the scientific and hazard management components are in place, and interlocking seamlessly, is any geological EWS likely to achieve maximum effectiveness. This is a goal towards which we can work, but it is one that is likely to take a considerable time to accomplish in many parts of the world. Development of such a system, in many countries, is likely to be hindered by a plethora of factors, including a lack of political will, focus on other priorities, insufficient funding, inadequate technical or scientific skills, and poorly developed institutional responsibilities and capabilities in the hazard management field. In many cases, putting together an integrated EWS along the lines outlined is likely to be dependent, to a large degree, on help and support from international agencies such as the UN and the European Commission Humanitarian Office (ECHO), appropriate departments of developed world national governments, such as DfID, and aid organisations such as the IFRC

(International Federation of Red Cross and Red Crescent Societies). The problem is that many of these bodies focus on reacting to natural disasters rather than preparing for them. ECHO, for example, spends around 50 times more responding to humanitarian crises than it does anticipating them.

In a progressively more crowded world in which ever larger numbers of vulnerable people are increasingly exposed to geological hazards, the establishment of effective early warning systems must be embraced if we are not to experience a repeat of the Indian Ocean tsunami tragedy – or worse. The development of such systems should not, however, be undertaken in isolation, but should form part of a compendium of measures designed to foster a pro-active approach in which preparedness to prevent disaster takes precedence over response and recovery.

The pivotal role for effective natural hazard early warning systems in minimising the impacts of natural hazards was emphasised in the recent report of the UK Government's Natural Hazard Working Group* established by the PM in the aftermath of the tsunami. The key recommendation of the report, which recently received the support of the G8 meeting at Gleneagles, was the establishment of an International Science Panel for Natural Hazard Assessment to address the threat of potential natural hazards likely to have high global or regional impact. This would provide the critical first element of a global EWS by identifying geophysical threats capable of affecting more than one state, highlighting those of greatest concern and validating forecasts and predictions about their timing. The Panel, if it comes to fruition, will also play a role in fostering a pro-active approach to tackling natural hazards, which – it is to be hoped – will help to bring about a sea-change in disaster risk reduction.

*The role of science in physical natural hazard assessment. Report to the UK Government by the Natural Hazard Working Group. June 2005. DTI. 42pp. Online at: <http://www.ost.gov.uk/policy/bodies/nhwg/index.htm>

NHS PFI is not NHS PLC

Lord Warner, Minister of State, Department of Health

Patients expect and deserve bright, modern, clean environments, whether they are funded by public or private funds. The private finance initiative (PFI) and other public private partnerships, such as NHS Local Improvement Finance Trust (LIFT), are allowing us to ensure that more and more NHS patients experience fit for purpose facilities during their treatment.

Thanks to PFI, the NHS is in the middle of the biggest hospital building programme in its history. After years of under-investment, the infrastructure of the NHS is at last being modernised and made fit for the twenty-first century.

A total of 80 major PFI hospital building projects worth over £16 billion have been given the go-ahead since 1997. Around a third of these projects – 24 in total – are already built and operational. The great majority opened their doors to patients on or ahead of schedule.

Critics argue that PFI makes these hospitals more expensive and that the investment risk is not in practice borne by the private sector. However, the Government's spending watchdog, the National Audit Office (NAO) has twice confirmed that PFI delivers value for money. The NAO's reports on the business cases for the Dartford and Gravesham and West Middlesex PFI schemes confirmed that both projects are value for money, offering savings of £5.1m and £5.5m respectively. Just as importantly, the NAO revisited the Dartford and Gravesham scheme now it is open and confirmed in its report, published earlier this year, that the private sector partner has, to quote, "delivered the facilities and services contracted for, and to a quality that overall has been satisfactory."

On behalf of taxpayers, the NHS must always make sure it gets best value for money and that money is spent wisely. This includes making sure that the design of buildings is not only fit for purpose now, but that they are suitable for generations to come. The NHS is encouraged to think about how today's hospital designs will work in the future. Mechanisms requiring this are built into the business case development process for both PFI and public capital funded hospitals.

There are also sensible checks in place to avoid NHS cash disappearing into the private sector due to delays or unforeseen circumstances. In the event of any projects running behind schedule or over cost, PFI transfers risks onto the private sector. Taxpayers do not have to foot the bill of cost overruns, design faults, servicing and maintaining projects over the lifetime of the contract. The private sector is only paid once the facility is built and operational to the agreed standard and is subject to penalties and deductions if ongoing service and maintenance falls below agreed standard.

This is not to say that we cannot do more to make sure public private partnerships evolve to meet the NHS' changing requirements. NHS LIFT schemes in primary care are already allowing a long overdue investment to take place as part of the extra £1 billion promised in the NHS Plan to renovate GP premises, build new one stop primary care centres and other primary care facilities.

The NHS LIFT approach involves the local health economy – a primary care trust (PCT) or a cluster of PCTs – developing a strategic plan which incorporates its local primary care service needs and relationships with, for example,



intermediate care and local authority services. Based on the strategic plan, the NHS runs a competitive process to select a private sector partner for the next 20 years. The NHS and private sector then set up a joint venture company to manage the NHS LIFT project. They all own a share of the company and jointly have an interest in its long-term success. The NHS LIFT approach establishes a long-term sustainable relationship focused on delivering primary care investment and services and involves the private sector where it can add most value.

In all, there are 50 NHS LIFT projects at various stages. These schemes have delivered over 20 buildings already open to patients, with another 10 or so expected to be open during this summer. This level of activity is expected to continue across future years. The next challenge for NHS LIFT is to deliver a new generation of modern NHS community hospitals. These state of the art centres will provide diagnostics, day surgery and out patients facilities closer to where people live and work.

PFI and NHS LIFT are about adopting the best possible approach to delivering universal, comprehensive healthcare in up to date facilities, which is free at the point of delivery. Public private partnerships like PFI and NHS LIFT are not a laboratory for market-based policy, nor are they a means of unnecessarily channelling funds to big business. They are a practical, tried and tested, value for money way of ensuring the "old NHS" gets new facilities fit for the future.

The Private Finance Initiative: a policy built on sand

Professor Allyson Pollock
Public Health Policy Unit, School of Public Policy, UCL



With 677 Private Finance Initiative projects worth £42.7 billion already commissioned and many more in the pipeline, government commitment to PFI could not be clearer. The scale of PFI projects has been matched by the volume and variety of its critics, spurred on by its high costs which have resulted in cuts in services, public exposure of PFI failures and the flaws in the argument.

The UK Government accepts that private finance is more expensive than conventional procurement, but argues that the extra costs of private finance are offset by the transfer of risk and responsibility for performance to the private sector. According to the Treasury, "the private sector is better able to manage many of the risks inherent in complex or large scale investment projects than the public sector."¹ Savings in the costs of construction make it cheaper than traditional, publicly financed procurement, because the incentive structure of PFI whereby private firms risk losing their own money, brings benefits that outweigh "any cost involved" in using private finance.² Among the alleged benefits of private financing are savings due to the reduced incidence of cost and time overruns when construction projects come in over budget or late.

UK Government procurement policy rests on Treasury claims that PFI has reduced both the **frequency** and the **magnitude** of cost and time overruns. According to the Treasury document *PFI: Meeting the Investment Challenge*, 2003: "PFI projects are being

delivered on time and on budget. HM Treasury research into completed PFI projects showed 88 per cent coming in on time or early, and with no cost overruns on construction borne by the public sector. Previous research has shown that 70 per cent of non-PFI projects were delivered late and 73 per cent ran over budget."³

These data have been used by the Government to face down criticisms of the policy, to inform the Treasury's guidance on PFI appraisal, and to support the whole of government public-private partnership (PPP) policy both in the UK and abroad. More importantly, the data are now incorporated into government guidance. For example, the revised Treasury Green Book, which lays down the rules for evaluating public procurement, requires that all estimates of construction costs in non-PFI schemes are inflated by up to 24% to take account of the risk of cost underestimation and the risk of works taking longer than scheduled. This makes the PFI projects appear to be better value for money.

The UK Treasury cites five research studies as the source of the cost and overrun data. However, the reports themselves acknowledge limitations to the data, that both the Treasury and the NAO ignore. We have recently conducted an evaluation of the five reports which highlights the following deficiencies in the evidence base:

Two of the five reports were based on surveys and consultations with project managers and contain no primary data on cost and time overrun. [National Audit Office

reports; *Modernising Construction* (2001) and *PFI Construction Performance* (2003)].

A third study was designed to develop a method, not to evaluate cost and time performance and has no data on cost and time overrun performance. [Agile Construction Initiative: Benchmarking Stage Two Study (1999) cited by NAO]

The Treasury's own report contains no data to assess cost and time overruns and its methodology is not in the public domain.

The fifth study, conducted by Mott MacDonald, a company which acts as a technical adviser on PFI deals, does have data but it is methodologically so flawed and statistically so biased that the conclusions are uninterpretable.

The Mott MacDonald Report is the only comparative study of PFI versus conventional procurement. But our evaluation of the data revealed four categories of serious error:

Sample bias. Although 500 PFI deals had been signed at a value of £28 billion, the Mott MacDonald sample was restricted to 11 PFI schemes and 39 non-PFI schemes of which only three PFI and seven non-PFI were standard building schemes. The sample is small and not representative of procurement schemes as a whole. There were too few cases to compare costs and time overruns.

Selection bias. The selection of cases under each procurement route was not done on a like for like basis. Non-PFI schemes were over-represented by unusual and atypical schemes compared with PFI. For example the PFI sample excluded high profile IT and other failed PFI schemes.

Policy time period bias. The conventionally procured project sample includes projects commissioned under much earlier and different policy guidance periods, sometimes several decades earlier, than for PFI projects. They therefore do not benefit from significant improvements to procurement that have been made since.

Bias in baseline measures for cost and time overruns. PFI costs and

time overruns were measured at a much later stage in the procurement process than Non-PFI. This has resulted in Non-PFI costs being artificially and wrongly inflated compared with PFI.

The Treasury objective of having "a sound evidence base" for and a "rigorous investigation" of PFI has not been fulfilled. More than 600 PFI projects with a combined capital value of £42.7 billion have been approved or completed but

the chief justification for the policy, that it is value for money, is not supported. The data are being applied in the guidance and used in the policy process despite their evident shortcomings. The evidence base underpinning Treasury guidance for the appraisal of PFI is unsound.

¹HM Treasury (2004), *Quantitative assessment user guide*, p. 7.

²HM Treasury (2003), *PFI: Meeting the Investment Challenge*, p.109.

³HM Treasury (2004), *PFI: Meeting the Investment Challenge*, p.43.

Visit to the London IDEAS Genetics Knowledge Park, UCL

Wednesday 22nd June 2005 – Report by Robert Freer

Does our health depend on our genes or are our illnesses a consequence of the way we choose to live our lives? If it is our individual genes that make us susceptible to illnesses do we need individual tests and individual cures which are special to us? And if we rely on genetic testing to assess our future health prospects, for instance the risk of heart disease, are there any adverse consequences? One of the practical concerns raised is the possibility that a negative result may lead to a difficulty in obtaining life assurance.

Questions which are seemingly straightforward to the layman do not always have simple answers, and as a step towards understanding such problems a party from the Parliamentary and Scientific Committee, led by the chairman Dr Doug Naysmith, together with other MPs and members, visited the London IDEAS Genetics Knowledge Park at the Institute of Child Health, University College London. The visit was arranged by kind permission of Professor Steve Humphries, CEO of London IDEAS Genetics Knowledge Park and the Director for the Centre for Cardiovascular Genetics at UCL. In welcoming the party Professor Humphries explained the background to the work London IDEAS is doing on human genetics and testing for disease, and whether or not DNA-based genetic tests for heart disease are helpful.

To be useful in practice a DNA-based test for the risk of any disease must meet three criteria:

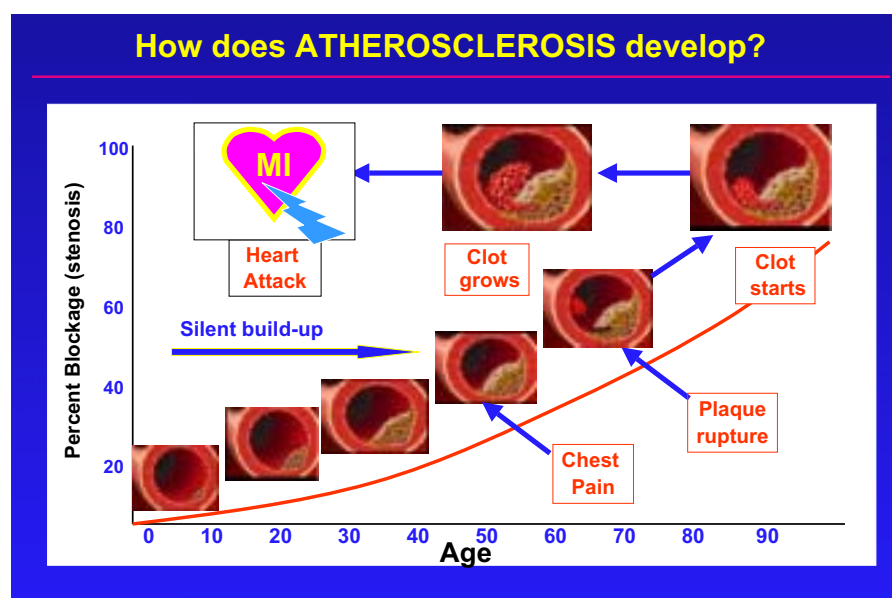
- Be predictive over and above established risk factors;
- Be based on risk estimates that are accurate and reproducible;
- Not be associated with negative psychological impact.

Professor Humphries said the presentations and demonstrations would show how the work of the department is directed to meeting these criteria.

The Genetics Knowledge Park network was set up in 2002 as part of the strategy outlined in the Government's White Paper of June 2003, "Our Inheritance Our

Future". The network is based at UCL and includes Imperial College London, and the St George's medical schools, and also biotech companies and representatives from consumer groups. The objective of the network is to provide the necessary information "to enable all individuals to make informed choices to reduce the burden of disease for which they are at genetic risk".

The basic science underpinning the clinical advances is being overseen by Professor Pete Scambler and Dr Maria Bitner-Glindzicz. Professor Scambler is Director of the Genetics Application Unit, London IDEAS, and Head of Molecular Medicine Unit, Institute of Child Health and



Dr Bitner-Glindzicz is Senior Lecturer and Honorary Consultant in Clinical Genetics at Great Ormond Street Hospital. Although not presented during our visit, other basic research at London IDEAS is also being performed at St George's (University of London).

London is a particularly suitable place to carry out such research, because patients in London come from many ethnic backgrounds, and this diversity provides a range of genetic variations and specific health needs. In fact 36% of children under 16 in Greater London are from non-white ethnic groups.

The visit to the laboratories, led by Ms Kerra Pearce, illustrated the use of the "Pyrosequencer" machine, which is a very high speed and high throughput genotyping analysis platform which facilitates the research work. Genotyping is a technique which identifies a small region of the genome that is linked

to the disease of interest, and it is first necessary to increase the quantity of DNA being analysed by means of the "polymerase chain reaction". This is analogous to a photocopying reaction to amplify a specific area of DNA. The double helical DNA is first separated out to form two separate strands (called "denaturing") and the region of interest is extended from two primers using the strands as templates. This process is repeated about 35 times and the exponential amplification generates very much larger amounts of the wanted gene. Subsequent sequencing, which is a similar process but uses only one primer, determines the exact nucleotide sequence of the stretch of DNA being analysed.

Developing the results of this work with scientists and the public was the theme of presentations given by Dr Amy Hunter, Genetics Knowledge Park Manager, Dr Gail Davies, Honorary Lecturer, Imperial

College, and Dr Ainsley Newson, Postdoctoral Associate, Imperial College. Dr Hunter discussed the response of a number of insurance companies to a female applicant with a family history of breast cancer. Dr Davies described their work on educating schools and the public on genetic knowledge for the future, and Dr Newson considered the practicalities and ethics of personal genomics and the future of clinical genetics.

The visit concluded with a most enjoyable buffet lunch and the opportunity for questions and discussions.

We are most grateful to London IDEAS and to the Institute of Child Health for their kind hospitality in allowing us the opportunity to learn about the work they are doing and for this most informative visit. This research is at the forefront of medical science and promises to provide valuable information in the future for the treatment of diseases.

LETTER TO THE EDITOR

Sir,

Science in Parliament is a splendid publication, so that to criticise one or two articles seems churlish. Nevertheless, the article in the Summer 2005 issue entitled "Steel's fire performance under scrutiny" should not pass without comment. Actually, the scrutiny is used to laud concrete and to promote its use. Now, I have been involved in concrete – research, construction, and investigation of failures – for half a century so that I am, so to speak, pro-concrete, but objectivity should not be sacrificed on the altar of commercial promotion.

Concrete as a material behaves well in fire because it is incombustible, does not emit toxic gases, and offers reasonable insulation against transmission of heat. However, when we talk about concrete as a building material we should not forget that structural elements always contain reinforcing steel so that an important role of concrete is to protect the reinforcing steel against a rise in temperature to a level at which the properties of steel become degraded.

This is why in structural design we are concerned with fire endurance rating, which is the survival time of specific structural assemblies or components. It follows that looking at concrete as the material alone is inadequate. Hence, that statement in the article by Anna Scothern that "failure [in the Windsor Torre in Madrid] was limited to the perimeter steel frame whereas the internal concrete frame survived complete burnout with no collapse" is not sound in structural engineering terms. For requisite fire endurance rating, in addition to the properties of coarse aggregate, the structural engineer needs to consider the depth of cover to any embedded steel and, very importantly, the structural system and design details, including restraint during heating in a fire. Especially in high-rise buildings, robustness and redundancy are

essential; this way, alternative load paths will exist and progressive collapse will be avoided. Therein lies safety.

Unfortunately, the article discussed above is not the only example of rather sweeping and one-sided assertions in praise of concrete published in *Science in Parliament*. In the Summer 2004 issue, the sustainable nature of concrete was rather exaggerated. For example, it was said that "the thermal mass of exposed concrete enables it to absorb, store and later radiate heat" and in consequence "the daytime temperature can be reduced by as much as 5°C." This is the same phenomenon as that exploited in the old-fashioned night-storage heaters, but any benefits depend on the time and duration of heating and cooling.

