

# ENVIRONMENT

An image from the London Futures exhibition, on display at the Museum of London until 6 March 2011



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**Climate scientists admit that a forecast beyond five days is useless, but they can predict the Earth's climate at the end of the century**

# Perception or reality?

*Professor Piers Forster admits that it's hard to gauge the reality of climate change with all this weather getting in the way*

**WHAT'S YOUR FIRST** memory of the weather? Is it the hot summer of 1976, or the snow and cold during the winter of 1946-47? 2010's record snowfall may be my daughter's first weather memory – especially as she'll have the tobogganing-into-a-lamp post scar in her chin to remind her in later years.

Memories such as these form our early perceptions of the weather, fuelling our national obsession. Weather facts and figures trip off our tongues. However, the word 'climate' is a more difficult beast to get to grips with. We may remember discovering from geography text books that, based on long-term averages, Cherrapunji was the wettest place on Earth with 12m of rainfall every year, and the Atacama desert typically had only 2cm. These texts describe the British climate as 'temperate and maritime'. My Aussie spouse prefers 'wet, grey and freezing'.

When talking to the public about climate change, or trying to persuade politicians to take action about it, it is important to recall that people have different perceptions of the meaning of the word 'climate', and

that the human mind is a hopeless gauge of how things have changed through time. Memories can be manipulated, confused and lost. Brains forget the boring bits, causing extreme weather events to stand out in our memories, leading to a biased view of the past. If someone tells me that they remember winters were always colder or summers wetter in their childhood, I am sceptical, as a climate scientist, that they bear credible witness to a change in the climate.

We climate scientists are just as confusing. We readily admit that a weather forecast beyond five days is useless, but tell you that we can predict the Earth's climate at the end of the century. For us to be capable of such a feat, surely 'climate' and 'weather' must be very different things? But if you were to ask me "How will climate change affect me?" I may well reply, "Oh you know: floods, intense storms, heatwaves, droughts, etc." I've seemingly contradicted myself by describing climate as the weather.

Confusion arises because climate is all about collecting weather statistics. At the most basic level we want to know the average >

➤ temperature and rainfall for a region. How much the weather fluctuates from hour to hour, month to month or year to year are also important statistics. They help tell you whether we live in a stable or changeable climate. As you average these weather variations over larger and larger regions, or longer and longer time periods, the variations cancel each other out. Eventually you can find a large enough region or time period where the variations become small enough not to affect your average weather statistic too much.

You could, for example, take some measurements in your back garden and find that August 2010 was colder than September 2010, but if you were to average ten years worth of August temperatures and then compare them to ten years worth of September temperatures, you would find that your average August was warmer than your average September. You have then determined the August and September climates for your garden. Using these you can go further to find how climate changes between August and September. Now you can look for external factors, other than chance weather, that could have caused this 'climate change'. In this case, differences between monthly climates are ultimately caused by the position of the Sun in the sky, giving us our seasons. Rainfall varies much more than temperature and you typically need many more years of data (20 to 30) before achieving robust climate statistics to determine its seasonal climate.

We can then use these climate statistics to make a prediction for future years. August 2011 will be unlikely to have an average

**Russia's heatwave of up to 40°C, and severe air pollution from forest fires, caused thousands of deaths**



**Severe flooding hit Pakistan after rainfall of over 200mm per day in some areas**

temperature that exactly matches our ten-year August climatology, but the August climatology would be our best guess. But if we went on to measure temperature for the next ten years, and found that the average of these new temperatures was slightly higher than our original August climatology, there are two possible explanations. Maybe we didn't average temperatures for long enough to build up robust statistics, or perhaps some external influence has 'changed our climate'.

This is what we do when looking for signals of climate change – we try and separate the signals from external causes from those that are due to random fluctuations in the weather. If you want a quick answer to the question 'are humans changing the Earth's climate?' you don't have the luxury of waiting for 50 to 100 years to build up enough statistics. That's why most

scientists really only talk about one number when discussing climate change – the Earth's globally-averaged surface temperature. By choosing the largest region possible we are minimising weather noise and only need to average global temperatures for about ten

**This doesn't mean climate change isn't happening... It just means we won't know for sure until it's too late**

years for robust statistics. Then, comparing the climate of different decades, we can detect real climate change signals larger than about 0.1 degree Celsius.

This also explains why it is so difficult to tell how climate change will affect us individually. At a single location and for the weather we care about (floods, drought, etc), it takes too long for even large climate change signals to be detectable above the background weather noise.

This doesn't mean that climate change isn't happening or that 2010's heatwave in Russia and floods in Pakistan were not partially affected by rising carbon dioxide. It just means we won't know for sure until it's too late. An old English meteorological adage that Americans mistakenly attribute to Robert A Heinlein, the author of *Starship Troopers*, goes: 'climate is what you expect, weather is what you get'.

Climate models predict increased summer heatwaves and a more intense monsoon circulation, the cause of Pakistan's floods in 2010. I hope we can do something to change these expectations. ■

[www.see.leeds.ac.uk](http://www.see.leeds.ac.uk)

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# Crunch time?

*Robert Falkner examines the policy options for preventing an oil crisis*

**IS THE WORLD** facing a looming oil crunch? Until recently, most energy experts would have considered this question alarmist. Today, a number of indicators point to growing instability in global oil markets.

When the oil price hit a record \$147 per barrel in 2008, shockwaves were sent through the global economy. The economic recession brought prices down to \$32 at the end of that year, but as the economic recovery gets under way prices are pushing up again, reaching \$75 in September 2010. More and more analysts now argue that the era of cheap oil is over, and that greater price volatility will be with us for the foreseeable future. This could have severe consequences for Britain.

Two long-term developments are behind this worrying trend. For decades, oil demand has been rising steadily. Britain and other industrialised countries may have been able to halt the growth in oil consumption within their own shores, largely by greater energy efficiency and a shift away from energy-intensive manufacturing. But the forces of globalisation are changing the dynamics of future energy demand, which will be driven by the emerging economies. Countries such as China and India are experiencing unfettered growth of export-orientated industries and rapidly rising car ownership among the new middle classes. Their thirst for oil will more than compensate for the weakening of demand in established industrialised countries.

