
Hilary Benn

Secretary of State for Environment,
Food and Rural Affairs



The Nobel Peace Prize has been jointly awarded to the UN's Intergovernmental Panel on Climate Change and Al Gore for the huge efforts they have made to raise awareness climate change.

As we face food and water shortages, failing crops and the disappearance of animal and plant species, governments, industries and individuals have a choice. Either we act and each make a contribution to fighting dangerous climate change, or we will face a bleak tomorrow.

I applaud and am deeply proud of the work being carried out in UK universities by dedicated teams of scientists who are seeking solutions to climate change. I will do all I can to ensure this work continues.

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Professor Rick Trainor
President, Universities UK

We are in a time of unprecedented interest in the environment, especially climate change. What used to be purely an environmental issue has been pushed to the forefront of public and media interest by the release of the [Stern Review on the Economics of Climate Change](#) and Al Gore's documentary [An Inconvenient Truth](#). Political parties are keen to establish their green credentials, while increasing corporate attention is being given to environmental impact.

This Universities UK publication showcases the contribution of higher education institutions to this 'greening' agenda. The range of initiatives, research programmes and projects from across the UK HE sector is such that we can only highlight a few – but we hope this selection of case studies demonstrates the energy and vision that is going into scientific research into some of the most challenging and unknowable issues of our age. If universities ever presented 'dreaming spires', that somnolence has long gone – I prefer the description 'greening spires'.

The 600-page Stern Review estimates that climate change could cost the global economy up to £3.67tn and displace up to two hundred million people unless a drastic 60% reduction in carbon emissions is reached by 2050. [An Inconvenient Truth](#) draws similar conclusions about the catastrophic effects of global warming and the need to curb greenhouse gases.

The UK is responding via the long-awaited Climate Change Bill, announced in November 2007, which sets out a plan to cut carbon emissions by 60% compared to 1990 levels by 2050. The Government has also said it will extend mandatory carbon caps beyond the most polluting industries to low-energy-intensive industries such as food retailers and hotel chains. The aim is to make the UK the first country in the world to introduce a legally binding framework to reduce CO₂ emissions.

Universities are key to achieving this aim. Their research, and the extensive links they are forging with industry, as well as their international collaborations, signal their leading role in the global search for solutions to environmental problems. Initiatives such as Forum for the Future, the UK Energy Research Centre, set up to bring together government, industry and academia, and the Tyndall Centre, which hosts a consortium of six universities and wider collaborations all working to develop sustainable responses to climate change, are just three examples of this.

In addition to highlighting research activity our report demonstrates the practical steps universities are taking, as employers and as places where people live and work. We know there is more that must be done, and we look forward to the Higher Education Funding Council for England's forthcoming strategic review of sustainable development in higher education, due in 2008.

The Stern Review set out three policy requirements for an effective global response to climate change: carbon pricing, policy to support innovation and deployment of low-carbon technologies, and the third being to 'inform, educate and persuade' individuals about what they can do. All of us now have a greater understanding of the links between a healthy environment and a healthy society, but as the Stern Review also reminds us, climate change requires global action. As the following report makes clear, universities are playing their part.

Since 1997, when the Kyoto Protocol was signed in Japan, calling for industrialised nations to reduce collective emissions of greenhouse gases, climate change has hardly been out of the news. Increasing numbers of students are enrolling onto environment-related courses but, quietly and diligently, researchers have been working for decades attempting to record and monitor the minute changes that could lead to gigantic problems.

The UK's universities were among the first in the world to dedicate teams of scientists to investigate just how our world is changing. Research into climate change is an ongoing discipline that offers no quick-fix solutions.

From deep in the Earth's crust to the furthestmost atmospheres bordering on space; across mountain ranges to the largest ocean and tiniest stream, UK scientists are working to collect data. These add to and update the computer generated models being used to predict how our climate is changing and what effect these changes will have on us all.

Facts and figures

1

An average warming of 5–6°C will result in a 5–10% loss of global GDP.¹

2

Global market for environmental products and services (excluding green products/process design and renewable energy) will exceed £315bn by 2010.²

3

Value to the English economy of managing the natural environment: £67.6bn/annum gross, supporting 2.68m full-time equivalent jobs.^{2,3}

4

UK environmental goods and services sector:

- employs 400,000 people in 17,000 companies;
- generates £25bn (in 2004: set to rise to £34bn by 2010, and £46bn by 2015).^{2,4,5}

5

UK spending on environmental research, training, and infrastructure estimated to be in excess of £500m.⁶
Conservative estimated cost of UK environmental monitoring activity is in excess of £88m.^{7,8}

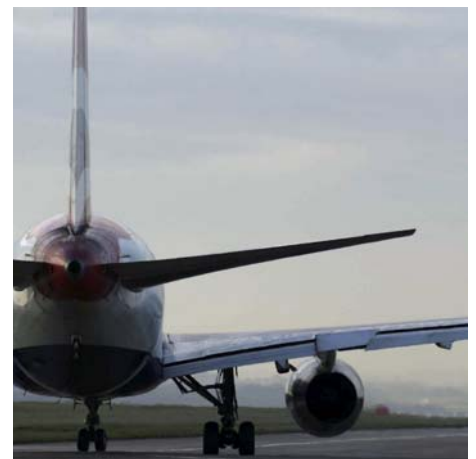
MMU leads the way as more research is called for on aviation impacts on the environment

Aviation will account for 5% of the world's carbon emissions by 2050.

Climate modellers at Manchester Metropolitan University's Centre for Air Transport and the Environment say that technological solutions to increased aviation pollution lag well behind the growth of the aviation industry. They are calling for improvements in technology and air traffic management, as total air traffic is predicted to increase by six to eight times by 2050.

Their study is part of a European Commission (EC) research project on emissions called QUANTIFY looking at the relative effects of different modes of transport on the climate.

David Lee, MMU's Professor of Atmospheric Science, warns that more research is needed now into the non-CO₂ effects of aviation emissions – ozone, vapour trails (contrails) and cirrus clouds – which have been described as 'potentially more worrying than the CO₂ emissions'.



Contrails – 'potentially more worrying than CO₂ emissions'.

Meteors will show climate change and giant waves at the 'edge of space'

A new research radar based in Antarctica is allowing scientists to study the highest layer of the Earth's atmosphere. They will be investigating climate change and exploring the theory that while the lower atmosphere is warming, the upper atmosphere, the mesosphere, is cooling annually by as much as 1°C.

A team from the University of Bath's Department of Electronic and Electrical Engineering, working on a joint project with the British Antarctic Survey, is also hoping to discover more about the complex waves, tides and other mechanisms that link the two atmospheric regions.

The radar, made of six antennas about two metres high, set over a space the size of a football pitch, will help explore the region using remote sensing. As part of a global network, it bounces radio waves off tiny meteors entering the upper atmospheres to discover how fast they move and so measure the winds at the edge of space.

At heights of around 80–100km (50–62 miles) the mesosphere is notoriously difficult to investigate – satellites burn up when entering – and is the least explored part of the Earth's atmosphere.

'The mesosphere has been called the miners' canary for climate change: meaning that it is very sensitive and the changes there may be larger than in any other part of the atmosphere,' says Professor Nick Mitchell, who heads the project at Bath.

'Evidence of such changes comes from sightings of unusual clouds in the polar mesosphere (called noctilucent clouds), which may mark the onset of long-term cooling of the upper atmosphere.'



Dr Pete Younger installing the radar at the Rothera Research Station in Antarctica.