Anyway, in considering sustainability, we should include the consideration of the energy required to produce Portland cement and the associated noxious emissions: the production of 1 tonne of Portland cement results in the emission of 1 tonne of carbon dioxide, if fossil fuel is used. And so on.

I now understand that the two articles to which I have referred were published in association with back cover advertisements in *Science in Parliament*. This may be sound commercial practice, but it would help the unwary reader of the journal to be alerted to the promotional nature of the articles such as those discussed in this letter. I am certainly not advocating censorship, but perhaps a discrete caption or footnote would be helpful.

Having said all that, I would like to laud the excellence of *Science in Parliament*, which I find to be a source of valuable information on a wide range of scientific and technical topics.

Adam Neville FEng, FRSE
A&M Neville Engineering

Editor's note: The policy has been to invite those organisations who sponsor the front and back covers to contribute a two-page article for the journal.

Geophysics Education in the UK

Professor Aftab Khan, Leicester University, Peter Maguire, President, and Christine Thomas, Education Secretary, British Geophysical Association

Geophysics has emerged as an educational subject in its own right. Observations of the Earth's physical properties made in laboratories and observatories, from ships, aircraft and satellites worldwide have led to a revolution in our understanding of how the earth works, its hazards and their mitigation. Technological and computing advances have increased our ability to make refined investigations at depth at a variety of scales ranging from the exploration for the oil, gas, water, and raw materials mankind needs for survival, to the location of archaeological remains and environmental monitoring as well as answering fundamental questions about the physics of the Earth. Excellent first degree courses have been developed in a dozen or so universities to provide increasingly employable graduates. However the number of students reading for a first degree in geophysics has fallen by more than 50% in the last 2 decades even though the total number of students has been rising. This decline is only partly explained by falls of 20 % (mathematics) and 40 % (physics) in the number of students doing A levels in the subjects normally required for entry, while Geophysics MSc courses in Earth Science departments have been reduced for financial reasons from five to one.

This rapid decline stimulated a wide-ranging review into "Geophysics Education" in the UK by the British Geophysical Association (BGA), sponsored by its parent learned Societies, the Royal Astronomical Society (RAS) and the Geological Society of London (GSL). Information is being sought from universities and employers, as well

as past and present students. The initial findings were presented at the Geological Society on April 22nd by members of a Review Committee drawn from the universities, schools, the oil industry, the shallow geophysics community and the public sector. A full report of the on-going review is expected at the end of the year.

The students (40% female) are of excellent quality with an average A-level grade of B in both Physics and Mathematics. Most embarked on the subject because of scientific curiosity without a specific career in mind. They all found their courses highly educative, lively and informative and thoroughly enjoyed their time at University. The oil industry was the most common employer followed by those in IT, private companies, the public sector, the environment, mining, teaching and research. Their responses indicate that the shortage of applicants is due to the lack of awareness in the schools. They found out about geophysics when searching for something exciting to do.

The oil-related companies who responded varied in size from those employing a few geophysics graduates to those with hundreds. The multinationals recruit worldwide so it is important to continue producing high quality graduates in the UK. There is concern in the industry about the future supply of geophysics graduates from the UK.

Employers in the non-oil sector include those concerned with the environment, engineering, water, mining, and archaeological applications in which multi-skilled people are required. The relevant skills are usually acquired five years after completing a first degree in Geophysics, which is an ideal

university education as it is broadly based. The base is very fragile at present and there is an urgent need for more R&D to underpin this area of science.

The public sector includes the British Geological Survey, a huge organisation with over 500 geoscientists and a range of thematic programmes requiring geophysicists for 3D investigations on- and off-shore. The Ministry of Defence supports a prestigious research centre on the use of seismology to detect and identify underground nuclear explosions. There are also anxieties about the future supply of graduates in this sector.

There is a danger that the university provision will decline further in response to the fall in applications, the effects of the research assessment exercise (RAE), a halving in the unit of resource, and the declining skills base of the intake. This decline should be arrested and recovery promoted by teaching geophysics in schools nationwide, as demonstrated by enthusiastic physics teachers in two schools that operate seismographs with the aid of Royal Society grants. These enabled them to link up with the "Incorporated Research Institutes for Seismology" Schools' network in the US. Their recordings of the 2004 Boxing Day Sumatran earthquake responsible for the tsunami received wide press coverage. There is a need for workshops to educate teachers on the merits of using earth examples to illustrate basic physics concepts. Geophysics is an admirable way of enthusing pupils to continue with physical science and mathematics to university level for a wide range of degree courses.

Promoting UK/Japan Science & Technology Collaborations

*Philippa Rogers, Science and Innovation Counsellor,
British Embassy, Tokyo*

Japan is the world's second biggest economy grounded, in part, on technological advances. Annual R&D spending totals approximately £90 billion, 3.35% of GDP. And due to recent increased investment in infrastructure, Japan now has some of the world's best-equipped research centres. This presents huge opportunities for British scientists and engineers. The Science and Innovation team in Japan aims to help realise those opportunities. Strengthening science and technology collaboration in key areas through bilateral linkages is currently a top priority. We have support for these activities at the highest levels, through the British and Japanese Prime Ministers' 2003 joint statement on S&T which established the UK Japan Programme on Emerging Technologies. Our flagship project is a unique collaboration on predicting climate change. Launched by the Foreign Secretary earlier this year, the project brings together two of our leading scientific centres on climate modelling with Japan's Earth Simulator, one of the world's most powerful supercomputers. This will enable climate modelling to be taken to a new level, allowing state of the art models to be run at unprecedented resolutions. This will give decision makers world-wide a firmer basis on which to assess climate change and its impacts. We were instrumental in bringing these partners together and providing pump-priming funding to get the partnership off the ground. We have also launched initiatives in nanotechnology, fuel cells and the hydrogen economy, structural genomics, gene therapy, sustainable building and "green" chemistry. A key part of our role is to inform the UK community of technology developments in Japan. The language barrier means that information in English on

breakthroughs and opportunities is not readily available. We therefore have a team of bilingual S&T experts who analyse and report on policies and developments in Japanese S&T. For example, Japan is a world leader in developing and implementing new technologies for energy efficiency. We have reported extensively on this, including informing the House of Lords Science & Technology Committee's recent inquiry on Energy Efficiency. All our reports are available through DTI's GlobalWatch website (www.globalwatchservice.com).

We also help high-tech UK companies and academics access and benchmark Japanese technology through organising DTI funded missions. A good example is a recent mission on Bioprocessing to look at Japanese approaches to reducing the environmental impact of its chemicals industry using biotechnology. Using our knowledge and contacts of the sector in Japan, we arranged visits to six leading Japanese companies and spent half a day with the leading Japanese academic, Professor Shimizu of Kyoto University. Several companies from the mission are now exploring potential collaborative opportunities in intermediates manufacture, and Professor Shimizu has since visited the UK to discuss academic collaborations.

Over the past 12 months we have organised 8 such missions covering, for example, "smart" textiles, global navigation systems, small scale semiconductor production, and technologies for elderly people. Through this work, we have enabled over 50 UK companies and universities to gain unique access to the expertise of more than 70 Japanese companies and research institutes. The strength of research and technology in Japan, the warmth of the welcome, and the potential and willingness for collaboration usually pleasantly surprise these mission teams.



As well as encouraging UK scientists and engineers to "think Japan", we are also very active in promoting the UK's strengths in S&T. For example, we have recently completed a year-long campaign, "Innovation UK", involving a huge number of special events including lectures by UK Nobel Prize winners and other "science stars", a mobile exhibition, special competitions and a series of "science in the pub" events. Post-campaign research revealed that Innovation UK had positively influenced perceptions of the UK as an innovative country. And this PR work continues. For example, in conjunction with our trade and investment colleagues, we are currently organising a seminar showcasing UK strengths in neuroscience and oncology at BioJapan 2005, the largest bioscience networking event in the Japanese calendar.

Over the next few months, special priority is being given to driving forward new projects under our UK Japan Programme on Emerging Technologies related to the EU and G8 presidency priorities. Three new collaborative initiatives are being pursued in infectious diseases, flooding and coastal defences and aircraft emissions. We have also launched a UK/Japan project on the health and environmental impacts of nanotechnology, aimed at ensuring early international engagement on the issues raised by nanotechnology developments.

In conclusion, we believe the UK/Japan S&T relationship is developing well. But the speed of change is very fast, and the science team in Japan will continue to work hard at identifying and reporting on new opportunities and to use our unique expertise and contacts with the Japanese S&T community to bring the right people together to realise these opportunities.

The Biological and Toxin Weapons Convention Meeting of Experts Codes of Conduct for Scientists

(June 2005)

John Freeman*

From 13-24 June 2005 the States Parties to the Biological and Toxin Weapons Convention (BTWC) held a meeting of experts to consider the issues surrounding codes of conduct for scientists. This was a topic States Parties to the BTWC had previously not considered in any great detail. It therefore presented some interesting challenges in how to consider the topic of codes of conduct, the extent of activities related to codes of conduct in other areas and by different types of organisations, the relevance of such codes to the prohibitions on biological and toxin weapons, and how to balance the concerns of different actors such as industry, professional associations, non-governmental and other advocacy organisations, and, not least, the views of Government departments and agencies.

These issues were particularly challenging for the UK as Chair for the Meeting of Experts and, later in the year, for the formal meeting of the States Parties (to be held later on 5-9 December).

BTWC Background

The BTWC prohibits the development, production, stockpiling, acquisition, and

transfer of biological and toxin weapons. It complements the 1925 Geneva Protocol, which prohibits the use of chemical and biological weapons in war. Negotiations on the BTWC were completed in the early 1970s and it has been 30 years since it entered into force in 1975. Along with the United States (US) and the Russian Federation, the UK is one of the Depositary Governments of the Convention. In addition, as the UK was one of the leading proponents of biological disarmament in the late 1960s, the Convention has a particularly important place in terms of its status and commitment to it both of the UK Government and in the academic and non-governmental arms control community.

At the Fifth Review Conference of the BTWC in 2002 the States Parties to the Convention adopted a programme of work between 2003 and 2005 intended to examine ways in which States could enhance implementation of the BTWC. The programme of work focused on discrete obligations under the Convention. For 2005 it was decided that States Parties would focus on “the content, promulgation, and adoption of codes of conduct for

scientists.” Under the 2002 agreement it was determined that the Western Group would hold the Chairmanship of the 2005 meetings (the Eastern Group having held the 2003 Chair, and the Non-Aligned Movement holding the Chair in 2004). It was later decided that the UK would act as Chair in 2005 for these meetings.

The Meetings of Experts and States Parties

The Meeting of Experts and Meeting of States Parties are designed to complement each other. Experts meet for two weeks to consider in detail each issue. This generally involves a wide-ranging discussion among States Parties about the different views on a particular issue, how it relates to recent developments, the advantages and disadvantages of various courses of action, the most appropriate locus for any action, and the sharing of information and details on actual practice.

The focus on discrete topics, such as national implementation legislation in 2003, has required each State Party to examine in detail their existing practices, the rationale for such activity in a given area, and the

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implementation and effectiveness of such measures. For the UK, which takes its international commitments very seriously, such meetings have been beneficial in themselves by requiring those involved in the implementation of the BTWC to consider how and why the UK does certain things in particular ways. Other States, including many of our key European partners, undertook similar preparatory work for each Meeting of Experts. To date the outcomes from the intersessional work programme have been able to identify good practice, where specific issues require further and more specialised consideration, and where co-operation with other partners might be required in the future. The results included a significant degree of information sharing, awareness raising, and identification of good practice among the States Parties. The outcome of each Meeting of Experts is a report for consideration at the later Meeting of States Parties. It is not the aim or the expectation of States Parties that Codes of Conduct for Scientists be devised, negotiated, or adopted in 2005.

Codes of Conduct for Scientists

At the national level the Foreign & Commonwealth Office took the lead in preparing for discussions on codes of conduct for scientists relating to the issue of biological and toxin weapons. Two seminars hosted by the FCO in December 2003 and June 2004 with representatives of academia, industry, and non-governmental organisations assisted in identifying key themes requiring consideration including the purpose, utility and scope of any codes of conduct, the need for awareness raising and education among the wider scientific community, the role of any

existing codes, and the most appropriate initiator of any code of conduct, eg professional body, industry, government, or other organisation.

It was widely acknowledged that the requisite expertise and knowledge on this subject would not necessarily reside in experts attached only to governments. States Parties and experts also had to be aware that codes of conduct were being considered by other bodies and organisations, and in different contexts than that related to the BTWC. For example, in the UK the Royal Society had released its own report and recommendations on the issue of Codes of Conduct prior to the meeting.¹ Participation at the Meeting of Experts could not, therefore, be limited to official representatives of each State Party.

In preparation for the Meeting of States Parties I wrote to each State Party in my role as Chair, prompting them to attend the Meeting prepared for a broad discussion on this topic. Seven questions were identified to provide a framework for the discussions. To provide a single example, States Parties were asked to consider how to encourage universities, industry, research bodies and government to reflect BTWC issues in their own in-house codes of practice and operational frameworks and whether or not there might be a need to consider the introduction of guidance or instructions into existing structures that deal with the safety and ethics of individual experiments and research. The questions were indicative of the kinds of issues on which the Meeting of Experts would need to engage.

The outcome of the Meeting of Experts

At the June meeting 82 of the 155 States Parties to the BTWC were

represented. In addition, eight Inter-governmental Organisations, 23 scientific, professional, academic, and industry organisations, and 16 other non-governmental organisations were also present at the meeting. The work of the meeting was organised to ensure adequate time was spent on each of the three areas under consideration (content, promulgation, and adoption) for codes of conduct. After initial statements from States Parties and inter-governmental organisations, the work of the meeting was divided into presentations from relevant scientific, professional, academic, and industry organisations which either I as Chair or interested States Party had encouraged to attend the meeting. These "Guests of the Meeting" brought external perspectives to the issues under discussion and made an extremely valuable input. It included organisations such as the American Society for Microbiology, Association of British Pharmaceutical Industry, the Islamic World Academy of Sciences, and the World Medical Association. To provide one example, the Chief Scientific Adviser to the UK Government, Sir David King, in a very well received address to the Meeting of Experts outlined the Office of Science and Technology's efforts at developing an overall code on scientific conduct.

At the end of the meeting all the proposals, perspectives, and other points made by those organisations and individuals, and States which addressed the meeting were collated in an Annex to the procedural report. This data will then be considered in the period between the Meeting of Experts and the Meeting of States Parties with a view to States Parties discussing them further.

¹The Royal Society, 'Issues for discussion at the 2005 Meeting of Experts of the Biological and Toxin Weapons Convention' 9 June 2005. Available at: <http://www.royalsoc.ac.uk/displaypagedoc.asp?id=12986>

Spaceport

*Michael F. Bode, Professor of Astrophysics and PPARC Senior Fellow
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As a recent participant with my local MP (Andrew Miller) in the Royal Society's MP-Scientist pairing scheme, I saw for myself the high priority given throughout Parliament to science and technology as a driving force behind the prosperity and wellbeing of the nation. It is of course also true that the UK is not producing sufficient numbers of scientists and engineers. Moreover, and perhaps just as importantly, we need to enhance the general level of public understanding in these areas and great efforts continue to be expended nationally to achieve this. Astronomers, such as myself, have somewhat of a natural advantage here. The level of public interest, particularly among our young people, for all things to do with "space" seems to grow by the day.

At Liverpool John Moores University, we have designed, built and now operate the Liverpool Telescope (LT - telescope.livjm.ac.uk) as the World's largest and most sophisticated robotic telescope. Sited atop the island of La Palma in the Canaries, the LT was funded by the University, the European Regional Development Fund, PPARC and a generous private benefactor (Mr Aldham Robarts) and is a National Facility for astronomy research.

It was always our ambition to bring our work in science and technology to the attention of the public. This took two forms. First of all, we knew that a flexibly-scheduled telescope such as the LT could be used to enable schools to execute their own projects in among the work of the professional astronomers. Thus it was that what is now the National Schools' Observatory (NSO - www.schoolsobservatory.org.uk) was born whose primary aim is to use astronomy to enthuse students about the study of science, technology and mathematics in general.

With assistance from the DfES and the Institute of Physics, the NSO now has around 500 subscribing member schools across the UK, both primary and secondary, and since October 2004, over 3,000 LT observation requests by pupils have been fulfilled.

We also wanted to have some more "physical" presence (the NSO being largely web-based), ideally in our own locality. This grew into an outline plan for a major visitor centre in astronomy and space research situated between the University's Astrophysics Research Institute and the university subsidiary company, Telescope Technologies Ltd (which was originally formed to build the LT).

Ultimately we had some of the required funding in place, but siting the centre where we originally intended was problematical. In addition, operating such a centre is well beyond the normal range of experience of any university. On the very day we thought we had reached the end of the road on the project, the local authority brought us together with Mersey Ferries and their parent company, Merseytravel. Just a mile from our Institute is the Seacombe Ferry Terminal. Next to the terminal is the Annexe Building, which when constructed in the early 1930s was of all things the largest multi-storey car park outside London. In recent years it fell into disrepair, but as an art deco listed



A school party at the opening of Spaceport on Merseyside in July. In the background is a Starchaser rocket.



Visitors to Spaceport enter the "Solar System Zone"

building, it could not be demolished. However Merseytravel wished to develop its business at this site and were simultaneously putting together a feasibility study to place a visitor attraction in the Annexe.

So it was that at the end of 1999 we formed a partnership between the University and Merseytravel/Mersey Ferries with the aim of jointly bringing our aspirations to fruition. On paper it was perhaps an odd partnership (astronomers and a regional transport body) but the teams' expertise complemented each other superbly. It took no time for both parties to be convinced that a visitor centre in space and astronomy at this location was likely to be a success and be beneficial to both.