The second development involves growing oil supply constraints. These have been less visible but could be of even greater importance. Just as global oil demand is returning to its long-term growth path, oil production is starting to come up against barriers that will prevent it from keeping up with this demand. Chronic under-investment in oil exploration and production is one factor. More worrying is the prognosis that the world may soon be passing peak oil, the point at which the global capacity to produce oil reaches its highest point and starts to level off or decline. With supply unable to serve growing demand, oil prices are bound to rise.

Peak oil theory dates back to the 1950s but has only recently gained traction in expert circles. Throughout the second half of the 20th century, oil companies sought to reassure the public that the world would not run out of oil any time soon. A series of major oilfield discoveries bolstered their argument that oil reserves were plentiful. In any case, technological innovation would allow us to find oil in ever more remote locations, or to replace it altogether with another energy source.



**Reliance on oil for transport and manufacturing will take decades to change**

But the situation has changed dramatically in the past few years. New oil discoveries are failing to keep up with current consumption rates, and BP's oil spill in the Gulf of Mexico has underlined the commercial and environmental risks involved in the scramble for ever more remote oil reserves. A growing number of studies now point to a rapidly approaching oil peak. In 2009 the UK Energy Research Centre produced a comprehensive review of 500 such studies and concluded that 'a peak in conventional oil production before 2030 appears likely and there is a significant risk of a peak before 2020'. Britain's Industry Taskforce on Peak Oil and Energy Security underlined this finding in its 2010 report and warned that we could reach peak oil even sooner, in a matter of years.

The debate on the precise timing of the oil peak will continue for some time. But as signs of growing distress in oil markets become visible, now is the time to start preparing for the looming oil crunch. Greater price volatility and short-term supply shocks will have far-reaching consequences for the British economy and society. The effects will be felt most strongly in the transport sector, which continues to rely heavily on oil-based liquid fuels. Road and air transport's share of oil demand in Britain has risen to more than 50 per cent of overall consumption, and air travel and road haulage are now the key reason why Britain remains dangerously addicted to oil. As the global oil crunch approaches, sudden and dramatic price rises will become the norm, and market instability will feed through the entire economy, affecting producers and consumers alike.

Dealing with this threat poses a serious challenge, not least because industrial societies have become accustomed to the availability of steady supplies of cheap oil. As the US Department of Energy warned in 2007, "peak oil presents

the world with a risk management problem of tremendous complexity". In the short run, even small disruptions to global oil markets would translate into large price rises, particularly due to the inability of the transport sector to replace oil-based liquid fuels with alternatives. Building up stockpiles of strategic oil reserves would somewhat cushion the effects of such supply shocks. But this would be a costly and limited form of preventive action that would leave the economy in a state of oil dependence. There simply are no short-term fixes for an oil crunch.

What is needed is a more comprehensive and long-term programme of investment to reduce our addiction to oil. A multitude of approaches will be needed. They include energy efficiency, developing renewable energy, and changing urban infrastructure. But it will take decades to transform Britain's transport system, by increasing energy efficiency, promoting public transport and inducing behavioural change.

The good news is that energy security and climate change policy can work together to promote this transformational shift. Current efforts to reduce the country's carbon footprint should help Britain to reduce its reliance on oil in power generation, manufacturing and transport. But the longer we delay this kind of investment, the harder we will be hit, be it by a warming climate or a global oil crunch. ■

[www.lse.ac.uk/depts/global](http://www.lse.ac.uk/depts/global)



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# Taking advantage of the green revolution

*While other countries master low-carbon technology, Britain's approach has been less than decisive*

**PUBLICLY-FUNDED DEMONSTRATION** projects and field trials play a vital role in accelerating the development of low-carbon energy technologies by bridging the gap between research and commercialisation. Research by Professor Chris Hendry, Director of the Centre for New Technologies, Innovation and Entrepreneurship at Cass Business School and Fellow of the Advanced Institute of Management Research, finds that while countries such as Germany and Japan clearly recognise this, it has been a blind spot in British innovation policy for years. As a result, Germany is a world leader in renewable energy from wind and solar power, with Japan, Germany and the US leading the development of hydrogen fuel cells.

Britain, despite its wind resources, has failed to develop successful firms to exploit wind power. The risk is that Britain will

continue to miss out on the green revolution as the world shifts away from fossil fuels to low-carbon technologies, and will not develop the new industries to benefit from this.

Moving new energy technologies from the laboratory to commercial application can take many years, especially when they face powerful entrenched interests. Demonstration projects and field trials help firms through this uncertain middle phase in a number of ways. They raise consumer awareness and stimulate private investment; they identify attractive early applications; they provide opportunities to test applications in real settings and iron out problems; they identify barriers to market entry that may require regulatory change, and they help create supply chains to support the new industry.



Alamy

**Despite its wind resources, Britain has failed to exploit wind power**

The development of wind power, solar photovoltaics and fuel cells in the US, continental Europe and Japan provides many lessons for managing demonstrations and trials effectively. They need to be co-ordinated with continuing research and development to cope with the unforeseen problems that are found, and make the most of possible cost reductions. They must generate certificated performance data to create market confidence in the new technology. They should also

## Local food for locals

*Stroudco tests the water for other community projects*

**IS CONSUMING MORE** locally-grown food the key to revitalising our agricultural communities, reducing our food miles and tackling greenhouse gas emissions? There is increasing interest in community food hubs as a model for bringing together food producers and consumers within local communities.

The hope is that, as well as delivering fresh and affordable local food, they can help to create more sustainable and resilient communities. Exactly how this can be achieved in the face of a global food market dominated by the major retailers is the subject of a research partnership between the ESRC Centre for Business Relationships, Accountability, Sustainability and Society (BRASS) at Cardiff University, and a pioneering community food hub business called Stroudco.