University of Leeds one of first to study contrails

University of Leeds scientists are working on one of the world's foremost climate models, that of the Met Office's Hadley Centre. They are focusing on the impact of aviation vapour trails (contrails) on greenhouse gas emissions. The model will give one of the first insights into daytime temperature range effects and regional climate responses.

The study will produce a UK climate model that explicitly includes aviation effects. To date such effects have been largely quantified using a measurement known as radiative forcing, which is limited in quantifying the future impact of aviation emissions and does not provide a geographically specific representation.

Close collaboration with the Hadley Centre, including the secondment of scientists from Leeds, will develop an understanding of the climate effects of contrail formation which few climate change models have taken into account.

UEA – the grandfather of climate change research

For 35 years the University of East Anglia has been at the forefront of climate change research. Its Climatic Research Unit, established in 1972, played a major part in setting the agenda for research in, and the more recent political preoccupation with, climate change.

CRU's initial stated objective was 'to establish the past record of climate over as much of the world as possible, as far back in time as feasible, and in enough detail to recognise and establish the basic processes, interactions and evolutions in the Earth's fluid envelopes and those involving the Earth's crust and its vegetation cover.'

Interpretation of documentary historical records was the first step towards achieving this aim. This work still plays an important role in CRU's research portfolio and, alongside the development and analysis of early instrument records and the extension of climate indicators, now provides a 1,000-year climate record.

The area of CRU's work which probably has the largest international impact is the annual production of the world's land-based temperature data set – the first truly global temperature record.

This painstaking work, begun in 1978, now continues in conjunction with the Met Office's Hadley Centre. All the work on data set development is used extensively to assess the validity of global climate models, by CRU and many other groups around the world.

The unit has strong links with the Tyndall Centre for Climate Change Research, whose headquarters are at UEA, and the Department for Environment, Food and Rural Affairs-funded (Defra) Climate Impacts LINK project, which led the Intergovernmental Panel on Climate Change to establish their Data Distribution Centre.

Warming Welsh rivers damage wildlife

Researchers from Cardiff University have carried out the first study examining the effect of climate change on freshwater invertebrate species, showing that some of the smallest are under threat.

Led by Professor Steve Ormerod, the team examined macroinvertebrates; aquatic invertebrates including crustaceans, molluscs, worms and insects such as stoneflies and mayflies.

The results show that their numbers could decline by as much as 21% for every 1°C rise in temperature. This would have a knock-on effect for species which eat them, potentially affecting populations of birds, fish and bats.

Unless urgent action effectively reverses climate change, current predictions are that temperatures will rise between two and three degrees in the next few decades. On this basis rivers will be among the most sensitive indicators of environmental change.

UK Climate Impacts Programme

The UK Climate Impacts Programme (UKCIP) provides scenarios that show how our climate might change and co-ordinates research on dealing with this. Set up in April 1997, UKCIP is based at the University of Oxford's Environmental Change Institute (ECI) and funded by Defra.

UKCIP brings together stakeholders and scientists, to ensure that the outputs of scientific research have a practical application for policy-makers and practitioners.

UKCIP offers a variety of tools and guidance to help decision-makers understand how climate change might affect the way they do business, both now and in the future. These tools are already helping organisations to explore what climate change will mean for them. The UKCIP 'toolkit' includes information on climate changes in the 21st century, decision-making tools for the private sector and for local authorities, and support for regional adaptation initiatives around the UK.

Like the University of East Anglia (UEA), the University of Oxford's Environmental Change Institute is a core partner of the Tyndall Centre for Climate Change Research.

Could snow soon disappear from Snowdon?

A team of environmentalists from Bangor University has discovered that snow covering Wales' highest mountain has fallen by a third in 10 years. Measurements reveal average spring temperatures have risen by 2.5°C since the 1960s and snow levels have decreased by 35%.

The team's work in monitoring snow levels has been carried out with the Countryside Commission for Wales, whose climate change expert Dr Clive Walmsley says:

'This year both September and October were free of snow. The season is getting shorter and the amount of snow covering Snowdon is declining. We are linking that to rising temperatures.'

Images using 3D computer modelling show that as the climate warms the snowline retreats up the mountain, finishing with only a dusting on the peaks.

Study on melting glaciers reveals looming crisis

A pioneering 35-year study into river flow from glaciers in the Swiss Alps has revealed that increasing temperatures and lack of snow are causing the world's glaciers to melt at an alarming rate – with some of the smaller glaciers due to disappear this decade.

Professor David Collins from the University of Salford has been measuring river flow from Gornergletscher, near Zermatt, since 1974 – and now has the longest, most continuous detailed record of any glacier discharge study. It reveals that reducing river flows has allowed water temperatures to increase significantly.

Professor Collins has been taking undergraduate and postgraduate students from Salford and other UK universities – funded by the National Environment Research Council, the Royal Society, the University of Salford and the students themselves – on field trips to the site every summer. The ongoing experiment, which measures water flow, water temperature and solute chemistry, now runs with automatic data collection throughout the year.

The glaciers, which flow into the basins of the great continental rivers including the Rhône, have been melting steadily since Professor Collins began his study as a PhD student back in 1974.

Declining ice melt allows river temperatures to increase, and dissolved oxygen levels to fall – resulting in water that is harmful to wildlife, with the potential to kill fish.

'When these glaciers disappear completely the alpine eco-system will be destroyed forever,' says Professor Collins.



Students on a field trip to the Alps.

The environmental impact of our actions in travelling more and further afield, coupled with the vast amounts of rubbish our consumer-led society generates, has led to a huge academic effort to research a less environmentally damaging way of life.

Planting trees to offset carbon footprints, recycling household waste, buying locally produced food and taking fewer car, sea and plane journeys, are some of the solutions we are all being urged to practice in order to help tackle climate change. We are being told they make a difference, but just how much and what effect these changes in lifestyle might have is down to our scientists to predict.

Inter-university, inter-research establishment and inter-continental research solutions are being pooled to develop computer models to determine what actions could make a marked difference and what can be developed to ensure these differences make an impact.

Facts and figures

- 1** Greenhouse gas emissions have risen by 70% since 1970: if no global action is taken to curb emissions, this figure is predicted to rise by 25–90% over the next 25 years.⁹
- 2** UK Met Office predicts temperatures during at least half the years between 2009–2014 are likely to break all previous records, with the average temperature being 0.3°C warmer in 2014 than in 2004.¹⁰
- 3** Global emissions of the greenhouse gas CO₂ from shipping are twice the levels produced by aviation.¹¹
- 4** If every UK household installed energy-saving light bulbs, enough energy could be saved each year to supply all the country's street-lighting:¹² power stations throw away two-thirds of the power they generate.¹³
- 5** If we do nothing to combat climate change, extreme weather and rising sea-levels could permanently displace 200 million people; crop yields will fall, especially in Africa; 40% of all species are facing extinction.¹⁴

Omega – spearheading studies into the aviation industry

The Omega programme, based at Manchester Metropolitan University, is a partnership of leading academics from nine UK universities (the others are Cranfield, Cambridge, Oxford, Leeds, Sheffield, Reading, Southampton and Loughborough), established to study the scientific, technological, business and operational aspects of aviation’s environmental performance. The focus is upon long-term sustainability for air transport.

Omega’s knowledge transfer studies include work to improve aviation climate science understanding, ‘optioneering’ for clean technologies, investigating the viability of sustainable fuels for aircraft, and assessing the potential of emissions trading and carbon offset programmes. An expanding programme of activities – studies, workshops and a growing information resource for stakeholders – responds to major environmental challenges facing the sector.