Funding was gradually secured from a variety of sources including ERDF, the Wirral Waterfront (SRB6) initiative, the local authority and Merseytravel itself. The total amounted to around £10m. We had to use the building in a way that made it fit for purpose, enhanced it, but did not violate its aesthetic appeal. Essentially, it is long and thin and on two storeys, with roughly the same exhibition area as the National Space Centre in Leicester. Our concept was to take visitors on a journey out into the Universe, utilising the form of the building to greatest advantage and, above all, ensure that any visitor rapidly forgot that they were in Wallasey, or even on the Earth.

Our aim was to be educational at several levels, but also fun. It was one of the most challenging aspects of all to explain our science succinctly in layman's terms whilst retaining scientific accuracy and also making it entertaining and "hands-on". Somewhere along the road we had to choose a name and the partnership came up with "Spaceport" (www.spaceport.org.uk) – aptly tying together astronomy and seafaring, as had of course been the case via navigation for many centuries before – and the centre opened its doors to the public on July 26th 2005.

A visitor to Spaceport first "leaves the Earth" by entering a "spacepod" from which they emerge into our Solar System of the Sun, planets, moons, comets and asteroids. The more intrepid can experience a simulator which gives them a "white knuckle ride" through various imaginary landscapes. Along the way there are many inter-actives including demonstrations of weightlessness, crater formation and the relation of the tides on the Mersey outside to the Earth-Moon-Sun system.

We have had the technology for many years to travel around our Solar System. However, travelling the vaster distances to the stars is currently beyond us. The transit in Spaceport between the Solar System and out into the vast spiral of dust, gas and around 200 billion stars that make up our Galaxy, the Milky Way, is accomplished via a

"wormhole" – based on a theoretical concept allowing one to journey vast distances by effectively short-circuiting space. Here visitors learn that space is not really empty – they see, for example, the otherwise invisible tracks in a cloud chamber caused by charged sub-atomic particles that make up "cosmic rays" and view evidence of the magnetic field that threads its way throughout our Galaxy. They also hear and see the story of stars, from birth to (sometimes violent) death and explore the heavens represented on the ceiling via a virtual telescope, before entering a 360° theatre show.

The next transition is onto the second floor and into the wider Universe. Questions asked and answered here include "how did it start and how will it end?"; "how large/old is the Universe?" Along the way, visitors can learn more from the NSO area and understand how telescopes as probes of the Universe work. Finally in this zone, perhaps the biggest question of all is asked: "Are we alone?"

The penultimate transition is to a zone that as scientists we found the most challenging of all – the science behind science fiction. We debated this long and hard, weighing up the public interest in UFOs, Dr Who and the like against the absolute requirement not to mislead. In the end we let the designers' imaginations loose, but the final message is effectively to retain a healthy scepticism and, to coin a phrase, "Don't Panic!".

Emerging into daylight, visitors encounter the "Starchaser" zone, which is now the public home of the UK's bid to launch a commercial manned spacecraft, with rockets and their associated hardware all around. To the visitor's right, one of the most stunning views across the Mersey to the Liverpool waterfront suddenly reminds them that they are still in fact in Seacombe.

Although it is early days of course, visitor numbers are exceeding expectations. Since opening, on most days the centre has reached full capacity several hours before closing time. Indeed, one of the challenges now is that (ironically) we could actually do with more parking space!

Sustainable Development: The Engineering Contribution Guidance Documents for Young Engineers

Robert Freer

Sustainable development has become a cornerstone of political and social policy and the decisions to be made have implications for engineers responsible for the construction and maintenance of the national infrastructure. The Royal Academy of Engineering (RAEng) that "brings together the most eminent engineers from all disciplines to promote excellence in the science, art and practice of engineering" has responded to this challenge to make engineers, and especially young engineers, more aware of sustainable development, and the contributions they can make, by appointing 26 Visiting Professors in Engineering Design for Sustainable Development at UK universities and by the publication of teaching materials for undergraduates.

Previous publications by the Royal Academy of Engineering for the use of engineering designers have included: *The Universe of Engineering - A UK Perspective* (2000), *The Social Aspects of Risk* (2003), and *Educating Engineers in Design* (2005). The RAEng's most recent publication is entitled *Engineering for Sustainable Development: Guiding Principles*, edited by two of the Visiting Professors, Richard Dodds and Roger Venables¹. It was launched before a large audience on 6th September 2005 at a seminar entitled "What do Engineers really need to learn about Sustainable Development?" These Visiting Professors present case studies compiled from their own practical experience, that are based on general principles underlying the practical application of the theme of sustainability. A strong, healthy and just society can be realised by achieving a sustainable economy, by promoting good governance and by

using sound science responsibly and living within our environmental limits. This publication is set in the context of the government's report on its strategy for sustainable development entitled *Securing the Future* (2005) that sets out the principles to be used to achieve this objective.

The concept of sustainable development originated in the 1987 Brundtland report of the UN World Commission on Environment and Development that has become a political slogan with a number of different meanings. The essential point made by Dodds and Venables is the need to ensure that we are all able to continue to live on this planet indefinitely. Engineers have made the world habitable and they are responsible for developing the earth's natural resources to provide us with the infrastructure services we have come to rely on. There are no more unexplored lands and undiscovered continents that we can expand into, we must make the best use of what we have.

Although the report does not discuss population growth, it is relevant to note that our numbers are increasing almost exponentially. In the last 75 years the world population has increased from just over 2 billion to just over 6 billion and planners are now considering the supply of the basic needs of shelter, water, fuel and food to 10 billion people in the foreseeable future. The earth's natural resources are not increasing, they are part of our capital, and we need to ensure that we look after this inheritance carefully.

Dodds and Venables refer to the five forms of capital: Human, Environmental, Social, Financial and Manufactured and they consider that we should strive to

live off the interest rather than consume the capital. These factors should be combined in order to achieve economic success, social benefit and high environmental standards. They have selected seven examples to demonstrate how these objectives have been or are being achieved and to encourage others to introduce the concept of sustainable development into their own projects.

The Jubilee River is a new flood diversion channel on the River Thames which carries flood water to by-pass the towns of Maidenhead, Windsor and Eton.

Laundry cleaning products are an example of articles of mass production and consumption where the environmental impact of each stage of the process has to be considered.

The experiment of embedding sustainable development into an organisation has been introduced at Glasgow University.

Mobile phones are an iconic electronic symbol of the 21st century and the manufacturers are encouraged to examine the impact of their whole life cycle.

Regeneration of buildings: the Borough Council of Newtonabbey in Northern Ireland decided to renovate a disused mill for use as their new civic headquarters rather than construct a new building.

Catalytic converters: the use of catalytic converters is an example of balancing their practical benefits against the environmental impact of their manufacture.

The energy challenge: the problem is to meet the ever-increasing global demand for energy from sources generating minimal atmospheric pollution.

¹Engineering for Sustainable Development: Guiding Principles.

Edited by Professor Richard Dodds and Professor Roger Venables. The Royal Academy of Engineering, 2005

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House of Lords Science and Technology Select Committee

The members of the Committee (appointed 6 June 2005) are Lord Broers (Chairman), Baroness Finlay of Llandaff, Lord Howie of Troon, Lord Mitchell, Lord Patel, Lord Paul, Baroness Perry of Southwark, Baroness Platt of Writtle, the Earl of Selborne, Baroness Sharp of Guildford, Lord Sutherland of Houndwood, Lord Taverne, Lord Winston and Lord Young of Graffham.

The Reports and Calls for Evidence for the inquiries mentioned below can be found at the Committee's web site www.parliament.uk/hlscience.

Energy Efficiency - report published

The report on the Energy Efficiency inquiry, chaired by Baroness Perry of Southwark, was published in July. The report urged the Government to resolve the uncertainty and confusion that are undermining its attempts to promote energy efficiency and reduce greenhouse gas emissions.

Baroness Perry said "The Government has to get a grip on our huge waste of energy if it is to limit the UK's contribution to climate change. At the moment it simply doesn't have a coherent policy on energy efficiency. There are far too many departments, agencies and policies, often pulling in different directions."

The report called for better governance, including the appointment of a single minister responsible for both energy supply and energy efficiency, and improved energy use standards for buildings and products. Changing consumer behaviour was also recognised as a vital ingredient if targets are to be met.

Ageing: Scientific Aspects - report published

The report on the scientific aspects of ageing was also published in July, following the inquiry chaired by Lord Sutherland of Houndwood. Early in its deliberations, the members of the Committee were struck by the divergence between life expectancy (LE) and healthy life expectancy (HLE). It appears that LE is increasing at a faster rate than HLE; in other words, the unhealthy years towards the end of life are tending to increase. The demographic evidence for this is set out at the start of the report. The report goes on to consider the science of the ageing process and diseases prevalent in old age, the factors which cause ill health in later life, and what can be done to counter them. The Committee found the proportion of research council funds spent on ageing-related research to be disappointing, but it was the lack of co-ordination of this research which shocked the Committee. The report recommends that DTI and OST set up a new body to provide strategic oversight and direction for this research. The Committee also makes recommendations for improving the health of older people, by applying resources more effectively, in particular, by focusing on the prevention of disease rather than its cure.

The Committee were also surprised that industry seems largely to ignore the needs of older people, despite the economic strength of this age group. Products are seldom designed with older people in mind, and advertising ignores them. Assistive technology too is proceeding at a disappointing rate.

Water Management - new inquiry

Sub-Committee I, chaired by the Earl of Selborne, is now considering Water Management. The inquiry will investigate the future management of water supply and demand in the United Kingdom in the context of demographic and economic development, and climate change.

Written evidence is invited on all issues affecting the future balance of supply and demand. The Committee is keen to hear views on what the causes are of the current problems of water supply, what the projections are for future supply, and where and when serious problems are likely to emerge. They would like to know whether sufficient research is being devoted to predicting and handling possible future scenarios, and whether the responses of Government, the EU, regulators and the industry are adequate.

The Committee would like to know what are thought to be the options for increasing water supply, what are the likely future trends in water demand, and what can be done to manage demand more effectively, and to influence the behaviour of consumers and others. They are interested in the contribution that science, engineering and technology can make towards reducing water use or waste by households, businesses and the public sector.

Pandemic Influenza - new inquiry

The Select Committee is following-up its "Fighting Infection" report published in 2003 (HL Paper 138) with a short inquiry investigating the UK's preparations for a potential outbreak of pandemic influenza.

The Department of Health has stated that "warning signs are increasing that a new influenza virus with pandemic potential is possible and will affect around a quarter of the UK population, possibly resulting in more than 50,000 deaths". The death toll could be much higher according to some experts.

The inquiry will concentrate on contingency planning in the UK, but will also look at what the risk of a pandemic is, and how it can be reduced. The Committee will hear evidence in October and November, aiming to publish before the end of the year.



Parliamentary Office of Science and Technology



POST Board – 2005 Parliament

The establishment of POST's Board after a general election is a protracted process. Two House of Commons select committees (the newly-created Administration Committee and the Science and Technology Committee) make nominations to the Board. Until these committees are themselves created, they cannot make the nominations. Just before the summer recess, the Administration Committee nominated Neil Gerrard MP, (returning) and Mark Harper (new MP for Forest of Dean), while the Science and Technology Committee nominated Dr Des Turner (returning). The four Lords members of the Board had been nominated earlier. They are: Lord Broers, Baroness Greenfield, Lord Oxburgh, and Professor the Lord Winston. The non-parliamentary members of the Board remain Professor Fran Balkwill, Professor Sir Tom Blundell, Sir David Davies and Professor Jim Norton. POST is expecting the remainder of the Commons Board members to be nominated by the end of the summer recess.

Recent POST publication

Infection control in healthcare settings

July 2005

POSTnote 247

Healthcare associated infections (HCAs) are infections transmitted to patients (and healthcare workers) as a result of healthcare procedures, in hospital and other healthcare settings. Recent years have seen an increase in the awareness of HCAs, in particular those caused by antibiotic-resistant "superbugs". This POSTnote describes the nature, spread and treatment of HCAs. It focuses on challenges for public policy in their detection, prevention and management.

Current work

POSTnotes in preparation on:

Biological Sciences and Health - Avian flu, National DNA database, Science in Court.

Environment and Energy - Sustainable fisheries, Ecosystem services, Household energy efficiency, Cleaner coal, Farmland conservation and Water resource management.

Physical Sciences, IT and Communications - Criminal justice system ICT, Mobile phones, Space weapons/space security, and ICT in developing countries.

Science Policy, etc - The 24-hour society, Public engagement in science.

Seminars

In July POST held a joint seminar with the Wellcome Trust on Bugs, Drugs and Hospitals. The meeting brought together parliamentarians, researchers, healthcare professionals and others to discuss the issues relevant to healthcare associated infections in clinical practice.

On 9th November it will hold a seminar on the 24-hour society.

Fellows and interns at POST

Current and recent fellows/interns are: British Ecological Society Fellow Nick Worsfold (Sheffield University/Farmland conservation), Economic and Social Research Council Fellow Cindy Warwick (Oxford University/Water resource management), and Royal Society of Chemistry Fellows Ruth Croxton (Lincoln University/DNA database) and Greg Offer (Imperial College/Future transport technologies). Since June 2005, POST has also welcomed interns Nicholas Cockroft (UCL/Conservation science), Marina Roehrs (St Andrews University/Compiling database on overseas parliaments and science and technology), Lydia Cross (Manchester University/International finance facility), and Susanne Kadner (University of East Anglia/Aarhus Convention).

International activities

On 16th July 2005 Dr Chandrika Nath gave a presentation on "ICT and privacy in Europe" on behalf of the European Parliamentary Technology Assessment Network at the 3rd international conference on politics and information systems (PISTA) in Orlando, Florida. In September the Director participated in the second international Science and Technology in Society symposium in Kyoto.

Additional information can be obtained from POST, House of Commons, 7 Millbank, London SW1P 3JA (020 7219 2840).

Also available on the internet at <http://www.parliament.uk/post/home/htm>

Members of either House can obtain free copies of all published material. Others may purchase copies from the Parliamentary Bookshop (020 7219 3890). There is also a subscription service: details from POST.



House of Commons Select Committee on Science and Technology

Under the Standing Orders, the Committee's terms of reference are to examine "the expenditure, policy and administration of the Office of Science and Technology and its associated public bodies". The new Committee was nominated on 19 July 2005. The Chairman is Mr Phil Willis (Lib Dem, Harrogate and Knaresborough). Other Members of the Committee are Adam Afriyie (Con, Windsor), Mr Robert Ffello (Lab, Stoke-on-Trent South), Dr Ian Gibson (Lab, Norwich North), Dr Evan Harris (Lib Dem, Oxford West and Abingdon), Dr Brian Iddon (Lab, Bolton South East), Margaret Moran (Lab, Luton South), Mr Brooks Newmark (Con, Braintree), Anne Snelgrove (Lab/Co-op, South Swindon), Bob Spink (Con, Castle Point) and Dr Desmond Turner (Lab, Brighton Kemptown).

Current Inquiry

Carbon Capture and Storage Technology

Following its first meeting on 20 July 2005, the Committee announced its first inquiry, into carbon capture and storage technology (CCS). It is inviting written evidence on the following points:

- 1 The viability of CCS as a carbon abatement technology for the UK, in terms of:
 - The current state of R&D in, and deployment of, CCS technologies;
 - Projected timescales for producing market-ready, scalable technologies;
 - Cost;
 - Geophysical feasibility;
 - Other obstacles or constraints.
2. The UK Government's role in funding CCS R&D and providing incentives for technology transfer and industrial R&D in CCS technology.

The Committee will start taking oral evidence on this inquiry in the Autumn, when it will also announce the remainder of its programme.

Government Responses

The Work of Research Councils UK: Government Response to a Report by the House of Commons Science and Technology Select Committee

Before the new Committee was appointed, the Government published its Response to the Committee's Sixth Report of Session 2004–05, *The Work of Research Councils UK* (HC 219). *The Work of Research Councils UK: Government Response to a Report by the House of Commons Science and Technology Select Committee* (Cm 6598) was published in June 2005.

First Special Report

The Committee published its First Special Report of Session 2005–06, *Forensic Science on Trial: Government Response to the Committee's Seventh Report of Session 2004–05* (HC 427) on 25 July 2005.

Second Special Report

The Committee published its Second Special Report of Session 2005–06, *Strategic Science Provision in English Universities: Government Response to the Committee's Eighth Report of Session 2004–05* (HC 428) on 25 July 2005.

Human Reproductive Technologies and the Law: Government Response to the Report from the House of Commons Science and Technology Committee

During the summer recess, the Government published its Response to the Committee's Fifth Report of Session 2004–05, *Human Reproductive Technologies and the Law* (HC 491). *Human Reproductive Technologies and the Law: Government Response to the Report from the House of Commons Science and Technology Committee* (Cm 6641) was published in August 2005.

Further Information

Further information about the work of the Committee or its current inquiries can be obtained from the Clerk of the Committee, Chris Shaw or from the Committee Assistant, Ana Ferreira on 020 7219 2792/2794; or by writing to: The Clerk of the Committee, Science and Technology Committee, House of Commons, 7 Millbank, London SW1P 3JA. Inquiries can also be emailed to scitechcom@parliament.uk. Anyone wishing to be included on the Committee's mailing list should contact the staff of the Committee.

Anyone wishing to submit evidence to the Committee is strongly recommended to obtain a copy of the guidance note first. Guidance on the submission of evidence can be found at <http://www.parliament.uk/commons/selcom/witguide.htm>.

The Committee has a new website address (www.parliament.uk/s&tcom). All recent publications (from May 1997 onwards), terms of reference for all inquiries and press notices are available at this address.



Debates and Selected Parliamentary Questions & Answers



Following is a selection of Debates from the House of Commons.

A full digest of all Debates, Questions and Answers on topics of scientific interest from 6th June to 21st July 2005 from both Houses of Parliament appears on pages 41 to 46.

Animal Testing

Question and Written Answer on Monday 6 June

Mr Laurence Robertson (Tewkesbury): To ask the Secretary of State for Trade and Industry what assistance his Department is giving to research bodies to encourage them to use scientific research techniques which do not involve animals for risk assessments on chemicals; and if he will make a statement.