Researchers Dr. Julie Newton and Dr. Alex Franklin from BRASS are working with Stroudco to explore some of the challenges and opportunities faced by local



www.ruth-davey.co.uk

**Stroudco community food hub is working with BRASS to explore the challenges faced by local initiatives**

sustainability initiatives, which attempt to bring diverse communities together. The research will also examine how democratically owned and run social enterprises, with an emphasis on member participation and community building, can contribute to the achievement of sustainable behaviour change.

As the name suggests, Stroudco is located in Stroud, Gloucestershire, a market town containing a dynamic and innovative core of

committed sustainability activists within a sizeable, diverse and comparatively indifferent population. Stroudco has secured funding from a variety of sources to cover its running costs for three years, and aims to grow to reach a target of 200 producer and consumer members. The scheme operates through an online ordering system where consumers pay in advance for produce that they collect fortnightly at a local school. Prices are ten per cent below comparable

provide a series of structured steps to develop products and enter markets that reflect firms' own development processes. This transition from research and development to field trials and market subsidies needs to be carefully managed. In addition, field trials should not be seen as one-off events. Innovation proceeds unevenly and second- and third-generation technologies may also need some level of support.

Above all, demonstration projects and trials foster national advantage by stimulating domestic markets for local firms. But to do so, they need to be of sufficient scale and duration. Governments should be realistic about early stage projects that provide a subsidy to innovative small firms, and ensure their survival until real markets form.

Many countries have made mistakes in developing low carbon technologies. Britain's failure is not so much in mismanaging public demonstrations and field trials, but in the lack of commitment to funding them. We spend substantial money on basic research and market subsidies. Without support for the uncertain middle phase, the investment in new energy technologies will be wasted and Britain will find itself without significant firms to deliver the low carbon economy. ■

[www.aimresearch.org](http://www.aimresearch.org) (the Uncertain Middle)

retail prices because the producers are selling directly to local consumers. Stroudco is deliberately aiming to recruit consumer members from deprived neighbourhoods and those who may not have previously been involved in local sustainability initiatives.

The aim is for Stroudco to act as a testbed for the reorganisation of local food markets and to provide lessons for groups wishing to replicate the model elsewhere. The BRASS researchers are working alongside Stroudco to explore ways of engaging the wider Stroud community, who may not all be interested in sustainability. Preliminary research suggests that there has been tension between the practical logistics of getting Stroudco up and running and the recruitment of the target audience. An early priority has been to sign up enough different local producers offering a wide enough variety of affordable products to attract consumers, and by the same token to recruit enough consumers to make it worth the producers' while.

This 'chicken and egg' situation is the first of many challenges that Stroudco will have to overcome, but as it does so, the lessons learnt will help the future development of local food throughout Britain. ■

[www.stroudco.org.uk](http://www.stroudco.org.uk)  
 YouTube video: [AljYH80joww](https://www.youtube.com/watch?v=AljYH80joww)  
[www.brass.cf.ac.uk/projects/](http://www.brass.cf.ac.uk/projects/)  
 keywords/food

# Carbon reduction champions

*British retailers are exploring the power of partnership to ensure a bright future*

**CLIMATE CHANGE POSES** risks and offers opportunities for all businesses in Britain, but research from the ESRC-funded Electricity Policy Research Group finds that those who partner with outside organisations such as NGOs tend to have more effective climate strategies than others.

Partnership overcomes some of the barriers to action. It also encourages the spread of best practice in carbon reduction, harnessing the power of the private sector to tackle a problem that affects society as a whole.

In Britain, the policy landscape for large public and commercial organisations is changing fast. The latest development is the Carbon Reduction Commitment Energy Efficiency Scheme (CRC), which came into force in April 2010. The scheme requires all participants to collect and report detailed energy and carbon emissions data, something that will become standardised and mandatory.

Large retailers will be participants in the CRC. As the link between producers and consumers of goods, retailers have the potential to influence decisions on production, distribution, purchasing and even waste disposal. Although retailers' direct retail emissions are small at just over two per cent of the British total, retailers (including shops, wholesalers and garages) are connected to a much larger share of emissions indirectly. Emissions from purchased electricity bring the sector's total share to over six per cent. Emissions through the upstream and downstream impact of the goods and services retailed are approximately 30 times a retailer's direct emissions. So the potential for retailers to influence total emissions by changing supplier and consumer behaviour is enormous.

There are several features of climate strategies that distinguish the retail leaders from the rest. Long-term strategies are the preserve of a minority today, and yet are essential if retailers are to contribute to



**British retailers are teaming up with environmental bodies to ensure carbon reduction**

ambitious British targets. John Lewis is one of the few with specific plans beyond the next five-year period. But the commitment of senior management to carbon reduction is growing. The CEOs of M&S and Tesco, for instance, lead their firms' climate strategy. Leading companies recognise that engaging with employees, customers and suppliers improves implementation. Energy champion schemes are used by companies such as M&S, Kingfisher, HMV and Alliance Boots to encourage awareness of climate and energy issues among employees.

Retailers that partner with NGOs, academic groups or consulting firms tend to be leaders in climate response. The exact impact of partnership depends on how engaged the retailer is, but also on the

**Companies recognise that engaging with employees, customers and suppliers improves implementation**

menu of options provided by partner organisations. Forum for the Future, a sustainable development charity, has a partnership with John Lewis that requires the commitment of senior management for a minimum of three years. It includes bespoke strategic advice but also involvement in sustainable development issues more generally. For

John Lewis this meant helping to develop a sustainable construction framework for the retail sector. Tesco has a similar level of engagement with the Sustainable Consumption Institute at the University of Manchester, where the focus is on national and international retail sustainability issues.

Tackling climate change effectively will require co-operation from governments, individuals and all sectors of the economy. In this new environment the way businesses differentiate themselves will create innovations to reduce emissions and save energy across the economy. ■

[www.eprg.group.cam.ac.uk](http://www.eprg.group.cam.ac.uk)

# How low can you go?

*Research suggests emissions-reduction targets aren't enough*

**REDUCING CARBON EMISSIONS** from cars is high on government to-do lists, but new research from the BRASS Research Centre has shown that EU emissions-reduction targets lack ambition.

