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ENVIRONMENT



Sustainable living

Everywhere we turn we are being encouraged to live more sustainably, yet as a nation we are still not moving towards that goal

Catherine Brahic, Environment Reporter, *New Scientist*

IN THE PAST few years, Britain seems to have become obsessed with sustainable living.

The notion of a green lifestyle has crept into all areas of society. Environmental coverage in the press is at a record high, government agencies and private companies are offering online carbon footprint calculators, fashion houses are making ethical statements, and supermarkets are increasingly making sustainability pledges, ranging from Marks and Spencer's 'Plan A because there is no plan B' to incentives to use fewer plastic bags.

But what does it mean to have a sustainable lifestyle in Britain today? And are attempts at doing so having an effect? Research shows that living sustainably can mean different things to different people; that those who strive to lead more sustainable lifestyles feel held back by social structures and institutions, and that our increasing consumption is driven by a thirst for luxury – but

Living sustainably means different things to different people. For many it is a by-product of other life improvements.

also by necessity. But there is also good news. Green living need not be a burden. For many, it is a by-product of things they do to improve their lives in other ways.

We use our planet's resources in many different ways: by mining metals for our drink cans and jewellery; by cutting down trees for paper, furniture and loo-roll; or by pumping groundwater for showers and drinking water. Each year, we use more of these natural resources than the planet is able to generate over the same period.

According to the United Nations Environment programme's fourth *Global Environment Outlook*, published in November 2007, we would need 1.4 Earths to sustain our average rate of consumption. The Global Footprint Network records the date human society as a whole goes into planetary debt each year and announces Earth Overshoot Day, the date on which we finish using up

ENVIRONMENT SUSTAINABLE LIVING

► the resources that the Earth can regenerate in one year. Anything that is used after that date is unsustainable. In 2008, we went into planetary debt on 23 September.

“Sustainable living is essential for social and environmental reasons,” says Professor Tim Jackson, Director of RESOLVE, the Research Group on Lifestyles, Values and Environment at the University of Surrey. While current lifestyles depend on a range of natural resources, fossil fuels are the group that have received most attention. Supplies of oil, natural gas and coal are finite, and they release greenhouse gases when burnt. The increased attention being paid to sustainable living is probably related to the many political and scientific meetings which in the past two years have made climate change and what to do about it a topic of debate.

The government has set medium and long-term targets to help British society as a whole become more sustainable. As a signatory of the Kyoto Protocol, it has pledged to reduce its greenhouse gas emissions to 12.5 per cent below their 1990 level by 2010. As a member of the European Union, the UK has also agreed to reduce its emissions by 20 per cent below 1990 levels by 2010. Finally, it is one of the only nations in the world considering an ambitious long-term target: to cut emissions by 80 per cent by 2050.

Industry provides the largest bulk sources of greenhouse gas emissions, which makes these emissions the easiest to regulate. But it is not just factories and power stations that burn fossil fuel and pump out greenhouse gases. Heating and lighting households accounts for 27 per cent of UK emissions. A study led by Professor Jackson and Dr Eleni Papathanasopoulou, also at RESOLVE, sought



That business travel accounts for two thirds of the increase in our household carbon emissions in the last 40 years suggests that modern life demands a higher consumption of fossil fuels.

to determine just how much fossil fuel resources British households are consuming. They found that household fossil fuel consumption went up by 35 per cent between 1968 and 2000. Once the concomitant six per cent rise in population was accounted for, this came to a 27 per cent rise in fossil fuel consumption per person.

The calculation of the use of fuel in British households includes the energy that is consumed directly in transport and heating our homes, and the considerable quantities that are consumed indirectly, such as the energy that goes into producing the food we eat and the clothes we wear.

Their analysis provides insights into what drives household carbon emissions in Britain. Business travel, including commuting and recreation, accounted for two thirds of the increase. Between 1968 and 2000, the amount of fossil fuels burnt in business travel nearly doubled, and the resources used for recreation rose by 66 per cent.