Mr. Morley: I have been asked to reply.

Risk assessments on chemicals are carried out according to EU and UK regulatory requirements to provide the necessary data for the protection of human health and the environment. There is currently a legal requirement to use animals for some testing where there is no other method for producing the data. The Government is keen to keep animal testing to a minimum and supports the development of alternative methods which, once properly validated, may be accepted as part of the regulatory system. My Department is supporting the development of alternative methods and strategies that will lead to the reduced use of animals in chemical assessment programmes and is hosting a workshop on this topic in June.

The Government through the Medical Research Council (MRC) and the Biotechnology and Biological Sciences Research Council (BBSRC) funds the National Centre for the Replacement, Refinement and Reduction of Animals in Research (NC3Rs). The Centre provides a UK focus for the development, promotion and implementation of the 3 Rs in biological and biomedical research in academia and industry.

Renewable Energy (S&T Report)

Debate in the House of Lords on Thursday 23 June

Lord Oxburgh rose to move, That this House takes note of the report of the Science and Technology Committee on Renewable Energy: Practicalities (4th Report, Session 2003-04, HL Paper 126). There is now wide acceptance of the reality of anthropogenic climate change and the need to take action urgently. The Nobel Prize-winning chemist Arrhenius predicted in 1903 that the burning of fossil fuels would increase the carbon dioxide content of the atmosphere and cause the Earth to warm. It is the rate of change which matters most, especially in Africa where rapid climate change will impact on the poorest who will be at greatest risk. The report addressed one element of the Government's energy policy as outlined in the 2003 White Paper; namely, the intention that by 2010, 10 per cent and by 2020, 20 per cent of our electricity should be generated from renewable sources – that is from wind, waves, sun and the other intrinsic Earth processes, or from plant life or organic wastes.

Modifications were proposed to the Renewables Obligations Certificates scheme to extend their application until 2020. Regarding security of supply, the Government's blind faith in the security of markets for an essential infrastructure service is surprising. It

does matter if the lights go out. Biomass may be burned or used to make liquid fuels opening the door to co-production of food and fuel. If human life is to continue on this planet, secure and sustainable energy sources must be found. Fossil fuels are limited as a stopgap measure, however the contribution from many renewables is limited because technology is presently too primitive to exploit them fully.

Lord Whitty regretted that regulatory authorities and the Treasury are reluctant to intervene in a way that is designed to change personal behaviour and attitudes towards climate change. Without this change the improvements needed in energy efficiency will not be achieved.

The Earl of Selborne described the difficulties he had had in trying to implement a small biomass scheme at farm level. This was not feasible due to the punitive pricing scheme for those who have to sell at the prices required under the scheme. He called for policies that combine nature conservation with renewable energy programmes. He described successful woodchip operations at the farm scale in Denmark and Holland. A renewable energy think small approach is needed to which anyone can make a modest contribution by installing solar panels, for example, inconvenient though it will be to the large electricity generators.

Baroness Sharp of Guildford noted that the Government have increased the annual R&D spend on renewable and low-carbon technologies from £40 million to £70 million. If this issue is of the highest priority, is this really enough?

Lord Haworth is in favour of renewables but not the role in terms of energy mix they are designed to play. He agreed entirely with Lord Whitty that renewables and nuclear together should replace the burning of fossil fuels. He had been under the misapprehension that development of renewables would mean their substitution for fossil fuels. However it emerges that any increase in electricity generated by renewables will be used to replace nuclear power. This will make no difference at all to the sources of climate change. Meeting the Government's environmental targets will be made much harder over the next two decades by the retirement of 20 per cent of our present generating capacity that is carbon free – namely nuclear.

Lord Jenkin of Roding noted that wind power can sometimes fall by thousands of megawatts in the course of just two hours. This requires immediate mobilisation of fossil fuel generators to meet demand. Problems arising from such imbalances appear unresolved. Funding for transmission from remote renewable generators has not been agreed yet. If there is no transmission there will be no offshore generators.

Lord Methuen noted that CHP take-up in the UK is pathetic compared with European counterparts. Closure of all nuclear generation by 2023 except Sizewell B will leave us almost totally dependent on oil and gas imports

from Russia, the Ukraine and other states less politically stable than the UK. For the UK to abandon nuclear electricity generation in that scenario is madness as nuclear is the obvious candidate for baseload generation. New designs such as the BNFL Westinghouse AP1000 reactor are now ready for exploitation, but there is a serious risk of the intellectual property rights for that design being lost to the UK and sold to the US, thus losing the benefits of our accumulated design expertise. A balanced energy policy with a diversity of reliable energy sources is essential for the future of our country.

Lord Cameron of Dillington described a world-leading small-scale pyrolysis plant and gasification plant that is capable of extracting renewable energy from all non-inert wastes except nuclear, developed by Compact Power.

Baroness Platt of Writtle recommended the appointment of one minister responsible for security of supply. Government policy has split responsibility on this vital issue. The rise in the potential use of nuclear power was welcomed. Coalmine methane should be used rather than let it leak to the upper atmosphere. The Government was urged to act on the many fronts she described.

Lord Chorley described in vivid detail the disfigurement of the landscape by new generation turbines which simply dwarf the landscapes they inhabit.

Lord Winston noted that 50% of the audience at the Cheltenham science festival, and at other science festivals, supported nuclear power.

Lord Dixon-Smith noted that carbon dioxide emissions increased throughout Europe in 2003 and the largest contributor to that was the United Kingdom. He described the South East London Combined Heat and Power plant designed to incinerate waste, provide electricity and heat the houses nearby. However, for lack of a regulatory system not a single house has been heated. That is a scandal. He raised doubts about the benefit of generating electricity in the outer isles to supply London.

Lord Tombs attributed the Government's interest in wind power to the fact that it can be promoted through electricity regulation thus providing a source of funds not subject to Treasury scrutiny. The subsidy for wind power until 2020 will be some £30 billion due to the freedom of multiple departmental committees to reach consensus conclusions in a policy vacuum with no effective ministerial leadership. This is enough money to provide 40 Millenium Domes or 1200 brand new city academies and will render the UK less competitive with countries overseas. An approach that would address the problems of climate change and international competitiveness would be the acceptance of a renewed nuclear programme. The actions of the Government over the past eight years have been of neglect, delay and downright hostility, all of which must be brought to an end. What we have is a highly directed market designed to promote an irrational policy. This cannot go on.

Lord Moynihan presented arguments in favour of offshore wind power generation.

Baroness Miller of Chilthorne Domer noted that Malcolm Wicks, Minister with responsibility for energy is launching a consultation on micro generation

Baroness Miller of Hendon discussed security of supply.

The Parliamentary Under-Secretary of State, Department of Trade and Industry (Lord Sainsbury of Turville) The report rightly challenged the Government on many key issues. The Government's

projections for the contribution of energy crops is over-optimistic. Equal importance was given to the security of electricity supply and that of baked beans. Lord Haworth's and Lord Methuen's criticisms were welcomed, and it was accepted that this makes the UK vulnerable, and a matter for debate. Current Government policies were generally reiterated. Sir Ben Gill has been appointed to take on all the bureaucratic rules that surround biomass schemes. It was expected that generators would react to energy shortages in future by increasing coal and gas usage, thus increasing emissions.

Clean Coal Technology

Question and Written Answer on Monday 27 June

Sandra Osborne (Ayr, Carrick and Cumnock): To ask the Secretary of State for Trade and Industry what steps he is taking to support the development of clean coal technology in the UK.

Malcolm Wicks: The UK's Carbon Abatement Technologies strategy was launched on 14 June. This sets out the work programme needed to support the development of sustainable fossil fuel technologies mainly using coal and natural gas. It recognises that fossil fuels will continue to be a major source of energy for decades to come and that technologies need to be developed and deployed which will radically reduce CO₂ emissions from the use of these fuels. Improved combustion efficiency and Carbon Capture and Storage (CCS) are seen as the key technologies for achieving this aim.

The Government have announced funding of some £25 million towards demonstration of carbon abatement technologies as part of a £40 million package of support for clean energy technologies. Also, in his Budget statement this year the Chancellor undertook to assess support for the development of CCS in the Climate Change Programme Review (CCPR), including the potential for economic incentives.

In addition to this we will continue to fund research and development in this area under the DTI's Technology Programme. Under the Cleaner Coal Technology R and D Programme from 1999 up to 2008, the Government will have committed some £13.5 million in supporting UK industry to develop cleaner coal technologies. In addition to this we are also committing some £3.5 million for UK industry and academia to collaborate with the USA to develop these technologies.

Sustainable Development

Debate in Westminster Hall on Thursday 7 July

The Minister for Climate Change and the Environment (Mr Elliot Morley) introduced the debate which was overshadowed by the dreadful events in central London earlier that day. The public sector spends more than £125 billion per year which represents an enormous opportunity for furthering sustainable development, innovation, new companies and new ways of looking at whole-life assessments. During the UK presidency of the EU one of the priorities will be to lead work on promoting sustainable procurement throughout Europe. In October the UK will host a workshop with representatives from all member states to discuss how to improve environmental performance in public procurement across the EU. Various cross-departmental initiatives that are designed to make England cleaner, safer, greener and healthier were then described.

Mark Lazarowicz (Edinburgh, North and Leith) emphasised that this is a UK-wide strategy and

introduced Environment Direct that is linked nationwide to a range of Government strategies designed to encourage people to choose a more sustainable way forward.

Mr Morley referred to the recently launched eco-standard directive from the EU that focuses on energy consumption, especially the stand-by mode which is very wasteful of energy on some TVs.

Mr Geoffrey Clifton-Brown (Cotswold) Oilseed rape and cereals are being exported to other EU countries to be made into biofuel, which is then re-imported. That is crazy, arising from a lack of long-term commitment through the UK tax regime. There are active plans for a biofuel plant in the south-west if they could have that commitment.

Mr Morley said that Sir Ben Gill has been tasked with producing a report on how a biofuel industry can be developed in this country. Funding has been provided to develop the biofuel supply chain.

Mr John Hayes (South Holland and The Deepings) remarked that sustainability has become a watchword that every political speech needs to mention to gain validity. Defining it is altogether more difficult because it is used rather loosely. The Government's planned demolition of 400,000 homes is a negative example of the application of this principle, as many of these could be renovated in a more environmentally sustainable manner and as they are also essential to the character of the area.

Mr David Chaytor (Bury, North) was born and lived in one of those places and many of his constituents still do and want to get rid of them and move into modern, more energy-efficient, sustainable homes.

Mr John Hayes returned to the subject of sustainability and discussed several potential aspects of the classification and re-use of land with potential for sustainable housing development.

Norman Baker (Lewes) discussed the general misunderstanding of the meaning of the term sustainability and its application to common problems. For example, the south-east has a major problem with water resources. A desalination plant is to be built off the coast of Newhaven, yet water metering has not yet been undertaken so someone can leave their tap on all day and pay the same as someone who has the tap off all day. The Government needs to grasp the need for metering. Universal metering is needed, starting in the south-east. It should not be left to water companies to do. A long discussion ensued on the extent to which Government did or did not wish to change the definition and interpretation of sustainability in order to be able to focus in future more on the economic pillar rather than the environmental and social pillars that together support the concept.

Mr Morley concluded with a general discussion on brownfield sites and the benefits and public attitudes towards demolishing or refurbishing housing stock that is in poor condition and several other related issues.

Progress of Legislation before Parliament.

Government Bills

Charities Bill (HL) – 2nd Reading 7.6.05; Committee 28.6.05 & 12.7.05; Report 12.10.05

Commons Bill (HL) – 2nd Reading 20.7.05; provisional date for Committee 25.10.05

Identity Cards Bill – 2nd Reading 28.6.05 – Committee stage 5, 6, 7, 12, 14, 19 & 21.7.05

Merchant Shipping (Pollution) Bill (HL) – 2nd Reading 14.6.05; Committee stage 11.7.05; provisional date for Report 17.10.05

Natural Environment and Communities Bill – 2nd Reading 6.6.05; Committee 21, 23, 28 & 30.6 & 5.7.05; Report 11.10.05

Private Members' Bills

Breast Cancer Bill – introduced under the ballot by Mr Shailesh Vara MP – provisional date for 2nd Reading 20.1.06

Children's Food Bill – introduced under the ballot by Mary Creagh MP – provisional date for 2nd Reading 28.10.05

Climate Change and Sustainable Energy Bill –

introduced under the ballot by Mr Mark Lazarowicz MP – provisional date for 2nd Reading 11.11.05

Fishery Limits (United Kingdom) Bill (HL) –

introduced by Lady Saltoun of Abernethy – 2nd Reading 16.6.05 – Committee 5.7.05

Food Supplements (European Communities Act

1972 Disapplication) Bill – introduced by Mr William Cash MP – provisional date for 2nd Reading 14.10.05

Management of Energy in Buildings Bill – introduced under the ballot by Dr Alan Whitehead MP – provisional date for 2nd Reading 11.11.05

Pharmaceutical Labelling (Warning of Cognitive

Function Impairment) Bill – introduced by Mr Andrew Dismore MP – provisional date for 2nd Reading 12.5.06

Regulation of Laser Eye Surgery Bill – introduced under the ballot by Mr Frank Cook MP – provisional date for 2nd Reading 21.10.05

Parliamentary & Scientific Committee News

Sir Hermann Bondi FRS

Sir Hermann Bondi, who died in September, had been an enthusiastic member of the Committee for many years. He was a guest speaker at two of the Committee's meetings: in November 1970 he spoke on the work and future plans of the European Space Research Organisation; and in October 1982, as Chairman of the Natural Environment Research Council, he was one of three speakers on Environmental Pollution. He represented the NERC on the Committee from 1983-1987 and served as a Vice-President from 1984-1987. On his

retirement from that office he was elected a Life Member and regularly attended meetings and the annual lunch.

New Members

We are pleased to welcome the following new members:

Mr Stephen Hammond MP

Dr Keith Winters, Individual member, formerly a representative of AEA Technology

SET for BRITAIN, Scientific and Technical Organisation, represented by Dr Eric Wharton

UK Parliament - Digest of Parliamentary Debates, Questions and Answers 6th June – 21st July 2005

The references are to Hansard, giving first the date of publication, either HoC (House of Commons) or HoL (House of Lords), and finally the column number in Hansard.

**Denotes selected Debates and Questions and Answers of particular interest which are reproduced on pages 38 to 40*

Agriculture

Cereal Disease – 13.7.05 HoC 1036W
Fruit Growing – 6.7.05 HoC 425W
National Fruit Collection – 6.6.05 HoC 259W
Potato Ring Rot – 21.7.05 HoC 1966W

Animal Experiments

* Animal Testing – 6.6.05 HoC 303W, 16.6.05 HoC 549W
& 12.7.05 HoC 950W
Botulinum Toxin – 9.6.05 HoC 639W
LD50 – 4.7.05 HoC 133W
Primates – 21.6.05 HoC 889W

Animal Health and Welfare

Animal Feed: Waste Food – 21.7.05 HoL WA262
Animal Slaughter – 13.6.05 HoC 31W
Animal Welfare – 13.6.05 HoC 31W & 20.6.05 HoC 668W
Avian Flu – 14.6.05 HoC 241W & 7.7.05 HoL WA114
Bees – 6.6.05 HoC 250W, 21.6.05 HoC 886W, 4.7.05 HoC 2W & 6.7.05 HoC 413W
Birds (Imports) – 21.7.05 HoC 1947W
Cattle Diseases – 13.6.05 HoC 34W
Egg Imports – 21.7.05 HoC 1954W
Foot and Mouth – 15.6.05 HoC 421W, 28.6.05 HoC 1403W, 5.7.05 HoC 250W & 21.7.05 HoC 141WS
Illegal Meat – 20.6.05 HoC 669W
Imports – 9.6.05 HoC 1380
Marine Noise Pollution – 11.7.05 HoC 650W
National Bee Unit – 27.6.05 HoC 1188W
Newcastle Disease – 21.7.05 HoC 144WS & 1964W
Scrapie – 8.6.05 HoL WA84
Seal Products – 11.7.05 HoC 655W
Snaring – 16.6.05 HoC 561W
Veterinary Medicines (EU Directive) – 28.6.05 HoC 1405W
Medicines Directorate – 21.6.05 HoC 890W
Surgeons – 12.7.05 HoC 960W
Surgeons Act – 21.7.05 HoC 1970W

Aviation

Air Transport (Emissions) – 21.6.05 HoC 884W
Aircraft Carbon Dioxide – 27.6.05 HoC 1182W
Emergency Evacuation – 14.7.05 HoL WA164
Pollution – 28.6.05 HoC 1413W
Seat Spacing and Dimensions – 14.7.05 HoL WA163
& HoL WA164
Hydrocarbons Consumption (International Aviation) – 16.6.05 HoC 529W

Biodiversity and Conservation

Beavers – 16.6.05 HoC 550W
Canada Geese – 14.6.05 HoC 241W
Cetaceans – 21.7.05 HoC 1952W
Cormorants – 15.6.05 HoC 420W & 14.7.05 HoC 1154W
Dormice – 5.7.05 HoC 247W
Endangered Species – 16.6.05 HoC 551W & 6.7.05 HoC 415W
Regulations – 27.6.05 HoC 1185W
Gardens (Biodiversity) – 19.7.05 HoC 1520W
Hedgehogs/Badgers – 11.7.05 HoC 649W
Northern Ireland: Irish Hares – 8.6.05 HoL WA91
Peat – 21.7.05 HoC 1965W
Rats – 30.6.05 HoC 1644W
SSSIs – 16.6.05 HoC 561W
Whaling – 7.6.05 HoC 443W, 14.6.05 HoC 244W, 5.7.05 HoC 252W, 6.7.05 HoC 430W & 13.7.05 HoC 1041W
White-tailed Sea Eagle – 30.6.05 HoC 1646W
Woodland – 29.6.05 HoC 57WS

Biological and Chemical Weapons

Bio-contamination – 20.6.05 HoC 734W
Biological and Toxin Weapons Convention – 5.7.05 HoC 322W & 14.7.05 HoC 1176W