Transport is the sector with the fastest-growing greenhouse gas emissions across Europe. There is little hope of achieving European targets for carbon dioxide reduction without tackling cars, which account for around 12 per cent of all emissions. Under EU legislation adopted in 2009, the average passenger car sold by 2015 should comply with a carbon dioxide target of 130 grams per kilometre. This compares with an existing average of 150-160g/km. The EU has now set a further target to reduce emissions to 95g/km by 2020. But is this as low as we could realistically go?

Research conducted by BRASS, and commissioned by Greenpeace International, has explored the potential options available for governments and car companies to pursue more aggressive reductions. The findings demonstrate that a lower target of 80g/km is readily achievable. It involves combining the technological improvements planned to

deliver the reduction to 95g/km with design strategies, which will deliver reduced average car weight and power.

One of the report's authors, Dr Peter Wells, comments: "If the automotive industry starts to act now, it has ten years and considerable strategic flexibility to achieve a managed transition towards low-CO2 mobility by 2020. All the evidence on climate change suggests our response must be stronger and faster than previously thought. This report shows that the automotive industry can, and should, do more."

Greenpeace EU transport policy advisor Franziska Achterberg says: "EU industry ministers are right to see clean vehicle technology as a way of maintaining the competitiveness of the European car sector. They should recognise that the single most important EU measure to achieve this is ambitious legislation. Stronger fuel efficiency standards will help the sector reduce its carbon footprint while maintaining a level playing field for the industry."

The current target is to limit emissions from new cars to 95g/km by 2020. A review of this legislation to agree how car makers



**Transport is responsible for 12 per cent of greenhouse gas emissions in Europe**

should reach the target is scheduled no later than the end of 2012. This research demonstrates that they could drive emissions down further to reach the lower target of 80g/km, and sets out the route by which they can get there. The question is not whether it is feasible to get car emissions down to 80g/km by 2020, but whether governments have the gumption and car companies the vision to make sure it happens. ■

[www.brass.cf.ac.uk/projects/keywords/automotive](http://www.brass.cf.ac.uk/projects/keywords/automotive)  
[www.greenpeace.org/eu-unit/press-centre/reports/lowering-the-bar-for-cars-20-05-10](http://www.greenpeace.org/eu-unit/press-centre/reports/lowering-the-bar-for-cars-20-05-10)

## Save our spaces

*Historic gardens and rural landscapes need our help*

**THE PUBLIC COULD** play an important role in protecting our historic gardens and rural landscapes from disease, but we need wider public debate about the threat posed by newly emerging tree diseases, say researchers from Imperial College London.

The team is investigating *Phytophthora ramorum* (sometimes known as Sudden Oak Death) and the related pathogen, *Phytophthora kernoviae* on woodland and historic gardens, as part of the Research Councils UK Rural Economy and Land Use (RELU) Programme.

Popular tourist destinations in the West Country in particular have been badly affected. Cornish gardens are a spring attraction for many visitors, but they are also highly susceptible to these diseases. Woodland and commercial forestry are at risk and during 2010, the Forestry Commission began felling thousands of trees in Devon and Cornwall in an effort to contain the outbreak. Even heathland species such as bilberry can become infected, threatening one of the most important habitats in Britain.



**Sudden Oak Death biosecurity – just one of many measures to ward off disease**

Controlling any disease outbreak is difficult once a pathogen such as *ramorum* has become established. The team has found that the public would be willing to play a greater role in monitoring disease spread and taking actions to minimise the risk, but know little about it. They argue that there is a need for the public to be better informed about the links between the international trade in plant material and the resulting biosecurity risks, with conservation groups and government agencies at the forefront.

Dr Clive Potter from Imperial College, who led the research, said: "When these new diseases first came to light, some of those responsible for managing heritage gardens were reluctant to raise awareness of it for fear of discouraging visitors. But

we have been looking back at the situation in the 1970s, when Dutch elm disease wrought havoc with familiar landscapes, with the aim of learning from that experience. And our research suggests that a more open policy that draws attention to the link between garden visits and disease spread would be helpful. People who love to visit gardens, who use our open spaces and who enjoy woodland and heathlands want to play a role in protecting them.

"We are working with organisations such as the National Trust, the Royal Horticultural Society and the Forestry Commission on the application of our research." ■

[www.relu.ac.uk](http://www.relu.ac.uk)



Researchers debate a world where science and technology work more directly for social justice, poverty alleviation and the environment

# A new manifesto

*A vision for innovation, sustainability and development*

**WE LIVE IN** a time of unprecedented scientific and technical advances. Annual global spending on research and development exceeds a trillion dollars. Yet for many people and places, poverty is deepening and the environment is in crisis. Thousands of children die daily from waterborne diseases and more than a billion people go hungry.

Meeting the global challenges of poverty reduction, social justice and environmental sustainability is the great moral and political imperative of our age. Science, technology and innovation have big roles to play. Researchers at the ESRC Social Technological and Environmental Pathways to Sustainability Centre (STEPS) and their global partners believe this imperative can only be fulfilled via a huge shift in how we think about and perform innovation, amounting to a new politics.

Forty years ago, the Sussex Manifesto was published, urging investment and reform to link science and technology with development. This document influenced thinking in the UN and across the world. Now STEPS research is being linked with the work of others across the world to explore how science, technology and innovation might address today's challenges.

In the New Manifesto produced by this project, STEPS proposes a new '3D agenda

for 'innovation', focusing on direction, distribution and diversity. This goes beyond prioritising different sectors, such as military, health or energy, to address the direction of change supported in any given sector. Even a specific field presents a host of directions for innovation, ranging from small-scale distributed renewable energy to large-scale, centralised renewables in continent-spanning infrastructures; and from nuclear fission to fossil fuels with carbon capture and storage. These strategies compete with each other and deciding between them involves political choices.