Formed at the start of 2007 for an initial two-year period with £5m from the English Higher Education Funding Council’s Innovation Fund (HEIF), Omega’s Chief Executive Roger Gardner says the plan is for the programme to run much longer.

‘This will not be an ivory tower within academia,’ he says. ‘We work with manufacturers, airports, airlines, air traffic managers and Government – the “hands-on” expertise critical to delivering change that enables aviation to grow to meet business and leisure needs.’



The Omega programme, working with airports.

The problem of how to store hydrogen has been a stumbling block in the development of hydrogen power technology. Three universities are now a step nearer to finding the answer which could lead to using environmentally friendly hydrogen to power our cars. No existing hydrogen storage technology meets the challenging performance requirements to make hydrogen-powered cars competitive with traditional vehicles.

Hydrogen has been investigated for a long time as a replacement for petrol amid worries over the long-term availability of fossil fuels. It is a clean fuel as its waste product is only water, rather than CO₂ which contributes to global warming. However, how to store the substance has baffled scientists. It is a gas and so contains less energy in a given volume than liquid petrol.

A team from Newcastle and Liverpool universities are now using nanoporous materials to store and release hydrogen safely to produce energy. Such materials have minute pores one hundred thousandth the thickness of a sheet of paper.

Injecting hydrogen gas at high pressure into the tiny pores, then reducing pressure within the material, allows the captured hydrogen to be stored safely. Heat can then be applied to release the hydrogen as energy on which a car can potentially run.

Professor Matt Rosseinsky of the University of Liverpool says: 'Our new porous materials can capture hydrogen gas within their channels, like a molecular cat-flap.' Professor Mark Thomas from Newcastle University's Northern Carbon Research Labs adds: 'If developed further this method would have the potential to be applied not only to powering cars but any generator supplying power.'

As easy as flicking on a switch

A material which stores and releases hydrogen at room temperature at the flick of a switch, promises to help make hydrogen power a viable clean energy technology for the future.

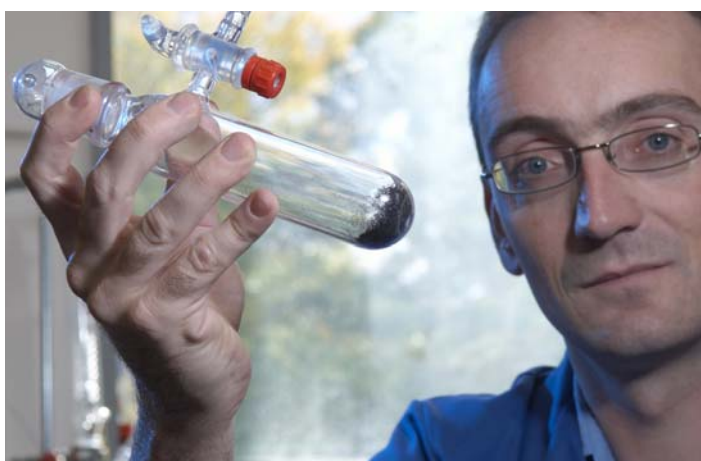
Thanks to research at the University of Bath, scientists hope to have a fully-working laboratory prototype ready within two to three years, taking us one step nearer to environmentally-friendly hydrogen-fuelled vehicles on our roads.

Scientists have been experimenting with storing hydrogen by locking the gas into metal lattices, but metal hydrides only work at temperatures above 300°C and metal organic framework materials at liquid nitrogen temperatures -198°C (75K).

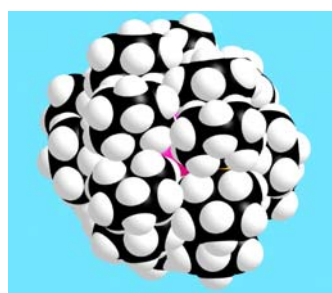
'Our new material works at room temperature and at atmospheric pressure at the flick of a switch. Because it is made from rhodium, a heavy metal, its weight to fuel ratio is low, 0-1%, but it could certainly fill the time lag between a driver putting a foot on the accelerator and a metal hydride fuel tank getting up to temperature,' says Dr Andrew Weller.

Bath's researchers made the discovery whilst investigating the effects hydrogen has on metals. Working with scientists from the Universities of Oxford and Victoria (Canada) they found that rhodium absorbs two molecules of hydrogen at room temperature and atmospheric pressure and releases the molecules when a small electric current is applied to the material. They are now hoping to print this material on to sheets which could be stacked together and encased to form a storage tank.

'The fact that we discovered the material by chance is a fantastic advertisement for the benefits of curiosity driven research,' adds Dr Weller.



Dr Andrew Weller holding a tube containing the material.



A diagram of the rhodium compound developed at the University of Bath.

Modelling our impact on the planet

Researchers from the University of Leeds have discovered that shifting the UK's night flights to daytime would save the equivalent of 2.5% of the UK's annual CO₂ emissions. A climate modelling team led by Dr Piers Forster is studying the complicated relationship between sunlight, clouds and the climate.

Meanwhile, colleague Professor Ken Carslaw and his team are creating climate models which include the phenomenon known as 'global dimming'. Here, particles produced by trees help clouds form, shading the Earth by reflecting sunlight.

'These particles, also coming from pollutants, could actually be masking the extent of climate change,' he says.

'They are some of the biggest uncertainties in climate science and if we can't understand them it makes it very difficult to predict what will happen in the future.'

Artificial Intelligence helps reduce scrap waste

Engineers at Swansea University have made a breakthrough in Artificial Intelligence that could allow computers to learn from mistakes, saving industry billions of pounds in quality control and waste material elimination.

MetaCause™ Studio (previously known as X1 Recall) – 'the world's first self-learning, web-based software' – gives computers the power of thought and reason and helps them learn from their own experience.

Dr Rajesh Ransing, of the University's School of Engineering says: 'Reducing the amount of scrap produced is a challenge facing manufacturing industries. Scrap wastes materials, energy and time. The software doesn't rely on experts to interpret data and analyse the best course of corrective action. It makes the computer think about the problem and reason why it has occurred.'



Dr Piers Forster from the University of Leeds.

Carbon8 could clean up

Contaminated land and industrial waste could be drastically reduced by a new process being developed by Carbon8 – a spin-out company from the University of Greenwich's School of Science, led by Dr Colin Hills.

Known as accelerated carbonisation technology, the process captures CO₂ from the environment; reduces waste going to landfill; and recycles waste into tiny harmless pebbles which can be used by the construction industry.

Carbonisation is completed in minutes with CO₂ being permanently captured, providing carbon credits and rendering hazardous elements inert. It offers a rapid, cost-effective solution for brownfield land remediation and development.

Carbon8 has won a number of regional and national awards and is attracting a great deal of interest from the construction and waste disposal industries.



Dr Colin Hills of Carbon8 at the University of Greenwich identifying components in contaminated soil.

The UK's first 'Earthship' has landed

A solar powered, eco-friendly 'Earthship' – in reality a visitor centre – constructed primarily from reused and recycled materials including tyres and glass bottles has been built by volunteers in Brighton's Stanmer Park. The University of Brighton's Centre for Sustainability of the Built Environment, with the Low Carbon Trust, have been working together to evaluate the performance of the Earthship.