Biotechnology

Bt 10 Maize – 28.6.05 HoC 1499W
Genetically Modified Maize – 6.6.05 HoC 257W & 14.6.05 HoC 242W
GM Animal Feed – 21.7.05 HoC 1960W
GM Crops – 16.6.05 HoC 553W, 6.7.05 HoC 427W, 14.7.05 HoC 1169W, 18.7.05 HoC 1282W, 20.7.05 HoC 1710W & 21.7.05 HoC 2068W
GM Food/Materials – 7.6.05 HoC 528W, 9.6.05 HoC 629W, 27.6.05 HoC 1360W & 28.6.05 HoC 1505W
Monsanto's Maize – 9.6.05 HoC 633W & 5.7.05 HoC 354W
Toxin – 14.6.05 HoC 308W

Bovine Tuberculosis

Badger Culling – 15.6.05 HoC 420W
Badger/Cattle TB – 12.7.05 HoC 951W
Badgers – 7.6.05 HoC 441W, 27.6.05 HoC 1183W & 6.7.05 HoL WA89
Bovine Tuberculosis – 16.6.05 HoL WA139 & 30.6.05 HoL WA31
Tuberculosis – 21.6.05 HoC 885W
Bovine Tuberculosis – 9.6.05 HoC 1375 & 622W, 13.6.05 HoC 33W, 20.6.05 HoL WA157, 27.6.05 HoC 1317W, 30.6.05 HoC 1637W, 4.7.05 HoC 3W, 7.7.05 HoC 436 & 564W, 11.7.05 HoC 813W, 14.7.05 HoC 1153W, 19.7.05 HoC 1515W & 21.7.05 HoC 1947W

BSE and CJD

Beef Imports – 12.7.05 HoC 951W
BSE – 13.6.05 HoC 33W, 6.7.05 HoC 414W & 20.7.05 HoC 1707W
Variant CJD – 20.7.05 HoC 91WS & HoL WS113
UK Cases – 7.6.05 HoL WA51

Chemicals

EU Presidency (Environmental and Sustainable Development) – 19.7.05 HoC 1108
Hormone Disruptors – 21.7.05 HoC 1961W
Mole-catchers – 27.6.05 HoC 1188W & 28.6.05 HoC 1403W
Parkinson's Disease – 14.6.05 HoC 308W
PBDE – 28.6.05 HoC 1524W
Pesticides/Chemicals (Royal Commission) – 21.7.05 HoC 1965W
Phthalates – 9.6.05 HoC 634W & 22.6.05 HoC 1107W
Strychnine Hydrochloride – 27.6.05 HoC 1295W

Climate Change

Air Conditioning – 7.6.05 HoC 457W
Carbon Capture – 20.6.05 HoC 696W
Technology – 20.6.05 HoC 716W
Carbon Emissions – 16.6.05 HoC 550W, 12.7.05 HoC 952W & 18.7.05 HoC 1281W
Clean Coal: China and India – 19.7.05 HoL 1355
Climate Change – 6.6.05 HoC 251W, 29.6.05 HoL WA23, 7.7.05 HoC 446, 14.7.05 HoC 1153W & 18.7.05 HoC 1328W
G8 – adjournment debate – 14.6.05 HoC 58WH
G8 – debate – 29.6.05 HoC 1359
Programme – 16.6.05 HoC 22WS
Fuel Emissions – 19.7.05 HoL WA211
Greenhouse Gas Emissions (EU) – 7.7.05 HoC 429
Insects – 21.6.05 HoC 886W
World Climate: Impact of Destruction of Rainforests – 6.6.05 HoL WA42

Construction

Building Regulations (Fire Safety) – 19.7.05 HoC 59WS

Crime

Automatic Number Plate Recognition – 20.6.05 HoC 748W, 4.7.05 HoC 122W & 11.7.05 HoC 759W
Credit Card Fraud – 21.7.05 HoC 2186W
Identity Theft – 7.6.05 HoC 511W, 9.6.05 HoC 656W & 20.7.05 HoC 1783W
Internet Fraud – 16.6.05 HoC 611W
National Identity Register – 15.6.05 HoC 453W
Police Information Technology Organisation – 23.6.05 HoC 46WS
Scanner Technology – 19.7.05 HoC 1622W

Defence

A400M – 21.6.05 HoL WA167
Bowman Communication System – 5.7.05 HoC 257W, 7.7.05 HoL 733 & 21.7.05 HoC 2110W
Defence Science and Technology Laboratory: Key Targets – 13.7.05 HoC 29WS & HoL WS38
Departmental Research – 27.6.05 HoC 1200W
Falcon Secure Trunk Communication System – 5.7.05 HoC 5WS
FRES – 6.6.05 HoC 285W, 27.6.05 HoC 1201W &

21.7.05 HoC 2114W
Military Technology Transfer – 19.7.05 HoC 1105
Nuclear Weapons – 14.6.05 HoC 333W
QinetiQ – 20.6.05 HoC 667W
Unmanned Aerial Vehicles – 6.6.05 HoC 246W, 14.6.05 HoC 334W, 28.6.05 HoC 1401W & 5.7.05 HoC 262W
Watchkeeper – 20.7.05 HoC 86WS & HoL WS104

Defence (Gulf War)

Gulf Veterans – 19.7.05 HoC 58WS & HoL WS75, 21.7.05 HoL 1593
Illnesses – 13.6.05 HoC 1WS & HoL WS49,
Gulf War Illnesses – 21.7.05 HoL WS136 & WA281
Gulf War Veterans: Neuro-imaging Studies – 21.7.05 HoL WA281
US Gulf War Veterans – 21.7.05 HoL WA323

Education

Academic Freedom – 14.7.05 HoL WA163
Academic Research (Commercial Exploitation) – 11.7.05 HoC 827W
A-levels – 14.6.05 HoC 351W
And GCSEs – 5.7.05 HoL 529
Grades – 6.6.05 HoC 326W
Mathematics – 19.7.05 HoL WA204
Physics and Chemistry – 13.7.05 HoL WA145
Chemistry – 11.7.05 HoC 833W
Students – 28.6.05 HoC 1434W
Dyslexia – 11.7.05 HoC 835W
Graduation Statistics – 23.6.05 HoC 943
Higher Education Institutions – 21.6.05 HoC 1009W
International GCSE – 30.6.05 HoC 1701W
Life-long Learning (EUC Report) – 7.7.05 HoL 832S
Mathematics – 21.6.05 HoC 1010W, 4.7.05 HoC 163W, 11.7.05 HoC 840W, 20.7.05 HoC 1723W & 21.7.05 HoC 2057W
Medical Academics – 14.6.05 HoL 1123
Multiplication – 23.6.05 HoC 1170W
Museums – debate – 9.6.05 HoL 1009
Postgraduate Science Degrees – 29.6.05 HoC 1625W
University Admissions – 4.7.05 HoC 176W
Departments (Closures) – 16.6.05 HoC 596W
Graduates – 4.7.05 HoC 176W

Energy

BP Decarbonised Fuel Project (Scotland) – 4.7.05 HoC 2WS
Carbon Capture and Abatement Technologies – 4.7.05 HoC 49W, 7.7.05 HoC 615W & 21.7.05 HoC 1922W
Carbon Sequestration – 4.7.05 HoC 50W, 12.7.05 HoC 852W & 18.7.05 HoC 1337W
* Clean Coal Technology – 6.6.05 HoL 659 & 27.6.05 HoC 1227W
Cleaner Fossil Fuel Technologies – 4.7.05 HoL WS13
Clear Skies Programme – 21.7.05 HoC 1923W
Coal Gasification Technology – 4.7.05 HoC 50W
Coal Mining – 23.6.05 HoC 1155W
Coal Reserves (South Wales) – 6.7.05 HoC 460W
Crude Oil Production – 18.7.05 HoC 1338W
Deep Coal Industry – 21.7.05 HoC 1396
Domestic Energy Costs – 23.6.05 HoC 1164W
Electricity Generation – 20.7.05 HoC 1739W
Waste Energy – 20.6.05 HoL WA152

Energy – 14.6.05 HoC 11WS
 Consumption: Domestic Appliances Standby Mode – 22.6.05 HoL WA187
 Efficiency – 9.6.05 HoC 1378 & 4.7.05 HoC 4W
 Green Paper – 7.7.05 HoC 443
 Policy – 14.6.05 HoL WS54, 20.6.05 HoL WA151 & 27.6.05 HoL WA3
 Research – 6.6.05 HoC 306W & 21.7.05 HoC 1926W
 Research, Development and Training – 27.6.05 HoL 4
 Security – 18.7.05 HoC 1339W
 Strategy – 4.7.05 HoC 53W & 5.7.05 HoC 283W
 Supply – 7.6.05 HoC 455W
 White Paper – 13.6.05 HoC 77W
 Gas Turbines – 23.6.05 HoC 1165W
 Hydro Electricity – 19.7.05 HoC 1521W
 Hydro Power – 18.7.05 HoC 1340W
 Hydrogen Energy – 21.7.05 HoC 1921W
 Methane Energy – 18.7.05 HoC 1282W
 Methane Gas – 5.7.05 HoC 284W
 Natural Gas – 13.6.05 HoC 81W
 Non-polluting Energy Technologies – 18.7.05 HoC 1346W
 North Sea Oil – 19.7.05 HoL WA219
 Oil and Gas Imports – 4.7.05 HoC 57W
 Oil Imports – 12.7.05 HoC 856W
 Oil Prices – debate – 8.6.05 HoL 936
 Royal Commission on Environmental Pollution – 18.7.05 HoC 1350W
 Standby Mode – 16.6.05 HoC 562W

Energy (Nuclear)

Advanced Gas-cooled Reactor Nuclear Power Stations – 4.7.05 HoC 47W
 Nuclear Fusion – 21.7.05 HoL WA313
 Industry – 7.6.05 HoC 462W
 Installations: Licensing – 19.7.05 HoL WA229
 Power – 7.6.05 HoC 1109, 23.6.05 HoC 929, 12.7.05 HoC 855W & 20.7.05 HoC 1744W

Energy (Renewable)

Biofuels – 9.6.05 HoC 1367 & 12.7.05 HoC 952W
 Directive – 13.6.05 HoC 32W
 EU Targets – 20.7.05 HoL 1467
 Electricity Generation – 13.6.05 HoL 1064
 Energy Crops – 21.7.05 HoC 1955W
 Local Energy Generation – adjournment debate – 6.6.05 HoC 1101
 Microgeneration – 21.7.05 HoC 1920W
 Onshore Wind Technology – 28.6.05 HoC 1409W
 Renewable Energy – 6.6.05 HoC 372W, 7.6.05 HoC 1115, 20.6.05 HoC 721W, 22.6.05 HoC 1042W, 23.6.05 HoC 1156W, 27.6.05 HoC 1234W, 18.7.05 HoC 1348W, 21.7.05 HoC 163WS & HoL WS150
 Crops – 9.6.05 HoC 623W
 Planning – 30.6.05 HoL WA49
 * S&T Report – debate – 23.6.05 HoL 1787
 Solar Grants Programme – 16.6.05 HoC 616W
 Wind Energy – 21.6.05 HoL WA166
 Wind Farms – 13.6.05 HoC 85W, 23.6.05 HoC 1155W, 28.6.05 HoC 1410W, 21.7.05 HoC 1933W

Environment (Pollution)

Air Pollution – 22.6.05 HoC 1091W
 Aquatic Environment – 20.6.05 HoC 669W
 Asbestos – adjournment debate – 28.6.05 HoC 403WH

Carbon Dioxide Emissions – 21.7.05 HoC 1951W
 Munitions/Fireworks Production (Land Contamination) – 30.6.05 HoC 1643W
 Pollution – 12.7.05 HoC 957W
 Smog – 5.7.05 HoC 254W
 Smog Warning – 14.7.05 HoC 1200W
 Trees – 15.6.05 HoC 432W

Environment (Protection)

Antarctic Consultative Meeting (Swedish Proposal) – 29.6.05 HoC 1575W
 Biospheres – 12.7.05 HoL WA137
 Carbon Sequestration – 4.7.05 HoC 3W
 Disaster Management – 4.7.05 HoL 413
 Flood Defences – 27.6.05 HoC 1186W
 Global Environment Facility – 27.6.05 HoC 1194W
 Marine Environment – 21.7.05 HoC 1963W
 Marine Noise Pollution – 6.7.05 HoC 476W
 Oil Tankers – 15.6.05 HoC 416W
 Plastic Bags – 7.7.05 HoL 731
 Rainforest – 18.7.05 HoC 1284W
 Roads – 4.7.05 HoC 25W
 Tree Cover – 13.7.05 HoC 1040W
 Trees – 16.6.05 HoC 565W & 11.7.05 HoC 655W

EU Meetings

Agriculture and Fisheries Council – 18.7.05 HoC 47WS & 21.7.05 HoC 145WS
 Education Ministers (Informal Meeting) – 21.7.05 HoC 127WS & HoL WS124
 Employment, Social Policy, Health and Consumer Affairs Council – 13.6.05 HoC 1WS & HoL WS50
 EU Presidency: Informal Competitiveness Council – 21.7.05 HoC 166WS & HoL WS127
 EU Telecom Council – 13.7.05 HoC 32WS & HoL WS39
 REACH – 20.7.05 HoC 1712W

Fisheries

Cetaceans – 5.7.05 HoC 245W & 11.7.05 HoC 645W
 Cormorants – 13.7.05 HoC 1037W
 Falkland Islands (Fish Stocks) – 14.6.05 HoC 326W
 Fisheries – 23.6.05 HoC 1115W & 21.7.05 HoC 1958W
 Fishing Industry – 9.6.05 HoC 1385
 Strategy Unit Report – 28.6.05 HoC 53WS
 Marine Bill – 7.6.05 HoC 442W
 River Thames – 4.7.05 HoC 11W
 Salmon – 22.6.05 HoL WA186
 Fishing – 20.6.05 HoL WA155
 Sea Fish – 21.7.05 HoC 1968W
 Sea Fishing (Restriction of Days at Sea) Order 2005 – 11.7.05 HoL WA134

Food

Acrylamide (Foodstuffs) – 28.6.05 HoC 1496W
 Air Services (Meals) – 27.6.05 HoC 1257W
 Annual Review of Controls on Imports of Animal Products – 20.7.05 HoC 89WS
 British Nutrition Foundation – 16.6.05 HoC 634W
 Food Irradiation – 18.7.05 HoC 1461W
 Labelling – 19.7.05 HoC 1671W
 Poisoning – 22.6.05 HoC 1069W
 Standards Agency – 27.6.05 HoC 1358W
 GCSE Food Technology – 13.6.05 HoC 195W
 Healthy Eating – 20.7.05 HoC 1901W
 Illegal Meats – 7.6.05 HoC 530W

School Meals – 7.6.05 HoC 476W, 21.6.05 HoC 1023W,
23.6.05 HoC 1171W & 20.7.05 HoC 1728W
Soya Milk – 14.6.05 HoC 309W
Trans Fats – 11.7.05 HoC 749W
UK-produced Food – 11.7.05 HoC 656W

Food (Supplements)

EU Regulation (Nutrition and Health Claims) – 7.6.05 HoC 526W
Food Labelling/Supplements – 7.6.05 HoC 526W
Supplements – 20.6.05 HoC WA154
Supplements Directive – 22.6.05 HoL WA184 &
21.7.05 HoC 2162W

Health (Cancer)

Anaemia – 27.6.05 HoC 1337W
Anastrozole – 18.7.05 HoC 1379W
Breast Cancer – 6.6.05 HoC 414W, 14.6.05 HoC 147,
20.6.05 HoC 696W & 843W & 21.7.05 HoC 2146W
Screening – 22.6.05 HoC 1095W
Cancer – 4.7.05 HoC 203W
Deaths – 4.7.05 HoC 192W
Research – 20.7.05 HoC 1869W
Services/Treatment – 27.6.05 HoC 1339W
Treatment – 28.6.05 HoC 1500W, 30.6.05 HoC
1752W, 18.7.05 HoC 1454W, 19.7.05 HoC 1662W &
20.7.05 HoC 1893W
Treatment – debate – 21.7.05 HoL 1631
Cervical Cancer – 5.7.05 HoC 274W
Smear Tests – 15.6.05 HoC 501W
Childhood Cancer – 7.6.05 HoC 525W
Lymphoma – 28.6.05 HoC 1514W
Medical Research Council – 21.7.05 HoC 1930W
Myeloma – 6.6.05 HoC 432W, 12.7.05 HoC 972W,
18.7.05 HoC 1468W & 21.7.05 HoC 1983W
Photodynamic Therapy – 11.7.05 HoC 742W
Prostate Cancer – 6.6.05 HoC 371W
Skin Cancer – 13.7.05 HoC 1146W
Testicular Cancer – 20.6.05 HoC 703W

Health (General)

Abdominal Aortic Aneurysm Screening – adjournment
debate – 21.6.05 HoC 227WH
Abortion – 6.6.05 HoC 413W
Allergies – 15.6.05 HoC 499W
Alzheimer's Disease – 20.7.05 HoC 1889W
Avian Flu – 23.6.05 HoL 1725, 11.7.05 HoC 812W &
21.7.05 HoC 2146W
Bowel Diseases – 13.7.05 HoC 1124W
Cannabis – 27.6.05 HoC 1020
Chlamydia – 20.7.05 HoC 1893W
Childhood Obesity – 16.6.05 HoC 634W
Chronic Fatigue – 15.6.05 HoC 501W
Chronic Liver Disease – 16.6.05 HoC 635W
Colitis/Crohn's Disease – 6.7.05 HoC 460W
Complementary Medical Practitioners – 20.7.05 HoC
1896W
Complex Regional Pain Syndrome – 13.6.05 HoC 76W
Coronary Heart Disease – adjournment debate – 9.6.05
HoC 199WH
Dental Health Research – debate – 4.7.05 HoL 486
Diabetes – 20.6.05 HoC 790W
Duchenne Muscular Dystrophy – 6.6.05 HoC 421W,
16.6.05 HoC 636W & 27.6.05 HoC 1355W