**Thousands of children die daily from waterborne diseases and more than a billion people go hungry**

Direction shapes the distribution of the benefits, costs and risks of innovation. Marginal people and places are often the ones to lose out. This means thinking what different innovation pathways imply for equity and justice. It also involves making poor and vulnerable women and men more central to choosing and

promoting different innovation pathways, and to being valued as innovators themselves. In participatory approaches to plant breeding, for example, the knowledge and concerns of resource-poor farmers are the starting point, and farmers become involved in selecting and testing plant varieties, bringing their own innovations into the process and enabling justice-oriented technologies to be chosen.

This raises further questions about diversity. How many kinds of innovation do we need to address any particular challenge? Diversity promotes sensitivity to ecological, economic and cultural settings. And it fosters resilience – hedging against our uncertainty and ignorance about the future. In crop development in Africa, enhancing agro-biodiversity with multiple crop types and varieties makes for a better fit with a range of agronomic and social contexts, as well as offsetting the uncertainties of global markets and climate change.

However, diversity does not mean that anything goes. Politics of technological diversity must address which options offer the best ways to address poverty alleviation, social justice and environmental sustainability.

The New Manifesto envisions a world where science and technology work more directly for social justice, poverty alleviation and the environment. It is a world where the energy, creativity and ingenuity not only of scientists, but also of users, workers, consumers, citizens, activists, farmers and small businesses, is unleashed, supported and harnessed. It is a world where a deliberate diversity of innovation pathways flourishes.

In partnership with the many organisations that have contributed to the manifesto project, STEPS is taking its key messages to national governments, international organisations and civil society groups in an effort to effect long-term change at different levels. The actions identified in the New Manifesto can help catalyse and enable this new politics, so that people's creativity may rise to the environment and development challenges ahead. ■

[www.anewmanifesto.org](http://www.anewmanifesto.org)

# Disease politics

*Why some animal health issues are more pressing than others*

**WHAT IS A** healthy cow? To the supermarket, it's one that produces lots of safe, cheap milk. To the city-farm visitor, it's one that looks 'happy'. Sometimes these viewpoints don't coincide at all.

Researchers working on the RELU Governance of Livestock Disease (GoLD) project examine these differing viewpoints. In Sweden or California, for example, cows rarely go outside. They produce lots of cheap milk, which pleases the supermarkets and customers on a tight budget. But for most people a 'happy' cow is grazing in a field, so are these cows healthy?

The government addresses this issue by setting minimum standards for welfare. More recently, free-range, freedom food and organic labels have become part of the way food is marketed. These give shoppers a means of showing the financial value they place on welfare, and on the role of livestock in the management of the countryside.

What does a healthy cow mean for the farmer, and for the vet? Generally it means an animal free from disease, and those Swedish or Californian cows, kept indoors in what are likely to be hygienic surroundings, meet this criterion. Cattle are susceptible to a range of diseases. Some of them are nasty conditions that have serious economic implications for producers, but most do not excite politicians or the public.

Bovine tuberculosis and foot-and-mouth disease, on the other hand, do make headlines, so what is it that gives these diseases such a high political profile? Animal diseases that can be passed on to humans usually cause concern, and are pretty certain to be on the government's radar. Rabies and Lyme disease are obvious examples.

The second type of disease governments worry about is anything that threatens international trade and that includes foot-and-mouth. The European Community, after considerable effort, is now free of this disease, so any outbreak has to be dealt with according to EU legislation, which means export bans for affected countries. Such diseases are

Animal diseases that can be passed to humans, or affect international trade, are higher priorities for the EU



The measures needed to secure flood protection could take their toll on the British countryside

## The price of protection

*Could rural land management protect towns and cities from flooding?*

**FLOODING CAUSES MISERY** for individuals and economic problems for communities, and it seems to be on the increase. Countryside land management could play an increasingly important role in flood planning in the future, according to researchers at Cranfield University and the Open University, but we need to acknowledge the price that rural communities may be paying to protect our towns and cities.

Research carried out as part of the UK Research Councils' RELU Programme has looked at the effects of the severe floods of summer 2007. Around 42,000 hectares of agricultural land were affected, causing damage costing £50 million. Over 80 per cent of that was caused by crop losses

or additional expenditure on items such as animal feed, while the remainder involved damage to property and machinery and the costs of cleaning up after the waters receded. Most agricultural losses were not insured and on average, compensation payments only covered five per cent of flood-damage costs.

Government strategy is increasingly looking at ways of using floodplains and agricultural land to manage water and protect densely populated areas. This means that we are making more demands on land and requiring it to perform multiple functions. These include food production and supporting biodiversity, as well as floodwater storage. The RELU team has been investigating these competing demands on rural floodplains. They conclude that there is a need for an integrated approach to policy that takes into account the wide range of services provided by the floodplain, and the inevitable trade-offs that must be made.

Professor Joe Morris of Cranfield University, who led the research, says:

labelled exotic, they don't exist in Britain, and government is forced to act to regain disease-free status when there is infection.

But endemic diseases such as Johne's Disease, Bovine viral diarrhoea and Bovine viral rhinotracheitis are classed as production diseases and are generally seen as something to be dealt with by farmers and vets. What is considered a production disease varies over time and in different places. Bovine diarrhoea is treated as a production disease in England, but the Scottish government is consulting on a plan to eliminate it north of the border. If successful, such an initiative would change the status of the disease in Scotland to exotic.

But the disease that we have all been hearing a lot about recently is Bovine tuberculosis. While endemic, it has many of the ingredients that ensure a high political profile. It can be passed from animals to humans, although all the precautions taken in the modern food chain mean that this is very unlikely to occur. And it poses enormous challenges in meeting the competing objectives of the farming community and the animal protection lobby.