Autonomous and cheap to run, everything about the Earthship is designed to be eco-friendly. It is estimated in the UK we throw away 48 million tyres and 1.5 million tonnes of glass every year. Working on the passive solar principle of 'glass and mass', tyre walls tucked into banks of earth act as a thermal 'battery' to store the sun's energy. Two grey water planters clean waste water from the sinks and shower to supply a low flush toilet and rain water is collected to be treated. An array of solar panels gathers further energy whilst a wind turbine harvests wind energy.

'The University of Brighton was approached to formulate a solid, scientific but most importantly, completely independent and impartial study of the Earthship's performance,' said project manager Mischa Hewitt.

Extensive monitoring equipment was set up, including 24 temperature sensors buried in the tyre walls and floor; humidity and temperature sensors; and a solarimeter measuring incident solar radiation, collecting what Mischa Hewitt describes as 'an absolutely awesome amount of data'.

The Earthship principles have now been taken on board by Brighton and Hove City Council, which has given planning permission to build 16 new sustainable homes based on the prototype of the Earthship.



The prototype Earthship at the University of Brighton.

Call for eco-friendly and informative packaging

Concentrating on giving shoppers details of food miles alone ignores the impact of other parts of the food production process on the environment.

The team who developed the first 'eco-diet' at the University of Wales Institute, Cardiff (UWIC), is calling for better food labelling to assist consumer choice.

A more sophisticated labelling system could indicate the aggregate environmental impact from farm to shop. But this means that while beer and eggs might be acceptable to eco-friendly shoppers, the traditional romantic chocolate and wine would become anathema.

Dr Ruth Fairchild from UWIC believes all environmental impacts from source to plate should be calculated to give a true representation of the product's ecological footprint, the total resources used in the production and retailing of a product or service.

The warning comes as some of the UK's leading supermarkets begin to label products that have travelled by air. There have also been claims that lamb farmed in New Zealand and flown into Britain is more eco-friendly than our native lamb because the 'kiwis' use less intensive farming methods.

'I am worried about the food miles debate because it is oversimplifying the message,' says Dr Fairchild, who points out that some foods with low air miles might have been excessively processed, including the use of fertilisers and pesticides, and be over-packaged.

'We must ensure that all environmental effects of a product are included in the calculation. However, recent research conducted at UWIC indicates the average consumer is not quite ready for an eco-footprint label and considerable education is needed before consumers would be comfortable relying on a single "low impact" label,' she says.

The Carbon Trust, Defra and BSI British Standards Agency are in the process of developing a calculator to measure the greenhouse gas emissions of all goods and services. Its aim is to give an eco-impact figure for everything from bags of crisps to airline flights.

The week-long 'eco-diet' was designed by UWIC and the Centre for Business Relationships, Accountability, Sustainability and Society, (BRASS), to be as environmentally friendly as possible, healthy and economical. It costs just under £28 per week for a couple and includes coffee, tea and beer but no wine. It also contains no chocolate or red meat – both of which have a high environmental impact in their production.

Harnessing the sun's rays to create cheaper green energy

Researchers at the University of Durham are developing light-absorbing materials for use in the production of thin-layer solar photovoltaic (PV) cells used to convert light energy into electricity. Solar panels currently provide less than one hundredth of one percent of the UK's home energy needs.

The four-year project involves experiments on a range of different materials that would be less expensive and more sustainable in the manufacturing of solar panels. It is funded by the Engineering and Physical Sciences Research Council (EPSRC) SUPERGEN initiative.

The cells would be used to make solar panels that could be fitted to roofs to help power homes, with any surplus electricity being fed back into the National Grid. This could lead to cheaper fuel bills and less reliance on burning fossil fuels to generate electricity.

Professor Ken Durose, Director of the Durham Centre for Renewable Energy, says:

'If solar panels were cheap enough so you could buy a system off the shelf that provided even a fraction of your power needs you would do it, but that product isn't there at the moment.'

To aid its research the university has bought a £1.7m suite of high-powered electron microscopes, which have nanoscale resolution allowing scientists to see the effects that currently limit the performance of solar cells.



Experimenting with solar panels.

Modelling carbon trading in aircraft emissions

In the first of its kind, the University of Cambridge is developing a large scale macroeconomic model to study the impact on the aviation industry of carbon trading in aircraft emissions.

With global air travel set to grow 300% by 2030, it is generally recognised the increase in emissions cannot be offset by improvements in aviation technology and operations alone. This is likely to require even greater reductions in emissions from other industrial and end-user sectors.

Working in conjunction with the European Union, it is hoped the University's research will help decide whether, how and when to implement carbon trading in aviation emissions via the EU's Emissions Trading Scheme (ETS). To date there has been little analysis of aviation in the EU ETS.

World class marine energy research institute for the South West

A £15m institute for research into harnessing the energy from the sea is being set up in South West England. The Peninsula Research Institute for Marine Renewable Energy will create an international research base aimed at putting the region at the forefront of wave energy development.

The Research Institute is a joint venture between the Universities of Exeter and Plymouth and will be based at the main Combined Universities in Cornwall campus near Falmouth. Already world-leading experts are on board following an investment of £1.4m from the South West of England Regional Development Agency (RDA).

The Research Institute will work alongside the Wave Hub project, being developed by the South West RDA off the coast of Cornwall. Wave Hub is a £28m project to create the world's first large scale wave farm. Consisting of a giant electrical socket on the seabed, connected to the National Grid by an underwater cable, it could generate enough electricity for 7,500 homes, directly saving 300,000 tonnes of CO₂ over 25 years.

Lorelei Hunt, Director of Innovation at the South West RDA, said: 'Harnessing energy from the sea is still an embryonic industry but has enormous potential. This further investment in knowledge capital will ensure that we maximise the economic benefits of our investment in Wave Hub.'

Students and staff at our universities are leading by example in promoting cleaner, greener living. The majority of the UK's higher education institutions now have sustainable development programmes and much is being done to encourage the saving of energy and implement environmentally-friendly means of transport.

Britons walk less than the inhabitants of almost any other Western country, except Greece, while their cycling rate is 40% below the EU average. But cycling is now on the increase around our campuses and a variety of schemes exist to encourage this mode of transport, including free bike hire at the University of East London.

Our students are the decision-makers and role models of tomorrow. By establishing green credentials at the start of their professional lives they are ensuring a green basis for the future.

Facts and figures

- 1**
115 HE institutions offer approximately 945 environmental courses in the UK.¹⁵
- 2**
In 2004/05, there were 4,365 applicants to physical and terrestrial geography, and environmental sciences courses:¹⁶ rising by 9.2% to 4,765 applicants during 2005/06.¹⁷
- 3**
The University of Gloucestershire has been using 'green' electricity on its campus since 1993, and was the first English university to achieve the internationally recognised ISO 14001 registration standard for environmental management systems across the full range of its activities.¹⁸
- 4**
In 2000, 9,350 hybrid vehicles were sold in the US. Since then, the number has approximately doubled each year. In 2005, 205,749 hybrid vehicles were sold, representing 1.2% of all vehicles sold in the US in that year.¹⁹
- 5**
Could aircraft fly on hydrogen? As early as 1956, the US was experimenting with hydrogen-powered jet engines. Hydrogen is much safer than kerosene and contains three times as much energy per kg, but is difficult to store, especially in liquid form (at -253°C, 20K). Although small modifications would allow aircraft engines to burn hydrogen, they would need specialised fuel pumps, pipes, control valves and refuelling systems. Patents have been filed by Daimler-Benz Aerospace and Tupolev.²⁰

Staff and students sign up to make a difference

More than 3,000 staff and students at the University of Salford have signed a Charter for Sustainable Action, making major strides in reducing carbon footprints. The charter features a 10-point plan which lists practical steps they can all take to use less energy.