Embryos – 18.7.05 HoC 1460W
Foreign Animal Species – 21.7.05 HoC 2162W
Genetic Testing – 15.6.05 HoC 507W
Hepatitis C – adjournment debate – 11.7.05 HoC 672
Herbal Medicinal Products – 21.7.05 HoC 2168W
Human Embryos (Research) – 11.7.05 HoC 728W
Macular Degeneration – 15.6.05 HoC 512W
Malarial Infections – 5.7.05 HoC 352W
MRSA – research – 27.6.05 HoC 1372W
Myalgic Encephalomyelitis – 21.6.05 HoC 952W
Neonatal Care – 11.7.05 HoL WA128
Obesity – 19.7.05 HoC 1676W
Organ Transplants – debate – 21.7.05 HoL 1604
Ovarian Tissue Transplants – 21.7.05 HoC 2174W
Palliative Care – 21.7.05 HoC 2175W
Palliative Care – debate – 7.7.05 HoL 786
Panton-Valentine Leukocidin – 16.6.05 HoC 643W
Streptococcus Testing – 6.6.05 HoC 439W
Venous Thromboembolism – 21.7.05 HoC 152WS & HoL
WS164
Virus Outbreaks – 14.7.05 HoC 1201W
Xenotransplantation – 6.6.05 HoC 260W

Health (Infections)

Bacteriophages – 30.6.05 HoC 1752W & 7.7.05 HoC
575W
Clostridium Difficile – 13.6.05 HoC 49W, 89W & 102W,
15.6.05 HoC 502W, 21.6.05 HoC 964W, 22.6.05 HoC
1068W & 1097W, 27.6.05 HoC 1344W, 28.6.05 HoC
1502W, 11.7.05 HoC 717W, 19.7.05 HoC 1663W &
20.7.05 HoC 1895W
Health Care Associated Infection – 13.6.05 HoC 104W,
27.6.05 HoC 1363W, 6.7.05 HoC 454W & 11.7.05 HoC
727W
Hospital Hygiene – 21.6.05 HoC 966W & 22.6.05 HoC
1104W
Hospital Infections – 28.6.05 HoC 1425W, 4.7.05 HoC
86W & 21.7.05 HoC 2169W
Hospital-acquired Infections – 16.6.05 HoC 640W, 29.6.05
HoC 1607W, 30.6.05 HoC 1759W, 5.7.05 HoC 350W,
6.7.05 HoC 433W, 12.7.05 HoC 889W & 981W &
14.7.05 HoC 1189W
Infection Surveillance Data – 13.6.05 HoC 104W &
14.7.05 HoC 1190W
MRSA – 13.6.05 HoC 105W, 28.6.05 HoC 1397W &
1519W & 6.7.05 HoC 456W
National Infection Control Manual – 20.7.05 HoC 1909W
Surgical Site Infections – 20.6.05 HoC 869W

Health (International Development)

Africa (HIV/AIDS/Tuberculosis) – 5.7.05 HoC 266W
Antiretroviral Drugs – 13.6.05 HoC 3W
Brazil (HIV/AIDS) – 8.6.05 HoC 589W
Malaria – 13.7.05 HoC 1044W
Malaria/Tuberculosis – 19.7.05 HoC 1577W
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Eradication – 6.7.05 HoC 10WS

Health (Service and IT)

Allergy Specialists – 20.6.05 HoC 783W
Appraisals (NIHCE) – 30.6.05 HoC 1750W
Influenza – 7.6.05 HoC 530W & 14.6.05 HoC 307W
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National Institute for Health and Clinical Excellence – 6.6.05 HoC 432W
 NHS Research Ethics Committees – 6.6.05 HoC 33WS & HoL WS35, 13.7.05 HoC 1139W & 18.7.05 HoC 1468W
 NHS: Specialised Services – debate – 11.7.05 HoL 955
 Positron Emission Tomography Services – 19.7.05 HoC 1677W
 National NHS Database – 11.7.05 HoC 734W
 NHS: Information Systems – 11.7.05 HoL WA130
 NHS (IT Programme) – 8.6.05 HoC 587W

Health (Vaccines)

Anthrax Vaccination – 18.7.05 HoC 1309W
 Avian Flu – 18.7.05 HoL WA182
 Hepatitis – 30.6.05 HoC 1757W
 Hepatitis B – 14.7.05 HoC 1189W & 18.7.05 HoC 1465W
 Influenza Pandemic – 5.7.05 HoC 351W
 MMR (Students) – 28.6.05 HoC 1518W
 MMR Vaccinations – 13.7.05 HoC 1137W
 Mumps – 20.6.05 HoC 795W & 19.7.05 HoC 1675W
 Thimerosal – 28.6.05 HoC 1527W
 Tuberculosis – 28.6.05 HoC 1528W
 Vaccination – 18.7.05 HoL WA198

Information Technology

E-Government – 6.6.05 HoC 392W
 Government Departments: Electronic Attack – 18.7.05 HoL WA188
 IT Outsourcing – 14.6.05 HoL WA122
 Open Source Software – 15.6.05 HoL WA137
 Police Information Technology Organisation – 23.6.05 HoL WS80
 Schools: Open Source Software – 14.6.05 HoL WA121

Information Technology (ID Cards)

Biometric Information – 28.6.05 HoC 1448W & 4.7.05 HoC 122W
 Readers – 18.7.05 HoL WA182
 Identity Cards – 8.6.05 HoC 576W, 9.6.05 HoC 655W, 20.6.05 HoC 757W, 27.6.05 HoC 1242W & 28.6.05 HoC 1451W
 Biometric Technology – 13.6.05 HoC 159W & 21.7.05 HoL WA284
 Technology – 15.6.05 HoC 449W
 Identity Checks (Heathrow) – 9.6.05 HoC 656W

Intellectual Property

Draft European Computer Implemented Inventions Directive – 6.6.05 HoC 305W
 Patent Act – 18.7.05 HoC 1348W

International Development

Africa (Poverty) – adjournment debate – 30.6.05 HoC 1466
 Africa Commission – debate – 20.6.05 HoL 1484
 Fossil Fuels (International Funding) – 29.6.05 HoC 1541W
 Horticulture – 12.7.05 HoC 1005W
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Medicines and Drugs

Actrapid Insulin – 22.6.05 HoC 1091W & 29.6.05 HoC 1595W
 Adverse Drug Reactions – 20.7.05 HoC 1885W

Alzheimer's – 6.6.05 HoC 413W, 14.6.05 HoC 158, 16.6.05 HoC 630W & 12.7.05 HoC 696
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 Antipsychotic Drugs – 11.7.05 HoC 716W
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 Counterfeit Medicines – 22.6.05 HoC 1086W, 28.6.05 HoC 1465W, 4.7.05 HoC 206W & 21.7.05 HoC 2148W
 Diabetes: Insulin Injection Pens – 9.6.05 HoL 964
 Drugs – 4.7.05 HoC 126W
 Drugs Blacklist – 20.7.05 HoC 1899W
 Erythropoietin – 18.7.05 HoC 1461W
 Flixotide – 6.6.05 HoC 421W
 Herceptin – 6.6.05 HoC 426W & 27.6.05 HoC 1362W
 Illicit Medicines – 20.7.05 HoC 1902W
 Khat – adjournment debate – 8.6.05 HoC 183WH
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 Orlistat – 13.7.05 HoC 1143W
 Pharmaceutical Counterfeiting – 28.6.05 HoC 1470W
 Pharmaceuticals – 6.6.05 HoC 436W
 Rheumatology – 15.6.05 HoC 515W
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 Selective Serotonin Reuptake Inhibitors – 4.7.05 HoC 227W
 Seroxat – 13.7.05 HoC 1145W & 20.7.05 HoC 1917W
 Simvastatin – 20.6.05 HoL WA152, 13.7.05 HoC 1146W & 21.7.05 HoC 2181W
 Traditional Herbal Medicinal Products Directive – 27.6.05 HoC 1383W
 Velcade – 28.6.05 HoC 1473W
 Zoledronate – 13.6.05 HoC 110W

Nuclear and Radiation Hazards

Childhood Leukaemia (Power Lines) – 20.6.05 HoC 785W
 Committee on Radioactive Waste Management – 13.6.05 HoC 34W & 29.6.05 HoL WA25
 Leukaemia (High Voltage Lines) – 14.6.05 HoC 307W
 Nuclear Industry – 13.6.05 HoC 83W
 Inventories (Missing Material) – 16.6.05 HoC 577W
 Power – 18.7.05 HoC 1347W
 Nuclear Waste – 21.6.05 HoC 887W & 918W & 22.6.05 HoC 1040W
 Portsmouth – 6.7.05 HoC 428W
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 Portsmouth Nuclear Accident Plan – 28.6.05 HoC 1399W
 Radioactive Waste (Consultation) – 7.7.05 HoC 440
 Disposal – 6.7.05 HoC 429W
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 THORP Plant – 15.6.05 HoC 413W

Science Policy

Business and Industry Skills – 11.7.05 HoC 700W
 DEFRA Laboratory Strategy – 14.7.05 HoC 36WS & HoL WS47
 Empirical Economics of Standards – 20.6.05 HoC 28WS
 European Charter for Researchers – 11.7.05 HoC 701W
 Measurement Advisory Committee – 11.7.05 HoC 702W
 Parliamentary Links Day – 22.6.05 HoC 797
 Research and Development – 30.6.05 HoC 1435, 11.7.05 HoC 843W, 13.7.05 HoC 1145W & 18.7.05 HoL WA197

Research, Technology and Development – 5.7.05 HoC 285W
 Science and Engineering Graduate Scheme – 4.7.05 HoC 140W
 Science and Innovation Investment Framework – 20.7.05 HoL WS110
 Science Budget – 6.7.05 HoC 466W
 Science Investment – 7.7.05 HoC 620W & 19.7.05 HoC 1694W
 Stem Cell Research – 28.6.05 HoC 1527W
 US-UK Technology Transfer – 18.7.05 HoC 1353W

Space

British National Space Centre – 18.7.05 HoC 1337W
 European Space Policy – 23.6.05 HoC 1165W
 Space Exploration and Research – 5.7.05 HoL WA82
 Weapons in Space – 30.6.05 HoC 1738W

Sustainable Development

Deforestation (Brazil) – 12.7.05 HoC 1003W
 Forests – 20.6.05 HoC 691W
 Future of Transport – 6.6.05 HoC 277W
 Rainforests – 15.6.05 HoL 1195
 Illegal Logging – 4.7.05 HoL WA64
 Review of Sustainable Construction – 7.7.05 HoC 18WS
 Spatial Strategy (Water) – 20.6.05 HoC 840W
 Sustainability Designing – 8.6.05 HoC 563W
 * Sustainable Development – adjournment debate – 7.7.05 HoC 141WH
 Action Plans – 20.7.05 HoC 1714W
 Indicators – 30.6.05 HoC 65WS

Telecommunications and Broadcasting

3G Masts – 18.7.05 HoC 1425W
 Airwave – 20.6.05 HoC 747W
 Digital Reception (Rural Areas) – 18.7.05 HoC 1363W
 Digital Satellite Broadcasting – 23.6.05 HoC 1138W
 Digital Switchover – 21.7.05 HoC 112WS
 Adjournment debate – 5.7.05 HoC 54WH
 Digital Television – 13.6.05 HoC 10, 16.6.05 HoC 524W(2), 11.7.05 HoC 634W & 21.7.05 HoL WS123
 Mobile Phone Masts – 14.6.05 HoC 275W & 23.6.05 HoC 1138W
 Mobile Phones (Children) – 8.6.05 HoC 612W & 28.6.05 HoC 1519W
 Mobile Telephones – 7.6.05 HoC 531W
 Remote Electronic Voting – 18.7.05 HoC 1305W
 Telecommunications Masts – 22.6.05 HoC 1112W, 5.7.05 HoC 403W & 21.7.05 HoC 2097W
 Adjournment debate – 28.6.05 HoC 345WH
 Tetra Transmission – 7.6.05 HoC 522W

Transport

Air Pollution – 9.6.05 HoC 625W
 Biofuels – 12.7.05 HoC 994W
 Carbon Emissions – 5.7.05 HoC 244W & 20.7.05 HoC 1708W
 Fuel-efficient Cars – 12.7.05 HoC 999W
 Hydrogen Fuel Cell Buses – 20.7.05 HoC 1794W
 New Cars (Emissions) – 8.6.05 HoC 553W
 Passenger Transport (Fuel Consumption) – 20.7.05 HoC 1798W
 Pedestrian Crossings – 14.6.05 HoC 250W
 Pelican and Puffin Crossings – 6.6.05 HoC 278W
 Quieter Road Surfaces – 14.6.05 HoC 251W
 Renewable Transport Fuels – 9.6.05 HoC 1384 & 7.7.05 HoC 603W
 Road Charging Research – 27.6.05 HoC 1268W
 Pricing – 27.6.05 HoC 1269W
 Surfaces – 7.6.05 HoL WA63
 Tax – 7.7.05 HoC 604W
 Transport Fuels – 7.7.05 HoC 606W
 Solar-powered Devices – 6.6.05 HoC 279W
 Wheel Detachment Incidents – 21.7.05 HoC 2139W

Waste

Farm Plastics – 12.7.05 HoC 953W
 Government's National Waste Strategy – 21.7.05 HoC 147WS
 Hazardous Waste – 16.6.05 HoC 553W
 Incinerators – 15.6.05 HoC 509W
 Packaging – 4.7.05 HoC 9W
 Recycling – 11.7.05 HoC 651W & 14.7.05 HoC 1157W
 Sustainable Waste Management – 21.7.05 HoC 142WS
 Tyres – 30.6.05 HoC 1645W
 Waste Disposal – 14.7.05 HoC 1158W
 Definition – 6.6.05 HoL WA41
 Electrical and Electronic Equipment Directive – 18.7.05 HoC 1353W
 Management – 13.6.05 HoC 45W, 15.6.05 HoC 433W & 27.6.05 HoC 1190W
 Recycling – 28.6.05 HoC 1406W

Water

Water (Bacterial Contamination) – 16.6.05 HoC 646W
 Fluoridation – 5.7.05 HoC 367W
 Pollution – 13.6.05 HoC 47W
 Resources – 18.7.05 HoC 1289W
 Supply – 7.7.05 HoL 736

Euro-News

Commentary on science and technology within the European Parliament and the Commission

Parliament rejects a proposal on retention of data to prevent terrorist crimes

Following recommendations from the Committee on Civil Liberties, Parliament rejected a proposal from France, Ireland, Sweden and the United Kingdom on the adoption of a framework decision. This concerned the retention of data processed and stored in connection with the provision of publicly available electronic communication services or data on public communications networks. The purpose of the proposal was prevention, investigation, detection and prosecution of crime and criminal offences including terrorism.

Ban on six phthalates

Parliament voted in favour of a permanent ban on six phthalates, DEHP, DBP, BBP, DINP, DIDP and DNOP in toys and childcare articles. Phthalates are used to soften plastic. Since 1999, the use of six types of phthalate have been temporarily banned in the manufacture of toys and childcare articles for children under the age of three because of their carcinogenic, mutagenic and reprotoxic effects. These chemicals are not trapped by the PVC and can be released into the mouth and then absorbed by a child who is chewing a toy. MEPs also called on the Commission to look at other types of material containing these phthalates, especially in the fields of healthcare, food packaging, and floor coverings. They also wanted to limit the use of aromatic ingredients to 0.05% of the plasticized material so as not to encourage children to put the articles into their mouths. Manufacturers use aromatic products to mask the naturally unpleasant odour of phthalates.

Flame retardants: MEPs challenge the Commission

The "comitology" procedure, by which the power to take decisions on mainly technical matters is delegated to the Commission, is throwing up another conflict between MEPs and the European Commission. This time the dispute is over whether to scrap restrictions imposed two years ago on the use of decaBDE, a brominated flame-retardant used chiefly to ensure that electric and electronic devices, such as televisions and computers, do not burst into flames. The Commission wants to lift the restrictions but MEPs adopted a resolution opposing this plan. The MEPs believe the Commission has clearly exceeded its implementing powers and are calling on the Council to oppose the proposal. Brominated flame retardants can have toxic effects on health and the environment. Some of them, penta- and octaBDE were in fact completely banned two years ago. Parliament fought up to the conciliation stage to win a ban on octaBDE and restrictions on decaBDE, pending – for the latter – more precise risk assessments. These do not convince MEPs who note that less toxic substitute products exist, hence the justification for continuing the ban.

Agriculture in the outermost regions

Programmes for agriculture in the outermost regions of the Union will apply from 1 January 2006 or from a date thereafter. The list of products eligible should be a matter for each Member State. Community support programmes

should promote improvements to the environment and landscape by sustainable land management.

Patenting of computerised inventions

In a second reading vote on the controversial directive on the patentability of computerised inventions, the EP Legal Affairs Committee is recommending to allow patents on computer-driven inventions to protect the software itself. It is now up to the Parliament to decide.

PAH use to be restricted

A new European directive intends to reduce the use of certain aromatic hydrocarbons. Polycyclic aromatic hydrocarbons (PAH) are constituents in oils, some of which are used as extender oils in the production of tyres, and some of which are classified as carcinogenic, mutagenic and reprotoxic substances. Tyre tread, for example, contains up to 28 per cent of extender oils. These dangerous substances are released into the environment in the form of fine particles through tyre debris. From 2010, producers will have to apply new restrictive norms.

REACH "an asset for European competitiveness"

The EU's proposed new chemicals package (REACH) will "give a push to competitiveness in Europe" according to Luxembourg's Minister for the Environment, Lucien Lux, at a REACH workshop where KPMG presented their impact assessment study which concluded that the additional costs to industry were negligible.

Biometrics technology

Biometrics technology, which uses physical or behavioural information to identify a person, is increasingly being discussed as a means to tackle fraud and theft. National debates are under way in several countries on how desirable this technology is. A wider examination of its implications, involving all potential stakeholders, is yet to take place.