Media coverage has been high-profile and emotive, tending to focus on the role of badgers, which has polarised the debate. In areas such as South West England, where the dairy industry has been badly hit, feelings run particularly high. Such controversies cannot be resolved by the use of scientific evidence, particularly when that evidence is incomplete. The political dimension cannot be removed, placing a responsibility on ministers to give a clear direction to policy. ■

[www2.warwick.ac.uk/fac/cross\\_fac/gld](http://www2.warwick.ac.uk/fac/cross_fac/gld)

"Past policy interventions in floodplains have promoted different objectives at different times. For 50 years we had 'reclamation and improvement' for food production, but since the 1990s greater recognition has been given to other benefits provided by floodplain ecosystems, such as biodiversity and enjoyment of the countryside. And now flood management is rising up the agenda. Increased global demand for food and energy, combined with the prospect of climate change, could reinstate the importance of agricultural production in floodplains, especially as these areas contain almost 60 per cent of our Grade 1 land.

"We need to join up the hitherto fragmented policies and funding mechanisms to support an integrated approach, developing new collaborations between private and public organisations in the process. The forthcoming review of the Common Agricultural Policy provides a great opportunity to explore how best to use our limited land resources, as well as public funds, for maximum overall benefit." ■

[www.relu.ac.uk](http://www.relu.ac.uk)

# Pre-empting natural disasters

*Can we anticipate and manage natural risks?*



**Risk regulation could help minimise the damage caused by natural disasters**

**DEVELOPING MITIGATION STRATEGIES** for natural disaster risk reduction and risk reaction is a problem of global proportions. The risk of natural disasters is increasing across the world, as is their impact, partly as a result of climate change and also because of the co-location of large conurbations and high-technology sites. The costs of natural disasters are multiple and devastating in terms of lives lost and also financially. Much attention has been devoted to the anticipation and management of manufactured risks, especially those associated with scientific and technological developments. But attention is also turning increasingly to the anticipation and management of natural risks.

Research by Bridget Hutter, Professor of Risk Regulation and Director of the ESRC Centre for Analysis of Risk and Regulation at the LSE, looks at how to manage these natural risks.

Risk regulation anticipates risk and prevents it. In relation to natural disasters, risk regulation is primarily useful in pre-event mitigation and can effect significant risk reduction. Avoiding land use in known hazardous areas, along with establishing and enforcing building codes to prevent the collapse of poorly constructed buildings, can help us avoid the costs of disaster recovery, save lives as well as preventing injury. Understanding these benefits can also encourage longer-term thinking and investment in mitigating

disasters, which may otherwise be perceived as uncertain and improbable.

Crucial policy decisions need to be made about balancing the anticipation of risks and resilience to them. This means putting in place emergency plans and capacities where one can realistically anticipate and act constructively, and focusing on resilience in less certain areas. The knowledge base is crucial for formulating policy. The past is not always a good predictor of the future. We need to be realistic about the reliability of our information.

Working locally to enhance sustainability and resilience is important in all areas vulnerable to extreme events. Where

levels of certainty are high, more detailed risk regulation measures and planning are also possible.

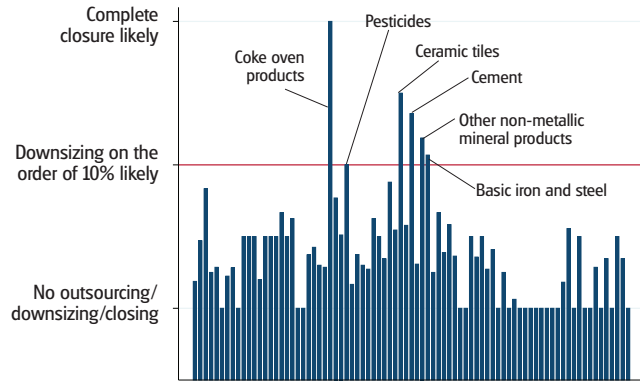
We also need to take factors that can influence the efficacy of risk regulation strategies into account. These include cultural influences such as how anticipatory or fatalistic a culture is, and socio-political conditions such as stable governance systems that are capable of

enforcing regulations. Local variations will often influence the effectiveness or even possibility of using some forms of mitigation. This needs to be dealt with by providing regulations that can be tailored to local circumstances, and here the role of social scientists is crucial. ■

[www.lse.ac.uk/collections/carr](http://www.lse.ac.uk/collections/carr)

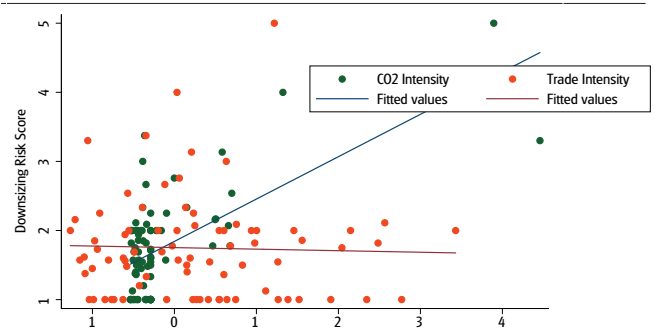
**Crucial policy decisions need to be made about balancing the anticipation of risks and resilience to them**

Figure 1. Average risk of downsizing across sectors



Notes: The bars show the sector-level average score measuring the risk of downsizing as a consequence of climate policy at the three-digit industry level.

Figure 2 Correlation between downsizing risk and intensity measures



Notes: Each three-digit (NACE 1.1) sector is represented by one green and one red point. The horizontal axis measures for red points normalised carbon intensity (VaS) and for green points normalised trade intensity (TI). The vertical axis measures the downsizing risk score derived from the interviews with managers. The two lines represent the fitted values for each set of points.

# The cost of carbon emissions

## European taxpayers lose out to the industry lobby in Europe's Emissions Trading System

**COVERING MORE THAN** 10,000 installations that are responsible for almost half of Europe's carbon dioxide emissions, the European Emissions Trading System (EUETS) is the largest of its kind in the world. It is a key pillar of European Climate Policy, and an important test case closely followed by policy makers globally.