By simple steps such as switching off computers, lights and photocopiers, the charter has demonstrated how easy it is to save energy. As a result, in 2007 the University has already reduced its energy use by 600,000 kWhrs – the same as 33 typical British homes.

The charter was one of the first actions to come out of the University's Sustainability Group which was formed on World Environment Day in June 2006.

Since then, as well as saving energy, the group has galvanised staff and students into increasing recycling facilities, such as plastic, glass, paper and cardboard. They've also installed a composter to produce fertiliser from catering facility scraps and introduced car sharing.

As Sustainability Manager Chris Rice explained: 'We're proud of how many staff and students have signed up to the charter. We were placed in the top half of the People and Planet Green League Table, which certainly wouldn't have happened before the charter raised awareness of green issues.'

'My aim is to ensure every single student and member of staff has signed up so we can cut our bills and emissions and put more money back into sustainable projects around the campus.'



Energy-saving light bulbs use up to 80% less electricity than standard bulbs, while producing the same amount of light.

New course in renewable energy – a first for the UK

The University of Exeter launched its BSc Renewable Energy course in 2003 with eight undergraduates; by 2006 this had quadrupled to 35. The course offers a practical, vocational programme for those seeking a professional role in the rapidly expanding and strategically important energy sector.

At its Cornwall campus, Exeter pioneered geothermal energy research in leading the £40m Hot Dry Rocks project and is developing shoreline wave power conversion technology. It has state of the art facilities including a renewable energy laboratory and field station. Cornwall has significant and diverse renewable energy resources and has led the nation in the development and exploitation of wind power.

Exeter's research strengths in geothermal energy, wave power, transport, bio fuels, energy policy and finance have attracted substantial support for the course from the renewable energy industry, which offers students a summer vacation industrial placement and close links with industry.

Accredited by the Energy Institute, the course provides the necessary basis to proceed to Chartered Engineer status, following graduation.

Renewable energy is produced from sources replenished as they are used, such as the wind; water flowing in streams, rivers and seas; the sun, and sustainably-grown crops. The students, as new renewable energy professionals, are taught the scientific principles of renewable energy technology and management skills to ensure UK and international carbon emission targets are met. Undergraduates learn to understand the effect of human activities on the environment and the socio-economic and business issues influencing the delivery of new technology.

95% of graduates from the course are employed in the renewable energy industry or studying for a higher degree.



Exeter students graduating.

Greener by degrees

The University of Gloucestershire has almost two decades' experience of including education for sustainable development (ESD) in its curriculum. Courses focusing explicitly on 'environmental issues' have been delivered by the institution since the 1970s. The University of Gloucestershire also began working in partnership in the 1990s with several UK initiatives concerned with promoting sound environmental practice.

It has now capitalised on this innovative approach and produced a book, *Greener by degrees*, which it hopes will inspire academics to include experiments in ESD learning in their own tuition. The book also aims to provide a forum for ESD practitioners to exchange and discuss their approaches and experiences and to disseminate good practice.

Greener by degrees contains 37 chapters exploring different aspects of sustainability within the undergraduate and postgraduate curriculum. The disciplines covered range from marketing to design, landscape architecture to leisure management, broadcast journalism to geography, with each case study explained in practical terms to allow replication of the approaches and ideas.

Gloucestershire was the first English university to achieve Environmental Management System BS ISO 14001 status for the whole of its activity – teaching and non-teaching. The University has also secured a national Centre for Excellence in Teaching and Learning (CETL) for Geography, Environment and related disciplines.



Students at Gloucestershire.

University uses students' chip fat to power campus tractors

A Welsh university is the first in the UK to set up an on-site plant for turning waste cooking oil into eco-friendly biodiesel. The University of Wales, Newport is recycling its kitchens' waste cooking oil to produce carbon neutral fuel to power the many campus maintenance vehicles and machinery, and production could eventually expand to provide the fuel for the University minibus and van fleet.

'We are very proud that, as a university, Newport is leading the way in pioneering this environmentally-friendly process which recycles one of our waste products into a fuel that produces a lot less CO₂ than standard diesel,' said Matthew Bellamy, the University's Environmental Officer.

'It's proving an extremely cost-effective and eco-friendly way of running a range of vehicles used to maintain the extensive grounds of our two campuses. We can produce 120 litres of fuel from 150 litres of waste cooking oil, and with the potential to collect up to 4,000 litres of waste oil for recycling per year it should amount to an initial annual saving of about £1,000.'

'This process has many environmental benefits including minimising the University's emissions of greenhouse gasses which contribute to global warming – we estimate a saving of some 20 tons of CO₂ emissions per year,' Matthew added.

On yer bike!

The University of East London (UEL), is the first UK university to offer free access, pay-as-you-go cycling for staff, students and local residents. Introduced in March 2007 the benefits are enormous: cyclists are exercising; not adding to environmental pollution by using public transport; and saving money. All journeys of less than half an hour are free.

UEL is working in tandem with the bike rental company, OYBike. Bikes are in place in docking stations at the Stratford campuses and after registering online, cyclists can hire bikes at a low hourly rate by calling a freephone number at the start and end of their journeys.

Greg Price, UEL's Organisational Development Manager said: 'This is a fantastic initiative and a great way of encouraging people to make the transition from a motoring to cycling mentality.'



UEL students get on their bikes!

Green travel plan takes off

Staff, students and residents of St Andrews have joined forces to tackle travel and parking around the University of St Andrews, whose policy is to include everyone in its sustainable development plans and raise awareness of a sustainable culture.

Following consultation and surveys, a Transport Forum was established and a Green Travel Plan implemented. The School of Geography devised a database and plans on an Ordnance Survey basis to present to transport providers. The University is now involved with discussions with local bus companies on bus routes and timings.

Findings from a newly-formed bicycle user group have resulted in almost 500 new and refurbished cycle spaces. Cycle information, maps and guides are available to all staff and students and bike maintenance classes have recently been introduced. All future building developments will include cycle and shower facilities.

The University is also setting up a bike pool scheme to enable staff to travel sustainably around town between meetings.



Staff from St Andrews Bicycle User Group setting off to work at the 2007 Bike to work breakfast event.

Not only are universities investing money, staff and expertise in environmental research, they are also leading from the front by introducing energy-saving initiatives on to their campuses.

From low-cost recycling and waste-disposal schemes to multi-million pound building refurbishment and construction, green issues are key issues for management teams, when liaising with architects and builders.

Students and staff are consulted and their views taken into consideration. This is particularly in evidence in the conception of the country's first sustainable student village being planned for Bradford.

Many establishments are turning to The Energy Consortium, which operates a not-for-profit service to supply green energy to the higher and further education sectors. It is hoped when the success of such programmes is realised more will be operated and the economic guideline of supply and demand will result in increased economic and energy-saving benefits.

Facts and figures

- 1** Independent watchdog says nuclear power is not the answer to tackling climate change and long-term energy security. Tidal power could supply 10% of the UK's electricity.^{21, 22}
- 2** 'Lighting an office overnight wastes enough energy to heat enough water for 1,000 cups of tea.'²³
- 3** Second only to energy production, deforestation is responsible for 18–25% of global carbon emissions. Every day, a forest area the size of Birmingham and Manchester combined is lost, leading to an extra 22 million tonnes of CO₂ entering the atmosphere. In pollution terms this is equivalent to flying 37 million people from London to New York every day.²⁴
- 4** As a nation, the UK every year travels around 500 bn km on 724,000 km of roads; 50 bn km on 16,600 km of rail; and 275 bn km by air from 28 major airports; spending £8bn per year to maintain this transport infrastructure. Investments made now will be with us for at least the next 50–100 years.²⁵
- 5** Last season's FA Cup Final produced an ecological footprint the size of about 3,051 football pitches. This footprint expresses resource consumption in terms of global hectares; the largest impact coming from fans travelling to the game by car.²⁶

Campus boasts own renewable energy sources

Like many other institutions, the University of Westminster buys its energy through The Energy Consortium. However, it is able to source just 60% of its green electricity due to the limited supply of renewables on the National Grid and additional premium costs.