European gateway for science education

The European Commission has launched a new European gateway for science education – the Xplora portal – to make science more interesting to young people and encourage them to take up scientific careers. Xplora provides resources for primary and secondary education, and is aimed at teachers, pupils, scientists, communication professionals and others involved in science education. To discover Xplora please visit <http://www.xplora.org>

Keeping Europe at the forefront of nanotechnology

The European Commission has proposed an action plan for nanosciences and nanotechnologies (N&N) which makes clear what the Commission and the Member States must do in order to keep Europe at the forefront in this field. The Commission has pledged to reinforce N&N within FP7 to include specific support for nanoelectronics under the information society technologies section of FP7 and to boost funding for research into the potential impacts of N&N.

European Union - Digest

The references are to the Official Journal of the European Communities (OJ), Adopted Legislation from the L Series (OJL) and Proposals and Opinions from the C Series (OJC).

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The Association for the British Pharmaceutical Industry members brings together companies in Britain producing prescription medicines both through manufacture and supply as well as research and development (R&D).

The ABPI's mission is to represent the pharmaceutical industry operating in the UK in a way that:

- assures patient access to the best available medicine;
- creates a favourable political and economic environment;
- encourages innovative research and development;
- avoids unfair commercial returns

Association of Marine Scientific Industries



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AMSI is a constituent association of the Society of Maritime Industries; the other associations are:
Association of British Offshore Industries (ABOI)
British Marine Equipment Association (BMEA)
British Naval Equipment Association (BNEA)
Ports and Terminals Group (PTG)

Academy of Medical Sciences



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The Academy of Medical Sciences promotes advances in medical science and campaigns to ensure these are converted as quickly as possible into healthcare benefits for society. The Academy's eight hundred Fellows are the United Kingdom's leading medical scientists from hospitals, academia, industry and the public service. The Academy provides independent, authoritative advice on public policy issues in medical science and healthcare.

AIRTO



Contact: Professor Richard Brook
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AIRTO represents the UK's independent research and technology sector - member organisations employ a combined staff of over 20,000 scientists and engineers with a turnover in the region of £2 billion. Work carried out by members includes research, consultancy, training and global information monitoring. AIRTO promotes their work by building closer links between members and industry, academia, UK government agencies and the European Union.

Association of Medical Research Charities



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The Association of Medical Research Charities (AMRC) works to advance medical research in the UK and, in particular, aims to improve the effectiveness of the charitable sector in medical research. There are over 100 member charities within the Association: in 2003/2004 their combined expenditure on biomedical research in the UK was £634 million. AMRC provides information, guidance and advice to medical research charities and information and data on the activities of the charity sector in medical research to government, the media and decision-formers.

Biotechnology and Biological Sciences Research Council



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The BBSRC is the UK's leading funding agency for academic research in the non-medical life sciences and is funded principally through the Science Budget of the Office of Science and Technology. It supports staff in universities and research institutes throughout the UK, and funds basic and strategic science in: agri-food, animal sciences, biomolecular sciences, biochemistry and cell biology, engineering and biological systems, genes and developmental biology, and plant and microbial sciences.

British Association for the Advancement of Science - the BA



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The BA is the UK's nationwide, open membership organisation dedicated to connecting people with science, so that science and its applications become accessible to all. The BA aims to promote openness about science in society and to engage and inspire people directly with science and technology and their implications.

Established in 1831, the BA organises major initiatives across the UK, including the annual BA Festival of Science, National Science Week, programmes of regional and local events, and an extensive programme for young people in schools and colleges.

British Ecological Society



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The BES is an active, successful and independent scientific society. It aims to promote the science of ecology worldwide. It supports the ecological research and education communities to ensure that they remain vibrant and productive, thus generating new knowledge, skilled people and a greater appreciation of the science of ecology in the wider community. The Society publishes internationally renowned journals, organises Europe's biggest annual meeting of ecologists, provides advice to policy-makers and opinion formers, has an active programme of educational initiatives and provides grants.

British Pharmacological Society



Advancing molecules into medicines.

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The British Pharmacological Society's 2,500 members are trained to study drug action from the laboratory bench to the patient's bed-side. Our members come from academia, industry, hospitals and regulatory authorities and government bodies. Our aim is to improve the quality of life by developing new medicines to treat and prevent the diseases and conditions which affect millions of people and animals. Inquiries about drugs and how they work are welcome.

The British Psychological Society



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Parliamentary Officer
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The British Psychological Society is an organisation of over 34,000 members governed by Royal Charter. It maintains the Register of Chartered Psychologists, publishes books, 10 primary science Journals and organises conferences. Requests for information about psychology and psychologists from parliamentarians are welcome.

British Society for Antimicrobial Chemotherapy

Contact: Tracey Guest, Executive Officer

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Founded in 1971, and with 800 members worldwide, the Society exists to facilitate the acquisition and dissemination of knowledge in the field of antimicrobial chemotherapy. The BSAC publishes the *Journal of Antimicrobial Chemotherapy* (JAC), internationally renowned for its scientific excellence, undertakes a range of educational activities, awards grants for research and has active relationships with its peer groups and government.

British Veterinary Association



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BVA's chief interests are:

- * Standards of animal health
- * Veterinary surgeons' working practices
- * Professional standards and quality of service
- * Relationships with external bodies, particularly government

BVA carries out three main functions which are:

- * Policy development in areas affecting the profession
- * Protecting and promoting the profession in matters propounded by government and other external bodies
- * Provision of services to members

CABI Bioscience



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CABI Bioscience is a new breed of international organisation specialising in sustainable agriculture, the conservation of biodiversity, invasive species management and industrial and environmental bioremediation. Globally the work of CABI Bioscience focuses on the farmer and his need to adapt and respond to the changes and challenges of the markets - these may be for organic produce, a route to transgenic production, or dealing with the effects of climate change or alien invasive species in a safe and sustainable way.

CABI Bioscience UK is one of a network of 6 global CABI Bioscience centres and a division of CAB International, a 42 member strong UN treaty-level organisation. Its sister enterprise is CABI Publishing, a leading international life science publisher.

Campden & Chorleywood Food Research Association



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A independent, membership-based industrial research association providing substantial R&D, processing, analytical hygiene, best practice, training, auditing and HACCP services for the food chain worldwide.

Members include growers, processors, retailers, caterers, distributors, machinery manufacturers, government departments and enforcement authorities. Employs over 300; serves over 2,000 member sites; and has a subsidiary company in Hungary. Activities focus on safety, quality, efficiency and innovation. Participates in DTI's Faraday Partnerships and collaborates with universities on LINK projects and studentships, transferring practical knowledge between industry and academia.

Cavendish Laboratory



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The Cavendish Laboratory houses the Department of Physics of the University of Cambridge.

Its world-class research is focused in a number of experimental and theoretical diverse fields.

Astrophysics: Millimetre astronomy, optical interferometry observations & instrumentation. Astrophysics, geometric algebra, maximum entropy, neural networks.

High Energy Physics: LEP, SP5 & future LHC experiments. Detector development. Particle physics theory.

Condensed Matter Physics: Semiconductor physics, quantum effect devices, nanolithography. Superconductivity, magnetic thin films. Optoelectronics, conducting polymers. Biological Soft Systems. Polymers and Colloids. Surface physics, fracture, wear & erosion. Amorphous solids. Electron microscopy. Electronic structure theory & computation. Structural phase transitions, fractals, quantum Monte Carlo calculations. Biological Physics.

Chartered Institute of Patent Agents



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CIPA's members practise in intellectual property, especially patents, trade marks, designs, and copyright, either in private partnerships or industrial companies. CIPA maintains the statutory Register. It advises government and international circles on policy issues and provides information services, promoting the benefits to UK industry of obtaining IP protection, and to overseas industry of using British agents to obtain international protection.

Clifton Scientific Trust



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Science for Citizenship and Employability,
Science for Life, Science for Real

We build grass-roots partnerships between school and the wider world of professional science and its applications

- for young people of all ages and abilities
- experiencing science as a creative, questioning, human activity
- bringing school science added meaning and motivation, from primary to post-16
- locally, nationally, internationally (currently between Britain and Japan)

Clifton Scientific Trust Ltd is registered charity 1086933

Council for the Central Laboratory of the Research Councils



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The CCLRC is the UK's strategic agency for scientific research facilities. It also supports leading-edge science and technology by providing world-class, large-scale experimental facilities. These advanced technological capabilities, backed by a pool of expertise and skills across a broad range of disciplines, are exploited by more than 1100 government, academic, industrial and other research organisations around the world each year. The annual budget of the CCLRC is c. £150 million.

University of East Anglia

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From award-winning technology translating speech into sign language, to internationally-renowned climate research, and from the intricacies of diseases such as cancer to the large-scale hazards of earthquakes and volcanoes, UEA scientists are carrying out world-class research and teaching. A strongly interdisciplinary science cluster: Biological Sciences, Chemical Sciences and Pharmacy, Environmental Sciences, Computing Sciences and Mathematics.

Economic and Social Research Council

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The ESRC is the UK's leading research and training agency addressing economic and social concerns. We pursue excellence in social science research; work to increase the impact of our research policy and practice; and provide trained social scientists who meet the needs of users and beneficiaries, thereby contributing to the economic competitiveness of the United Kingdom, the effectiveness of public services and policy, and quality of life. The ESRC is independent, established by Royal Charter in 1965, and funded mainly by government.

Engineering and Physical Sciences Research Council

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EPSRC invests more than £500 million a year in research and postgraduate training in the physical sciences and engineering, to help the nation handle the next generation of technological change. The areas covered range from mathematics to materials science, and information technology to structural engineering.

We also actively promote public engagement with science and engineering, and we collaborate with a wide range of organisations in this area.

English Nature

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English Nature is the Government's wildlife agency working throughout England. With our partners and others we promote the conservation of wildlife and natural places.

We commission research and publish scientific papers which underpin the development of policies and programmes to maintain and enhance biodiversity

Environment Agency

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The Environment Agency is responsible for protecting and enhancing the environment in England and Wales. We contribute to sustainable development through the integrated management of air, land and water. We commission research to support our functions through our Science Programme that is based on a 5 year plan developed through consultation.

Freshwater Biological Association

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The Freshwater Biological Association is an independent organisation and a registered Charity, founded in 1929. It aims to promote freshwater science through an innovative research programme, an active membership organisation and by providing sound independent opinion. It publishes a variety of specialist volumes and houses one of the finest freshwater libraries in the world.

Fund for the Replacement of Animals in Medical Experiments

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Registered Charity No.: 259464

FRAME considers that the current scale of live animal experimentation is unacceptable, but recognises that the immediate total abolition of all animal experimentation is not possible. FRAME advocates the Three Rs approach, with the long-term aim of eliminating the need for live-animal experiments altogether, through the proper development, validation and acceptance of replacement alternative methods.

Health Protection Agency

Radiation Protection Division (formerly NRPB)
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The Radiation Protection Division was formed on 1 April 2005 when the National Radiological Protection Board merged with the Health Protection Agency, under the provisions of the Health Protection Agency Act 2004.

As part of the Centre for Radiation, Chemical and Environmental Hazards, the Division carries out the Agency's work on ionising and non-ionising radiations. It undertakes research to advance knowledge about protection of people from the risks of these radiations; provides laboratory and technical services; runs training courses; provides expert information and has a significant advisory role in the UK.



Human Fertilisation and Embryology Authority

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The HFEA is a non-departmental Government body that regulates and inspects all UK clinics providing IVF, donor insemination or the storage of eggs, sperm or embryos. The HFEA also licenses and monitors all human embryo research being conducted in the UK.

Institute of Biology



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The biological sciences have truly come of age with the new millennium and the Institute of Biology is the professional body to represent biology and biologists to all. A source of independent advice to Government, a supporter of education, a measure of excellence and a disseminator of information - the Institute of Biology is the Voice of British Biology.

The Institute of Mathematics and its Applications



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The IMA is a professional and learned society for qualified and practising mathematicians. Its mission is to promote mathematics in industry, business, the public sector, education and research. Forty percent of members are employed in education (schools through to universities), and the other 60% work in commercial and governmental organisations. The Institute is incorporated by Royal Charter and has the right to award Chartered Mathematician status.

Institute of Physics



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www.einsteinyear.org

2005 is Einstein Year, part of an international celebration of physics to mark the centenary of the publication of Einstein's most famous theories. The Institute of Physics (IOP), the learned society and professional body which represents physics and physicists, is co-ordinating a range of activities designed to show the diversity and importance of modern physics today and to enthuse and inspire young people to study physics. The IOP supports physics in schools, colleges and universities and provides policy advice and opportunities for public debate.

Institute of Physics and Engineering in Medicine



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IPEM is a registered, incorporated charity for the advancement, in the public interest, of physics and engineering applied to medicine and biology. It accredits medical physicists, clinical engineers and clinical technologists through its membership register, organises training and CPD for them, and provides opportunities for the dissemination of knowledge through publications and scientific meetings. IPEM is licensed by the Science Council to award CSci and by the Engineering Council (UK) to award CEng, IEng and EngTech.

IChem^E

IChemE is the qualifying and professional body representing chemical and process engineers in the UK. In 2002, we published *Energy at the Crossroads* in response to the UK government consultation on energy policy; a report that seeks to improve the engineering and scientific input to policymaking. IChemE has also published a set of sustainable development indicators for the chemical & process industries. *The Sustainability Metrics* provide a valuable tool for the measurement of progress towards sustainability.

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heart of the process

Institution of Civil Engineers



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ICE aims to be a leader in shaping the engineering profession. With over 70,000 members, ICE acts as a knowledge exchange for all aspects of civil engineering. As a Learned Society, the Institution provides expertise, in the form of reports and comment, on a wide range of subjects from energy generation and supply, to sustainability and the environment.

LGC



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*Setting standards
in analytical science*

LGC is Europe's leading independent analytical laboratory providing chemical and DNA-based analysis, diagnostic services, reference standards, R&D, method development, consultancy and training to both the public and private sectors. LGC operates in a diverse range of markets including foods, pharmaceuticals, biotechnology, environment, chemicals and petroleum.

Under arrangements for the office and function of Government Chemist, LGC fulfils specific statutory duties and provides advice for Government and the wider analytical community on the implications of analytical chemistry for matters of policy, standards and regulation.

LGC is based in Teddington, Middlesex, with other UK operations in Runcorn and Edinburgh, and facilities in France, Germany, Italy, Poland, Spain, Sweden and India.

University of Leeds



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The University of Leeds is among the largest research universities in Europe. We have some 3000 researchers, including postgraduates, and an annual research income of more than £70m. Research activity extends across nine faculties representing most core disciplines and often crosses traditional subject boundaries. In the last Research Assessment Exercise, we had 35 schools rated internationally or nationally 'excellent'.

London Metropolitan Polymer Centre



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The London Metropolitan Polymer Centre provides training, consultancy and applied research to the UK polymer (plastics & rubber) industry. The training courses are delivered through a programme of industrial short courses and customised courses and these, together with distance learning and other flexible delivery methods, lead to qualifications ranging from technician to Masters level. Recent successes include a WRAP sponsored programme to develop new commercial applications for recycled PET and several technology transfer projects with companies.

Marks & Spencer Plc

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Main Business Activities

Retailer - Clothing, Food, Financial Services and Home.

Over 400 stores in 30 countries worldwide. Employing 65,000 people.

We offer our customers quality, value, service and trust in our brand by applying science and technology to develop innovative products and services.

Medical Research Council



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The Medical Research Council (MRC) is funded by the UK taxpayer. We are independent of Government, but work closely with the Health Departments, the National Health Service and industry to ensure that the research we support takes account of the public's needs as well as being of excellent scientific quality. As a result, MRC-funded research has led to some of the most significant discoveries in medical science and benefited millions of people, both in the UK and worldwide.

Merck Sharp & Dohme Research Laboratories

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Drug discovery for brain diseases.

The National Endowment for Science, Technology and the Arts



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NESTA (the National Endowment for Science, Technology and the Arts) is all about innovation. Through a range of pioneering programmes, we invest in talented people and ground-breaking ideas. On a wider scale we work to improve the climate for change in this country, acting as a catalyst for change and helping the UK to fulfil its potential.

National Physical Laboratory



National Physical Laboratory

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The National Physical Laboratory (NPL) is the United Kingdom's national standards laboratory, an internationally respected and independent centre of excellence in research, development and knowledge transfer in measurement and materials science. For more than a century, NPL has developed and maintained the nation's primary measurement standards - the heart of an infrastructure designed to ensure accuracy, consistency and innovation in physical measurement.

Natural Environment Research Council



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The UK's Natural Environment Research Council funds and carries out impartial scientific research in the sciences of the environment. NERC trains the next generation of independent environmental scientists.

NERC funds research in universities and in a network of its own centres, which include:

British Antarctic Survey, British Geological Survey, Centre for Ecology and Hydrology, Southampton Oceanography Centre and Proudman Oceanographic Laboratory

University of Newcastle upon Tyne



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The University of Newcastle is a member of the Russell Group of research-intensive Universities and is enjoying substantial growth in student numbers and research income. The University has a well balanced portfolio of research funding across all sponsor groups and has one of the highest levels of research projects funded by UK Government Departments and EU activity. It was recently identified in a national survey as one of the top Universities in the UK for technology transfer.

Particle Physics and Astronomy Research Council



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The PPARC is the UK's strategic science investment agency that directs and funds research in national and international programmes in fundamental physics.

It is this research into fundamental physics that lies behind some of the major technological advances of the 20th Century, and delivers world leading science, technologies and people for the UK.

Prospect



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Prospect is an independent, thriving and forward-looking trade union with 104,000 members. We represent scientists, technologists and other professions in the civil service, research councils and private sector.

Prospect's collective voice champions the interests of the engineering and scientific community to key opinion-formers and policy makers and, with negotiating rights with over 300 employers, we seek to secure a better life at work by putting members' pay, conditions and careers first.

Queen Mary, University of London



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Queen Mary, University of London, incorporates the St Bartholomew's and Royal London School of Medicine and Dentistry. Queen Mary's outstanding research strengths cover the spectrum from Electronic Engineering to Preventive Healthcare. It is home to world-renowned specialist centres including the Centre for Commercial Law Studies, the Interdisciplinary Research Centre in Biomedical Materials and the William Harvey Research Institute.