The idea of an emissions trading system is to establish a price for pollution by capping the total amount of emissions and requiring polluters to purchase and trade emission permits on a market. This renders pollution costly and provides an incentive to curb it.

An emissions trading system can also generate revenue for the government as the initial owner of all permits. But so far, European governments have given this revenue back to industry by distributing free pollution permits to most emitters in proportion to their past emissions. This

violates the 'polluter pays' principle at the expense of taxpayers and rewards the companies that have done the least in the past to reduce their emissions.

The European Commission has vowed to end this practice and hold permit auctions from 2013 onwards, which marks the beginning of the third trading phase of the EUETS. But the Commission has also published criteria for which industrial sectors will receive free permits even after 2012, and the criteria are such that, yet again, most firms would continue to receive free permits. This move can be seen as a concession to industry pressure. Companies claim that the EUETS could endanger the international competitiveness of firms, leading to job losses as well as 'carbon leakage' i.e. when firms relocate and continue to pollute elsewhere.

Researchers at the ESRC Centre for Economic Performance conducted interviews

with approximately 800 manufacturing companies in six European countries (Britain, Belgium, France, Germany, Hungary and Poland) to examine the relevance of such concerns. They found first that dramatic relocation in response to carbon pricing is highly unlikely.

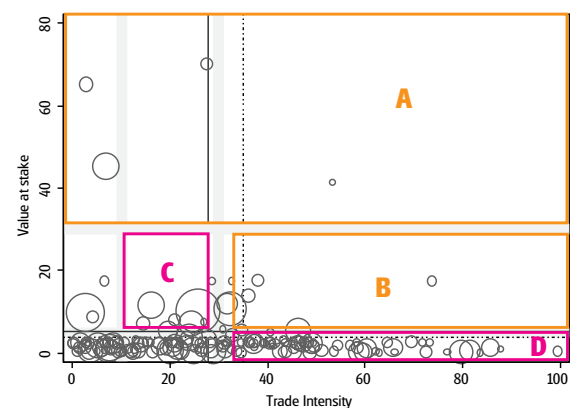
The researchers identified only one sector with dramatic downsizing risk: coke oven products, where closure seems likely in the absence of free permits. In addition, there are only a handful of sectors with somewhat heightened risk. These include pesticides, ceramic tiles, cement, other non-metallic mineral products and basic iron and steel.

Second, the research found that the Commission's assessment criteria are flawed. The Commission bases its assessment of sectors at risk of carbon leakage on two measures: their carbon intensity (the amount of carbon a sector emits divided by its value added, usually referred to as Value at Stake, VaS); and Trade Intensity (TI), which the Commission defines as the value of imports and exports to non-EU countries over the total market size of the sector within the EU.

The research examines how well these measures capture downsizing risk by correlating them with the researchers' score. This reveals that carbon intensity is strongly correlated with downsizing risk, but trade intensity is not (see Figure 2). So using trade intensity to determine which sectors should be exempt from auctioning is likely to result in exemptions for firms that are not at risk of downsizing or carbon leakage.

Third, by a conservative estimate, the research found that taxpayers in Europe

Figure 3. Value at stake and trade intensity of sectors in the sample



Notes: The figure plots the position of the sectors included in the interview sample in terms of the two criteria proposed for exempting sectors from auctioning of permits. The size of the circles is proportional to the number of firms in a given four-digit industry (NACE 1.1 classification). The rectangles A, B, C and D represent the four sets of eligible sectors defined by the Commission's thresholds for the two criteria. The solid lines show mean trade and carbon intensities, and the dotted lines represent the respective employment-weighted means.

will save more than €7 billion each year if permits are not given away to sectors with no increased downsizing risk. To examine which sectors will receive free permits unnecessarily Figure 3 plots where each sector is positioned with respect to the carbon and trade intensity criteria. According to the Commission's criteria, a sector is exempt if it has a trade or carbon intensity of more than 30 per cent, or if it simultaneously exceeds five per cent carbon and ten per cent trade intensity. The graph shows that most sectors are exempt solely because of the trade criterion (Group D).

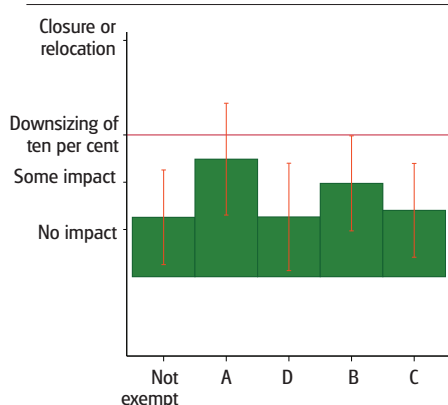
Figure 4 shows the average risk score for each of the groups identified in Figure 3. The lines (in orange) also indicate the dispersion within those groups. This suggests that only groups A and B have a heightened downsizing risk. The researchers proposed modifying the criteria for exemption from auctioning so that only groups A and B, but not groups C and D, would be exempt. If permits allocated to these sectors were auctioned at an average price of €30 this would generate extra revenue for European governments of about €7 billion.

Rather than giving away this amount as an unspecific subsidy to industry, the money could be earmarked to finance research, development and investment for the transition to a low-carbon economy. It could equally be used to mitigate the possibly regressive effects of higher carbon prices on low-income groups. Or it could help to balance strained government budgets in the wake of the financial crisis. ■

[cep.lse.ac.uk/pubs/download/pa010.pdf](http://cep.lse.ac.uk/pubs/download/pa010.pdf)

This article summarises *Still Time to Reclaim the European Union Emissions Trading System for the Taxpayer*, a CEP policy briefing by Ralf Martin, Mirabelle Muûls and Ulrich Wagner

**Figure 4. Impact measures across 'at risk' groups**



Notes: The green bars represent, for each set of firms as described on the horizontal axis, the average score measuring the risk of downsizing as a consequence of climate policy. The orange segments represent the confidence bands, calculated at the 95 per cent level.