Undaunted, the University is now planning to generate its own green energy on campus. The Low Carbon Building programme has offered a grant towards installing a 7.5kW solar panel and 15kW wind turbine. A 100kW biomass boiler will be installed using up to 20% of the Government's Bio-energy Capital Grant.

While the fuel for renewable energy, such as solar and wind, is available at the campus, biomass has to be sourced as a storable energy for use on demand. Here again The Energy Consortium helps out. It offers carbon-neutral wood pellets to all its member institutions.

The cost of wood pellets equates roughly with present gas prices. In sourcing the pellets the University will be considering CO₂ emissions from delivery vans. It aims to buy from consortium-approved companies with biofuel depots close to the site, or having their own vehicles run on biodiesel.

The University is now planning to incorporate energy and low-carbon management in all new buildings and conversions. Its green programme will also be used to educate not just students, but the local community to demonstrate how they too can cut their carbon footprints.

For the first time the University of Westminster has quantified that the total carbon emissions for the baseline year 2005/06 was 14,816 tonnes of CO₂, equivalent to filling 8,230 hot air balloons.



Carbon neutral wood pellets.

Birkbeck makes its college greener

Just two years after starting seriously to address the College's activities in the field of energy and sustainability, Birkbeck, University of London, has saved significant amounts of money and energy from its recycling programme.

At the end of 2005, Birkbeck set up a team to oversee the College's progress towards Environmental Management System (EMS) ISO 14001, taking a phased-implementation approach which breaks down the standard into manageable sections. An EMS is about understanding and implementing both a social and business model as well as making the College's staff, students and wider community aware of what Birkbeck is trying to achieve.

Currently 51% of the College's electrical energy is from renewable resources and 20% of waste is recycled. In the period November 2004/05 Birkbeck recycled 15,191 kilos of paper – roughly equivalent to 258 trees. For this the College received an award of a section of preserved rainforest being named after it. Birkbeck's paper recycling has improved: in 2005/06 39,000 kilos of paper were recycled and in 2006/07 recycling rose to 90,000 kilos, now including coloured paper, magazines and newspapers. The College's one and only van is powered by electricity, and recycling even runs to unwanted clothes being donated to homeless charities.

A web forum – called College Green – has been introduced where staff and students can air their views on sustainability and generate ideas to improve environmental awareness. This forum won a Kyocera GreenLight Award for environmental practice in the public sector and for identifying and meeting environmental challenges associated with the College. The website includes tips for reducing energy consumption both at home and work, explains recycling procedures and allows staff to work out their carbon footprint.



Gary Meades,
Environmental Affairs
Manager at British
Airways, presenting the
GreenLight Award to
Tom McCartney of
Birkbeck, with Patricia
Pascoe from Kyocera.

Green Gown commends Derby's waste management

The University of Derby is a longstanding and active member of EAUC – the Environmental Association for Universities and Colleges – and is proud to wear a green gown, a commendation for its waste management work.

Green Gown awards celebrate environmental best practice and innovation at UK universities and colleges.

For the past seven years, the University has created and refined an innovative pay-by-weight system of waste recycling which provides an accurate measurement of the weight of waste at the point of collection. Invoices are produced showing a breakdown of costs covering the rental of containers, travel to disposal sites and landfill, allowing the University to manage tightly collections matched with demand.

In addition a recycling scheme diverts 16–17% of waste every year to various projects. These include supplying books and sports equipment to schools in Ghana and either re-using or giving away redundant IT equipment.



The pay-by-weight system in action at Derby.

Plymouth – a model of education for sustainable development

Housed within the University of Plymouth, the new Centre for Sustainable Futures (CSF) is transforming the University into a model of education for sustainable development. Two and a half million pounds has been spent on enhancing the campus' green credentials and formal approval of a wide-reaching sustainability policy and action plan has been granted by the chancellery.

The campus greening initiative has been praised for its high level consultation with students and stakeholders on four main projects:

- Ensuring the high Building Research Establishment Environmental Assessment Method (BREEAM) rating of the new seven story Levinsky Arts building;
- Refurbishing the CSF's condemned Kirkby Lodge building with structural work, eco-paints, eco-carpeting and doubled-paned glass;
- Creating a students' union garden with native vegetation; and
- Conducting a detailed analysis of opportunities and feasibility of alternative energy creation across the University's two campuses and surrounding areas.

Partnerships have been forged between the University and three internationally-regarded bodies promoting sustainability – Schumacher College, Forum for the Future, and the Eden Project.

A new Masters in Learning for Sustainability has begun, while modules and courses in disciplines as diverse as engineering, geography and design have been infused with more sustainability content.

It is hoped the Centre will transform the University from an institution characterised by significant areas of excellence in Education for Sustainable Development into an institution modelling university-wide excellence. Already the CSF has presented more than 30 papers at national and international conferences and run a series of workshops at other UK universities.



Staff of the University of Plymouth's Centre for Sustainable Futures at its launch.



Alan Dyer, Associate Director of the Centre for Sustainable Futures at the University of Plymouth, tries out a Segway at the launch.

Panel power at Napier

Napier University has launched a new electricity generation project at its Merchiston campus. The installation of 32 rows of BP Solar silicon panels covering a total area of 160 square metres ensures generation of 17.6kW peak power when the sun shines on the south-facing wall.

DC power is produced from the high efficiency monocrystalline panels, each of which produces 90W of power at 22 Volts. This DC electricity is fed into four inverters, converting to a stable AC supply. The panels will generate enough electricity to power up to 80 of the 500 computers at the University's state-of-the-art Jack Kilby Computing Centre.

The project has been backed by more than £81,000 from the Energy Saving Trust, which covers 60% of the basic costs. The University has plans to generate hydrogen from solar electricity that will be stored for nocturnal production of electricity using fuel-cell technology, thus completing the cycle of generation, storage and reproduction of sustainable energy.

This project is managed by Napier's School of Engineering, which has been involved in education and research in renewable energy for the past 35 years.

Sheffield saves its water

Eight years ago the University of Sheffield realised it was spending more on providing water to its buildings than on heating them.

Accepting that water is an expensive, finite resource, staff at the University's Energy and Environment team carried out monitoring which showed many sites were performing poorly, particularly the main science centre: there consumption was more than double recommended levels. Working with Yorkshire Water it drew up an action plan to reduce water wastage.

Around 900 water conservation techniques were installed including urinal controls, tap regulators, self-closing taps and cistern volume regulators. Underground pipe work was mapped and sub-metering with remote-monitoring facilities installed.

The University's base load water, ie used during unoccupied hours, fell by 70%. The overall reduction was 34%, saving over 85,000 cubic metres in the first year alone. More water saving techniques are now in the pipeline.

Southampton's new £4m eco-building

When the University of Southampton started planning a new Professional Services building, the project team enlisted the help of the University's own Sustainable Energy Research Group, appointed environmentally-aware architects and builders, and consulted its own academics and students. It calculated there would be cost savings in doing it this way, as well as reductions in running costs and carbon emissions.