RIO TINTO

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Rio Tinto is a leading international mining company which focuses on exploration for first class ore-bodies and the development of large, efficient long-life mines capable of sustaining competitive advantage. Principal products (aluminium, borates, coal, copper, gold, iron ore, titanium dioxide, uranium, nickel, talc, salt, diamonds and silver) provide the materials necessary for economic progress and prosperity in the developed and developing world.

The Royal Academy of Engineering



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Founded in 1976, the Royal Academy of Engineering promotes the engineering and technological welfare of the country by facilitating the application of science. As a national academy, we offer independent and impartial advice to Government; work to secure the next generation of engineers; pursue excellence; and provide a voice for Britain's engineering community. Our Fellowship - comprising the UK's most eminent engineers - provides the leadership and expertise for our activities, which focus on the importance of engineering and technology to wealth creation and the quality of life.



PLANTS PEOPLE
POSSIBILITIES



ROYAL
BOTANIC
GARDENS
KEW
WORLD HERITAGE SITE

KEW GARDENS

The mission of Kew is to enable better management of the Earth's environment by increasing knowledge and understanding of the plant and fungal kingdoms – the basis of life on Earth. Kew is fundamentally a scientific, amenity and educational organisation devoted to increasing knowledge and public understanding of plant and fungal diversity – how it came to be, what its current status is, how it can be conserved for future generations, and how it can be used in sustainable ways for human benefit.

Contact: Prof. Simon J. Owens
Tel: 020 8332 5212
Fax: 020 8332 5278
Email: s.owens@kew.org
Website: www.kew.org

SAVING THE WORLD'S PLANTS FOR LIFE

Royal College of Veterinary Surgeons



Contact: Jeff Gill, Policy Officer,
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+44 (0)20 7222 2001
Fax: +44 (0)20 7202 0740
E-mail: j.gill@rcvs.org.uk
Website: www.rcvs.org.uk

"Promoting and sustaining public confidence in veterinary medicine". The Royal College of Veterinary Surgeons (RCVS) is the regulatory body for veterinary surgeons in the UK and is responsible for the registration of veterinary surgeons, for monitoring standards of veterinary education and for professional conduct. The Government regularly consults the RCVS on a range of legislative issues including animal welfare, control of animal disease and veterinary certification.

The Royal Institution



Contact: Dr Gail Cardew
Head of Programmes
The Royal Institution
21 Albemarle Street, London W1S 4BS
Tel: 020 7409 2992 Fax: 020 7670 2920
E-mail: ri@ri.ac.uk Website: www.rigb.org

The Royal Institution has a reputation established over 200 years for its high calibre events that break down the barriers between science and society. It acts as a unique forum for informing people about how science affects their daily lives, and prides itself on its reputation of engaging the public in scientific debate. The Royal Institution has a range of activities all under one roof, from programmes for schools and a forum for the general public, through to a heritage programme, an arts-science initiative, a media centre and state-of-the-art chemistry labs.

The Royal Society



Contact: Dr David Stewart Boak,
Director Communications
The Royal Society, 6-9 Carlton House Terrace,
London, SW1Y 5AG.
Tel: 020 7451 2510 Fax: 020 7451 2615
Email: david.boak@royalsoc.ac.uk
Website: www.royalsoc.ac.uk

Founded in 1660, the Royal Society is an independent academy promoting the natural and applied sciences. It aims to:

- strengthen UK science by providing support to excellent individuals
- fund excellent research to push back the frontiers of knowledge
- attract and retain the best scientists
- ensure the UK engages with the best science around the world
- support science communication and education; and communicate and encourage dialogue with the public
- provide the best independent advice nationally and internationally
- promote scholarship and encourage research into the history of science

Royal Society for the encouragement of Arts, manufactures and commerce



Contact: Susie Harries
8 John Adam Street
London WC2N 6EZ
Tel: 020 7451 6879
Fax: 020 7839 5805
E-mail: susie.harries@rsa.org.uk
Website: www.theRSA.org

The RSA's Forum for Technology, Citizens and the Market – a group of science-based companies and their principal stakeholders – aims to promote the flow of new technologies into society by enabling companies to sharpen their understanding of public concerns around new science and engage with these concerns early on as part of their routine product development process.

The Royal Society of Chemistry



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Parliamentary Affairs
The Royal Society of Chemistry
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E-Mail: benns@rsc.org
Website: http://www.rsc.org
http://www.chemsoc.org

The Royal Society of Chemistry is a learned, professional and scientific body of over 46,000 members with a duty under its Royal Charter "to serve the public interest". It is active in the areas of education and qualifications, science policy, publishing, Europe, information and internet services, media relations, public understanding of science, advice and assistance to Parliament and Government.

The Royal Statistical Society



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Press and Public Affairs Officer
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Fax: +44 20 7614 3905
E-mail: a.garratt@rss.org.uk
Website: www.rss.org.uk

The RSS is much more than just a learned society. We lead the way as an independent source of advice on statistical issues and play a crucial role in raising the profile of statistics, through our links with government, academia and the corporate and voluntary sectors. We have a powerful voice at Royal Commissions, Parliamentary Select Committees and at public consultations, offering our own unique view on just about anything, from freedom of information to sustainable development.

The Science Council



Contact: Dr Sarah Ball,
Chief Executive Officer
The Science Council
210 Euston Road, London NW1 2BE
Tel 020 7611 8754 Fax 020 7611 8743
E-mail: enquiries@sciencecouncil.org
Website: www.sciencecouncil.org

The Science Council has a membership of over 25 professional institutions and learned societies covering the breadth of science and mathematics. Its purpose is to provide an independent collective voice for science and scientists and to maintain standards across all scientific disciplines. We are active in science policy issues including science in education, health, society and sustainability. In 2003 the Science Council was granted its Royal Charter and in 2004 it launched the Chartered Scientist (CSci) designation as a measure of high standards in the practice, application, advancement and teaching of science. We now have over 10,000 Chartered Scientists.



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SEMTA (Science, Engineering and Manufacturing Technologies Alliance) is the Sector Skills Council for the science, engineering and manufacturing technology sectors.

Our Mission is 'to ensure that our sector has the knowledge and skills required to meet the challenges faced by the workforce of the future.'

Our sectors account for a significant proportion of the UK economy. There are about two million people employed in about 100,000 establishments in the core Science, Engineering and Technology sectors, currently contributes over £74 billion per annum – about ten per cent – of total UK GDP.

Microbiology

Contact: Dr Faye Jones,
Public Affairs Administrator
Marlborough House, Basingstoke Road,
Spencers Wood, Reading RG7 1AG.
Tel: 0118 988 1843 Fax: 0118 988 5656
E-mail: pa@sgm.ac.uk
Website: <http://www.sgm.ac.uk>

SGM is the largest microbiological society in Europe. The Society publishes four journals of international standing, and organises regular scientific meetings.

SGM also promotes education and careers in microbiology, and it is committed to represent microbiology to government, the media and the public.

An information service on microbiological issues concerning aspects of medicine, agriculture, food safety, biotechnology and the environment is available on request.

Society of Chemical Industry



Contact: Mr Richard Denyer,
General Secretary and Chief Executive
SCI, International Headquarters
14-15 Belgrave Square, London SW1X 8PS
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E-mail: secretariat@soci.org
Website: www.soci.org

SCI is an interdisciplinary network for science, commerce and industry. SCI attracts forward-looking people in process and materials technologies and in the biotechnology, energy, water, agriculture, food, pharmaceuticals, construction, and environmental protection sectors worldwide. Members exchange ideas and gain new perspectives on markets, technologies, strategies and people, through electronic and physical specialist conferences and debates, and publish journals, books and the respected magazine *Chemistry & Industry*.

University of Surrey



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The University of Surrey is one of the UK's leading professional, scientific and technological universities with a world class research profile and a reputation for excellence in teaching and learning. Ground-breaking research at the University is bringing direct benefit to all spheres of life - helping industry to maintain its competitive edge and creating improvements in the areas of health, medicine, space science, the environment, communications, ion beam and optoelectronics technology, visual multi media, defence and social policy.

Universities Federation for Animal Welfare



Contact: Dr James Kirkwood,
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Email: ufaw@ufaw.org.uk
Website: www.ufaw.org.uk
Registered Charity No: 207996

UFAW is an internationally-recognized independent scientific and educational animal welfare charity. It works to improve animal lives by:

- supporting animal welfare research.
- educating and raising awareness of welfare issues in the UK and overseas.
- producing the leading journal *Animal Welfare* and other high-quality publications on animal care and welfare.
- providing expert advice to government departments and other concerned bodies.

Science Diary

The Parliamentary and Scientific Committee

Contact: Annabel Lloyd
020 7222 7085
www.scienceinparliament.org.uk

Wednesday 26 October 17.30
From the Green to the Gene Revolution: a 21st century challenge
Speaker: Dr Norman E Borlaug

Monday 14 November 17.30
Risk Management
Speakers: Professor Sir Colin L Berry, Professor Susan Owens and Professor Ragnar Lofstedt

Tuesday 29 November
Visit to NPL

Monday 12 December 17.30
The Importance of Science, Engineering and Technology to a Sustainable Economy on the African Continent
Speakers: Sir Crispin Tickell, Professor Frank R Rijsberman, Professor Richard Carter and Professor Sir Gordon Conway.

Monday 23 January 17.30
Hospitals of the Future
Speakers to be confirmed

The Royal Institution

The Royal Institution
21 Albemarle Street, London W1S 4BS
For further information visit
www.rigb.org or
telephone 020 7409 2992
Events held at the Royal Institution

Wednesday 2 November 19.00
Your brain: the final frontier?
Prof David Nutt and Prof Nikolas Rose

Wednesday 16 November 19.00
Stroke – a demographic time-bomb
Prof Peter Rothwell and Prof Charles Wolfe

Wednesday 23 November 19.00
Live or die: the secret is in our genes
Prof Adi Kimchi and Iain McNeish
Wednesday 30 November 19.00
The future of surgery
Dr Richard Ashcroft, Prof Sir Ara Darzi and Prof Brian Davies

Thursday 1 December 19.00
Science and learning in Islam – a shared legacy
Dr Reefat Drabu, Prof Azim Nanji and Baroness Susan Greenfield

Thursday 8 December 19.00
Making sense of our world
David Brown and Dr Mark Lythgoe

Monday 26 December – Friday 30 December
Royal Institution Christmas Lectures: Food matters
Prof Sir John Krebs
Monday 26 December 19.00
The gourmet ape
Tuesday 27 December 19.00
Yuck or yummy?
Wednesday 28 December 19.00
You are what you eat
Thursday 29 December 19.00
When food goes wrong
Friday 30 December 19.00
Food for the future

The Royal Society

6-9 Carlton House Terrace
London SW1Y 5AG
All events are free, though pre-registration is required for the two-day conferences. Events are held at the Royal Society unless otherwise stated. For further information visit
www.royalsoc.ac.uk/events; email
events@royalsoc.ac.uk or call
020 7451 2518/2683.

Wednesday 26 to Thursday 27 October
Discussion meeting
Extreme natural hazards

Thursday 27 October 18.30
Prize lecture – Clifford Paterson Lecture
Optical science in the fast lane
Professor Wilson Sibbett CBE FRS

Thursday 10 November 18.30
Public lecture – 11th Hartley Lecture
Measuring our future: the role of sustainability metrics
Professor Richard Darton

Monday 14 to Tuesday 15 November
Discussion meeting
Quantum catalysis in enzymes – beyond the transition state theory paradigm

Wednesday 23 November 18.30
Public lecture
Einstein vs. Newton debate
Chaired by Professor Lisa Jardine

Monday 5 to Tuesday 6 December
Discussion meeting
New directions in liquid crystal science

Tuesday 6 December 18.30
Prize lecture – Rosalind Franklin lecture
The quandary of the quark
Professor Christine Davies

Thursday 8 December 18.30
Prize lecture – Francis Crick lecture
Lecture title to be confirmed
Professor Daniel Wolpert

Monday 15 to Tuesday 16 January
Discussion meeting
Physics, chemistry and astronomy of H₃⁺

Monday 13 to Tuesday 14 February
Discussion meeting
Conditions for the emergence of life on the early Earth

The Royal Academy of Engineering

29 Great Peter Street,
London SW1P 3LW.
For further information visit
www.raeng.org.uk/events or contact
events@raeng.org.uk

Tuesday 1 November 18.00
UK Focus for Biomedical Engineering
Annual Lecture
Innovation in Medical Technology – Global Reality and UK Promise

Wednesday 9 November 09.30
Radical Innovation in Advanced Nanomaterials

Wednesday 9 November 13.30
Energy Seminar Series
Security of Energy Supply

Wednesday 9 November 18.00
Mobile Communications Lecture Series
Innovations for the Commercialisation of CDMA for Wireless Communications and Future Directions

Monday 12 December 18.30
Annual Hinton Lecture
Guest Speaker: Lord Browne

The Royal Society of Edinburgh

22-26 George Street,
Edinburgh EH2 2PQ.
Tel: 0131 240 5000
Fax: 0131 240 5024
events@royalsoced.org.uk
www.royalsoced.org.uk
All events require registration and take place at the RSE.

Monday 7 November
Composite Individuality: A Gaian View
Dr Lynn Margulis

Thursday 1 December
Discussion Forum
**Earth, Wind, Fire and Water:
Tsunami**

Monday 19 December
Edinburgh Lecture
**Inside Surgery from Without:
Therapeutic Interventions from
Images**
Sir Alfred Cuschieri FRSE

Monday 23 January
Discussion Forum
Science Meets Religion
Professor Simon Conway-Morris and
Professor Wentzel van Huysteen

Monday 6 February
The Gannochy Trust Innovation Award
Prize Lecture

SCI

14/15 Belgrave Square
London SW1X 8PS
Contact: conferences@soci.org or
020 7598 1562
Events at SCI unless otherwise stated

Tuesday 8 November
**PET in Neurology: Clinical Research
and Drug Development**

Tuesday 29 to Wednesday 30 November
**Plants as Factories for Bioactive
Compounds**

Friday 2 December
**Frontiers of Research at the Polymer
Chemistry-Organic Chemistry
Interface**

Wednesday 22 February
**Omega 3 – on the brain – the impact
of nutrition on human behaviour**

Tuesday 28 February to Wednesday 1
March
Chemistry for Non Chemists

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Royal Pharmaceutical Society

Contact: Judith Callanan
020 7572 2261
science@rpsgb.org

Monday 28 to Wednesday 30 November
**Tableting technology for the
pharmaceutical industry**
De Vere University Arms Hotel,
Cambridge

Tuesday 7 February
**Challenges in small scale
manufacturing**
at AstraZeneca R & D, Charnwood,
Loughborough
Royal Pharmaceutical Society and
Academy of Pharmaceutical Sciences

Monday 13 to Wednesday 15 February
Stability Testing of Pharmaceuticals
The Moller Centre, Cambridge
Pharmaceutical Society, London

Institution of Mechanical Engineers

Tuesday 1 November
**Materials for a Greener Environment
– Reduce, Reuse, Recycle and
Recovery**
Contact Georgina Shaw 020 7973 1291;
g_shaw@imeche.org.uk

Friday 4 November
Sustainability for Engineering
Contact Madeline Willis 020 7973
1260; m_willis@imeche.org.uk

Tuesday 29 November
**Fuel Cells – Industrial Application
and Modelling**
Contact Victoria Gatt 020 7973 1316;
v_gatt@imeche.org.uk



Officers of the Parliamentary & Scientific Committee

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THE NOVARTIS AND THE DAILY TELEGRAPH VISIONS OF SCIENCE PHOTOGRAPHIC AWARDS

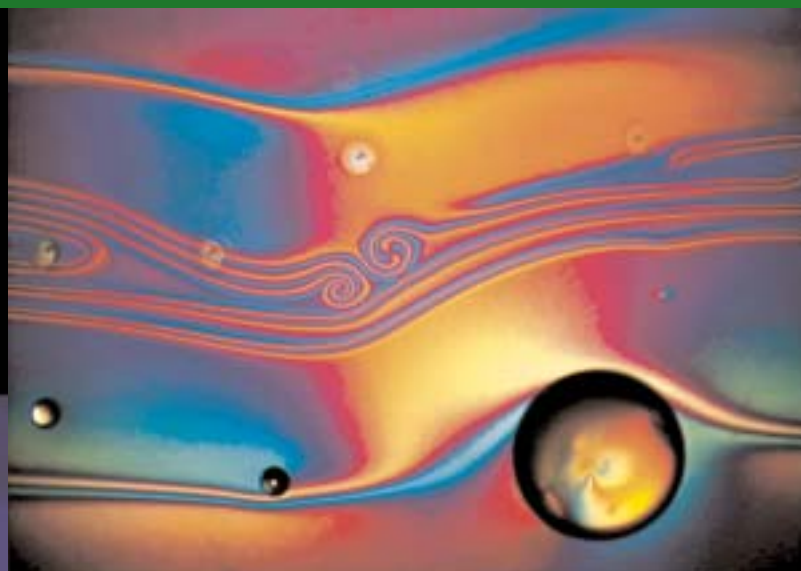
Salt and pepper by David McCarthy – Close-up - winner

This image of a whole peppercorn with a grain of sea salt offers a close-up glimpse of the structure of simple everyday products we use on our food.



Liquid crystals by Karen Neill – Close-up – highly commended

The orientation of molecules within a liquid crystal can be seen by viewing the crystals using polarised light. Regions that have the same colour have the same orientation of their constituent molecules.



Migraine attack by Debbie Ayles – Science meets Art - winner

Migraine attacks can cause a variety of visual symptoms (aura) as well as the notorious stabbing head pain. This is a representation of a barn seen during an attack, painted by an artist and migraine sufferer. Visual symptoms often include flattening and overlaying of images, pulsating kaleidoscopic colours and sparkling white "stars".



Shrimp cleaning the teeth of a lizard fish by Jim Greenfield

Action - winner

This tiny shrimp fearlessly enters the mouth of a fish to clean its teeth. Fish value this service as the shrimp removes and eats harmful parasites. The shrimp lives in the sea anemone in the background. Fish recognise the anemone as a cleaning station, and when they need a clean they approach it and open their mouths, encouraging the shrimp in.