# Look to the hills

*What does the future hold for our upland areas?*

**IF CLIMATE CHANGE** increases pressure on worldwide food supplies, we may have to look to the uplands to produce more of what we need. Animals have traditionally been raised on our hills, and we could see livestock farming becoming more intensive in some areas. Others might be ploughed up for crops or biofuels, which could be grown there if the climate was warmer.

If this happened, we could see more flooding, and water quality would deteriorate, resulting in higher water treatment costs. The extra grazing and cultivation could lead to more carbon being washed down into rivers. As soils are the largest carbon reserve in Britain, storing over three billion tonnes of carbon, this erosion could exacerbate climate change.

Dr Mark Reed, who co-led RELU's project Sustainable Uplands: Learning to Manage Future Change, says: "We have to think about what we need from our hills – they provide many services for us, including water supplies for large numbers of people.

"In order to help us to do this we have used computer modelling techniques to create two scenarios. They are extreme examples of how we might see upland landscapes changing, and we wouldn't expect one or the other to be appropriate for every situation. But this scenario modelling helps us to consider the types of problems we might face, and involve people in debate about the future for their own community and the needs of the British population."

One alternative scenario might involve managing the land for carbon and wildlife as priorities. If livestock numbers reduced, and grazing declined or stopped completely, the vegetation would change. There would be more heather, with less grass and sedge. The most unproductive land would probably be abandoned and the driest areas might eventually return to forest.

A lot of peat is eroding at the moment and allowing carbon to escape. Drainage ditches dug in the 1950s and 1960s to improve the land are making this situation worse. Blocking the ditches and restoring the peat would help to start the recapture and storage of more carbon.

Restoring damaged moorland could also bring back important wildlife, reduce the risk of wildfires, produce cleaner water, protect fish stocks and even help to ensure that urban areas further downstream are less susceptible to flooding. ■

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**Upland wildlife habitats could be under pressure to produce crops or biofuels**

# The politics of change

## Tackling poverty in a carbon-constrained world

**COUNTRIES THE WORLD** over must meet the energy needs of their citizens and industries while trying to tackle climate change. Is it possible to imagine development paths that generate fewer greenhouse gases, in a world where 1.6 billion people have no access to electricity? This challenge presents economic and technological issues of staggering proportions but the challenges are also fundamentally political in nature.

### BROKENHAGEN?

Many people vested high hopes in the 2009 climate change summit in Copenhagen. They expected rich countries to sign binding obligations to reduce emissions, and to raise billions of dollars to help developing countries cut carbon use and adapt to the impact of climate change, without affecting their efforts to combat poverty.

That expectation was dashed amid the worst financial crisis in over half a century, a fatal lack of political leadership, and tension between wealthier countries and poorer ones over who bears most responsibility for our present plight.

The fact that countries failed to produce a deal, and are unlikely to do so in Cancún in 2010, has led many to despair about tackling climate change, or the poverty that it deepens by hitting the poorest and most vulnerable the hardest.

Yet away from the negotiating halls of the UN, there are radical shifts taking place among businesses, governments and civil society organisations that may yet play a key role in bringing about a transition to a low-carbon economy. Though this change started in Europe and North America, countries such as China and India are now leading the way. They are combining state leadership with market instruments to ensure that they are well placed to benefit from opportunities that might arise in a low-carbon economy, and to access the \$100 billion a year of climate finance by 2020 promised at Copenhagen.

### INDIA SHINING?

It is a cliché to say 'India is a land of contrasts', but like most clichés it contains an element of truth. India is home to many of the world's wealthiest individuals and to a middle class whose contribution to climate change exceeds that of Australia by some estimates. But it is also where a third of the world's poor live.

Much is made of the new 'India shining,' and there is no doubting India's economic success. This has resulted in emissions that place India among the world's top five emitters. But if we look at emissions per capita, India is just 139th in the world.



Protesters at Copenhagen wanted binding obligations to reduce emissions

India's approach to climate change is positive. It has a National Action Plan on Climate Change, national missions on solar energy, and proposals for an internal Renewable Energy Certificate (REC) and energy efficiency (PAT – Perform, Achieve and Trade) scheme. All are driven by concerns about energy security and energy poverty more than by climate change itself. India will not be lectured to about the need for action by an international community that has failed to deliver its own emissions reductions. Instead, it appears to be adopting active policy responses that are aligned with national priorities and which are not, for the most part, dependent on financing or other assistance from the UN climate institutions.

**The fact that countries failed to produce a deal has led many to despair about addressing climate change**

India's experience points to the importance of a clear national strategy that can be pursued at many levels and which creates clear incentives for the private sector. By using policies such as feed-in tariffs, and creating internal markets in renewable energy and energy efficiency, the government of India has provided incentives for industries to take action. This helps the country's energy security situation by reducing its dependence on imported oil. And although the Indian government has not used these terms, these measures also allow India to show the world that it is taking action on climate change. Alongside India's national actions, many Indian states are also developing their own climate-change plans.

Projects and investments that are not viable on these domestic markets, but which contribute to the reduction of greenhouse gas emissions, are also eligible for project funds through the Kyoto Protocol's Clean Development Mechanism. This allows richer countries such as Britain, one of the

largest buyers in this market, to buy emissions reductions in places like India where it is cheaper to do so. India is the world's second largest recipient of projects of this type, many of which are in the energy sector.

### IT'S POLITICS, STUPID

The future of climate change politics at international level is uncertain. In the vacuum left by stalled UN progress, dozens of initiatives involving cities, businesses and civil society organisations have sprung up to generate finance, support technologies and set their own targets to reduce greenhouse emissions. These steps are important, but they are no substitute for a comprehensive global agreement that allocates responsibilities and manages the funding for emissions reductions and adaptation.

But India shows that as the centre of economic and political power in the world shifts further East, we may find leadership on climate change coming from countries using all the power at their disposal to deliver low carbon development aimed at addressing poverty. ■

[www.uea.ac.uk/dev](http://www.uea.ac.uk/dev)



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