The aim was to construct a building with the smallest possible carbon footprint whilst meeting the needs of its users. Choices about such things as computer equipment were made based on heat output and energy use. This meant that any cooling system for the building would not have to cope with very high temperatures.

Linking design and construction activities to the latest research at the University was key. Academics with expertise in renewable energy systems were involved in the project from an early stage, advising on low-energy designs, measuring environmental conditions in the new building and developing user-satisfaction questionnaires.

Responses showed that occupants who were involved in the design process were pleased to have done so and felt they 'owned' the building, positively influencing the way they use it. Some of the building's occupants were worried that, having agreed not to have air conditioning, they would have to use desk fans – not realising the difference in energy-usage through the summer. The carbon footprint of using a fan for an hour is just 25g but for air conditioning is 650g!

Project success depended on starting the team-building process as early as possible to break down barriers and establish enough trust for designers and users to negotiate shared goals successfully. The result is an energy efficient building that uses less than 60% of the energy and associated carbon emissions of a typical building of this type.



The University of Southampton's energy efficient building.

Award for Lincoln's environmental building

The University of Lincoln's environmentally-friendly Brayford campus draws many full-time undergraduates to the city, providing a safe and accessible environment for students.

Lincoln is the only university in the UK to own a RIBA-registered architectural practice, UL Architects, which has designed many of the University buildings. This environmentally sensitive approach, using high quality design and sustainable construction, transformed the Brayford Pool area in Lincoln.

During the last 10 years more than £100m has been spent on the campus including converting a disused engine shed into a new students' union building. The building was a Victorian locomotive maintenance shed which was abandoned, derelict and heavily contaminated with petrochemicals, guano and asbestos.

The University received an award in 2007 in the 'well designed and well built' category of the Academy for Sustainable Communities awards. Principal Architect Nigel Stevenson said: 'We are delighted that the Brayford campus has been recognised at national level, particularly in the area of sustainability.'



Lincoln's award-winning student centre.

University of East Anglia – practices what it preaches

As might be expected from a university with a top-rate School of Environmental Science, the University of East Anglia (UEA) has been addressing the effects of climate change on its own estates for the past 17 years. It has done this using low-energy building design, good energy management, incorporating renewable energy sources and raising awareness.

A particular challenge UEA faced is that many campus buildings were constructed in the 1960s, when energy saving was less of an issue. Some buildings are listed, limiting the scope for significant improvements in their thermal performance. However, since the 1990s, construction policy has been well in advance of current – and where possible – future building standards. This has led to a series of award-winning low-energy buildings which use internal concrete thermal mass with triple glazing and massive insulation, to reduce input energy requirements.

In terms of energy efficiency and user satisfaction, UEA's Elizabeth Fry building was hailed as possibly 'the best building ever' by a Post-occupancy Review of Buildings and their Engineering (PROBE) report in the *Building Services Journal*.

Most of the campus benefits from on-site heating and electricity generation. UEA is planning to expand its combined heat and power capacity by building a biomass plant which will gasify wood from nearby sustainable sources. Already CO₂ emissions have fallen by a third since the installation of combined heat and power. An absorption chiller uses excess heat generated over the summer to cool the science faculty research equipment.



UEA's Elizabeth Fry Building.

Queen's University awarded a first

Queen's University of Belfast has been awarded a first in the People and Planet UK Green League Table, which ranks the environmental performance of all UK universities.

The award reflects Queen's commitment to sustainability and recognises a number of environmental improvement initiatives it has introduced. One example is the University's new stationery and computer consumables contract with Office Depot, a company which itself has won an Environmental Responsibility Award.

All of the University's office paper has recycled content rather than virgin pulp, significantly reducing the University's environmental impact in this area. The University uses approximately 200 tonnes of office paper annually. The switch to recycled content paper has diverted 150 tonnes of paper waste from landfill.

Collette Donnelly from Queen's purchasing office said: 'There are potentially 20% annual savings to be gained by using environmentally-friendly products.'



Collette Donnelly
from Queen's.

Queen's campus.

Bradford's Ecoversity vision

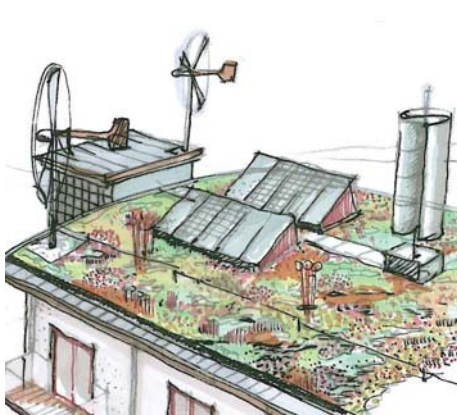
The University of Bradford's 'Ecoversity' project will see an innovative £21m sustainable student village built on its city centre campus. It is hoped the first phase will be completed by summer 2009.

The plan is to build a village of terraced housing and apartments, in keeping with the local area. In addition to being environmentally sustainable and green, the village has to be socially sustainable. To ensure this, the University has appointed 12 student ambassadors to help the student population engage with Ecoversity.

The ambassadors, who are paid for two hours work per week, have already asked their peers what features should be incorporated into the village and questioned them on issues such as energy bills and recycling. Ideas from the ambassadors include building a waste mountain from rubbish produced by a single department to demonstrate just how much can be recycled. They are also attempting to reduce catering waste by encouraging the use of reusable mugs after discovering that 168,000 disposable cups were used in one year.

Initial findings have been fed into a wider consultation exercise which has formed part of the specification offered to international designers vying to build the village.

Lecturer Dr Liz Sharp says the ambassador scheme follows a successful pilot at Harvard University. 'It is so important that we include students' opinions within the sustainable student village consultation because after all they are the ones who we are ultimately building this for.'



Artists' impressions of what the sustainable student village could look like.

In taking steps forward with their sustainable policies, universities do not operate in isolation. They are supported by a host of bodies, many aiming their services at the higher and further education sectors.

These offer advice, practical support, grants and in some cases, hands-on expertise, to ensure that the UK's universities are not operating alone or from scratch in their move towards sustainability.

Whether providing example questionnaires, monitoring the performance of suppliers in ethical and environmental practices, or providing consultants for initial planning advice for major building projects, the assistance from such organisations is valued and essential.

Facts and figures

- 1** Friends of the Earth International has 70 member groups, 15 affiliate groups, and more than two million members across the world.²⁷
- 2** The United Nations Educational, Scientific, and Cultural Organisation (UNESCO) runs a multimedia teaching education programme called 'Teaching and Learning for a Sustainable Future'.²⁸
- 3** Green Jobs Online UK is a UK recruitment agency specialising in renewable energy and environmental jobs.²⁹
- 4** The Energy Services and Technology Association (ESTA) aims to help businesses design, construct, update, operate, and manage their facilities at a lower cost, while improving sustainability and reducing CO₂ emissions.³⁰
- 5** With £1bn from Government and the private sector over the next 10 years, the Loughborough-based Energy Technologies Institute will tackle cutting CO₂ emissions, delivering more efficient energy, and guaranteeing the UK's future energy supplies.³¹

The Carbon Trust

The Carbon Trust offers practical support in identifying carbon-saving opportunities tailored to meet the needs of the higher education sector. The focus of its work is to reduce emissions under the control of the university such as academic, accommodation and leisure buildings as well as vehicle fleets.

It offers a 10-month consultancy support package which provides a guide through a systematic analysis of the university's carbon footprint.

A total of 48 higher education institutions have engaged in the Higher Education Carbon Management programme since it was launched in 2005, which has helped identify annual savings of more than £15m and 125,000 tonnes of CO₂ for the HEIs involved.

How one university works with the Carbon Trust

Representatives from the Carbon Trust have carried out an energy audit across Kingston University's four campuses, after it signed up to its Higher Education Carbon Management programme.

Regular workshops are being held and a 'Turn It Off' campaign instigated to encourage staff and students to make sure all unnecessary electrical equipment is turned off each evening. Staff are also encouraged to become carbon champions, responsible for encouraging their colleagues to embrace energy efficient initiatives.

University secretary Donald Beaton said Kingston's involvement with the programme signalled its strong commitment to addressing its impact on climate change.

'The University has already invested heavily in energy-saving technology and is ensuring its new buildings are energy efficient. This programme will help us identify additional areas where we can cut carbon emissions and really make a difference.'



The 'Turn it off' campaign encourages staff to turn off unnecessary electrical equipment each evening.

Carbon on Campus

The Association of University Directors of Estates (AUDE) has sponsored research work on the legacy of the 1960s estate. The work recognises the substantial number of HE buildings constructed in the 1960s and early 70s, most of which display significant problems of maintenance backlog, energy inefficiency, lack of compliance with legislation, poor brand image and inappropriate internal working environment.

Sector case studies are being analysed from various strategic viewpoints. Important themes are sustainability and the reduction of carbon emissions, in construction and in use. A sustainability matrix to enable future decision-making will be a key output, looking particularly at the 'demolish or refurbish' conundrum. The work will also contrast experiences in other sectors of the property market.

The research, which has been supported by HEFCE, will be formally presented at the 2008 AUDE Conference.

AUDE is also considering a possible BREEAM sustainability standard tailored to the HE sector. This work could progress jointly with HEEPI and HEFCE and has as its principal aim the simplification of the BREEAM process, with cost and programme reductions, which should make its use more viable for universities seeking to 'green' their construction activities.

Over the past year AUDE has also worked with HEFCE to develop Estate Management Statistics (EMS) to provide robust benchmarks for sustainability issues and carbon reduction measures. These include elements such as the amount of renewables generated, number of single occupancy car journeys and water supply borehole extraction. The new template has been issued and universities will complete their responses by the end of January 2008.

The Tyndall Centre

The Tyndall Centre for Climate Change Research brings together scientists, economists, engineers and social scientists, who are working to develop sustainable responses to climate change through trans-disciplinary research and dialogue on both a national and international level – not just within the research community, but also with business leaders, policy advisors, the media and the public. It aims to seek, evaluate and facilitate sustainable solutions that will minimise the adverse effects of climate change, and stimulate policy for the transition to a more benign energy and mobility regime, as well as to promote informed and effective dialogue across society about its ability and willingness to choose our future climate.

A partnership of researchers from six UK universities together form the Tyndall Consortium. The core partners are the University of East Anglia, the University of Manchester, the University of Southampton, the University of Oxford, the University of Newcastle, and the University of Sussex. It also has research collaborators at the universities of Cambridge, Leeds, Durham, University College London, the London School of Hygiene and Tropical Medicine, and the University of Loughborough.

www.tyndall.ac.uk

The UK Energy Research Centre

The Centre was established in 2004 following a report in 2002 by the Chief Scientific Advisor's energy research review group, and was set up to bring together government, industry and academia. It comprises more than 80 researchers based across the UK at various institutions and universities, including:

- University of Oxford
- Imperial College London
- The University of Manchester
- Lancaster University
- University of Exeter
- University of Edinburgh
- University of Sussex
- University of Southampton
- University of Bath
- University of Westminster (Policy Studies Institute)

Its mission is to be the UK's pre-eminent centre of research, and source of authoritative information on sustainable energy systems.

www.ukerc.ac.uk/Home.aspx

Green Gown Awards

Established to highlight growing pressures for better environmental performance at UK universities and colleges, and to celebrate innovative responses, the Green Gown Awards are becoming a coveted symbol. Their sponsors include the Association of University Director of Estates, the British Universities Finance Directors Group, the Environmental Association for Universities and Colleges and the Higher Education Funding Council for England.

greengowns@heepi.org.uk

Higher Education Environmental Performance Improvement

Established in 2001, the HEEPI project has run over 60 events for almost 300 delegates, collects benchmarking data (including the energy consumption of over 300 buildings), organises the Green Gown Awards, runs specialised initiatives on sustainable laboratories and residences, and hosts an online campus sustainability assessment tool (Good Campus) and guide to HE-relevant regulations (Environmental Virtual Campus).

www.heepi.org.uk

NUS Services Limited

The National Union of Students' trading arm, NUS Services Limited, has ethical and environmental principles at its core. It supports commercial activity in over 200 students' unions, where suppliers must complete, and pass, a comprehensive corporate social responsibility questionnaire. The company advocates the Sound Impact scheme and the Carbon Academy, developed to promote and recognise green good practice among students' unions.

www.nussl.co.uk



Green Gown Award Highly Commended 06/07 for Continuous Improvement – Oxford Brookes University.
Brookes Bus outside the Oxford Brookes Wheatley Campus.



Big Green Week at the University of Leicester.



Green Gown Award Highly Commended 06/07 for Sustainable Construction – The Queen Mother Building at the University of Dundee.
The Queen Mother Building houses the School of Computing, which is both a teaching and research facility.

BRASS

Based at Cardiff University, BRASS is the Centre for Business Relationships, Accountability, Sustainability and Society. One of its key aims is the development of the UK's research capacity in relation to business sustainability and social responsibility.

www.brass.cf.ac.uk

Environmental Association for Universities and Colleges

EAUC is the sustainability champion for universities and colleges in the UK. Through an extensive collaborative network of institutions and practitioners covering the whole organisation – campus, curriculum and community – the EAUC works to drive sustainability to the heart of further and higher education.

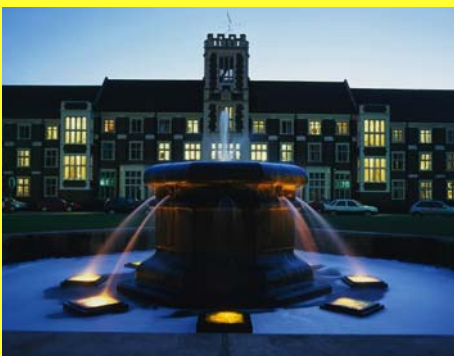
Its recent guide to 'biodiversity on campus' encourages higher and further education institutions across the UK to take a fresh look at how biodiversity fits into their environmental management agenda. It focuses on finding ways of managing campuses in the best way for biodiversity and gives practical 'how-to-do-it' advice on habitat creation and management, guidance for successful long-term biodiversity initiatives, strategy and policy, while ensuring legal compliance.

www.eauc.org.uk

People and Planet

This is the largest student network in Britain campaigning to alleviate world poverty, defend human rights and protect the environment. Some 55 UK universities have active groups on campus, run by students. In 2007 the group published its first 'Green League' in which universities are ranked according to their environmental performance, not academic results.

www.peopleandplanet.org



Green Gown Award
Highly Commended 06/07 for
Student Initiatives – Loughborough
University & Students' Union.

Hazlerigg: one of the participating
halls in the Energy League.



Recycling initiatives at the
University of Leeds have been
highly successful.



Students take part in People &
Planet's Carnival of Climate Change
in November 2006.

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