Increased resource use for recreation is perhaps not surprising in a society that emphasises economic and social mobility. But the growth in business travel suggests that it is not simply social aspirations to a more luxurious lifestyle that are driving us to consume more. We are also having to consume more in order to meet our daily needs.

One example is that in 2000 we burnt 30 per cent more fuel heating our homes than we did in 1968. Were we heating our homes too little then? Or are we overheating them now? Studies suggest both are true: lower-income households have been subject to fuel poverty in recent decades, but equally, the indoor temperature deemed comfortable has risen. In addition, our houses are less crowded than



they were a few decades ago, and it is more efficient to heat houses that have higher occupancies.

Do we have a choice? Is it possible to live more sustainable lives? Certainly, there are many in Britain who believe it is. Alison Armstrong at the University of Surrey points out that the increasing popularity of yoga has created an incentive to live more frugally. Though many see yoga simply as a form of exercise, the practice is not just physical, but ethical and spiritual as well, an outlook many of its UK followers have adopted. Yoga teachers often emphasise 'mindfulness', the idea that one must focus on the now and be fully aware of the moment. This, according to Armstrong, "may negate the need for consumer goods to bring that fleeting sense of fulfilment". Alison Armstrong, a PhD student in RESOLVE, has been studying environmental values and behaviours among yoga practitioners.

But promoting sustainable lifestyles – making them desirable and fashionable – may itself not be sustainable. "If the appeal of organic food or re-usable bags is grounded in fashion rather than ethical commitment, we run the risk of it going out of fashion," say Professor Jackson and colleague Dr David Evans.

But will sustainable living go out of fashion? What do we know about the ethical commitment of people living green lifestyles? The RESOLVE team carried out a survey of 25 people from south east England between 2007 and 2008. The participants responded to advertisements seeking people who deliberately tried to live sustainable or environmentally friendly lives. Interviews revealed that they had very different ways of 'doing their bit', from trying to limit the amount of flying they do, to running their cars on vegetable oil, and from

Yoga is being promoted not only for its health benefits but as a gateway to a less materialistic lifestyle.

an issue." Likewise, Claire, 58, has to choose between buying organic food from the supermarket – thereby limiting the amount of fertilisers and pesticides in her ecological footprint, but having to drive to the supermarket – and purchasing non-organic food from the local grocer.

So why bother at all? This is where the survey revealed its most interesting finding. Those who say they live sustainable lives, or are trying to, often have ulterior motives, frugality being chief among them. "I actually don't have much cop with this whole climate change business," says Jonathan, 61. "I am not convinced by it. Mind you, I cannot abide waste. I resent spending money for no reason and I think it is just wrong to waste water and electricity and all that."

Another driver was health. Cycling to work and eating organic food are perceived as components of a healthy lifestyle. Their environmental sustainability is an added extra. In the same way, several vegetarian respondents were not vegetarian out of concern for the large amount of resources that go into a carnivorous diet – though they were aware that cattle and sheep need to be fed, and that the cereals that are fed to them need fertilisers and pesticides. But having made their choice, vegetarians found that their diet had the added advantage of using fewer resources.

Sustainability can be a by-product of a lifestyle choice that may initially have nothing to do with environmental concerns. More than yoga teachers and hemp grocery bags, it is this that may prove to be the real key to Britain's shift to a more sustainable lifestyle. ■

<http://www.surrey.ac.uk/resolve>

Sustainability can be a by-product of a lifestyle choice that may initially have nothing to do with environmental concerns

recycling and composting to re-using the water in which they had boiled an egg.

Many found that doing one thing was seldom enough to absolve their eco-guilt. But will sustainable living go out of fashion? What do we know about the ethical commitment of people living green lifestyles? RESOLVE researchers, Dr Evans and Dr Wolkje Abrahamse, carried out long interviews with 25 people from south east England between 2007 and 2008. The researchers found that living sustainably was not an achievable end, but a life project. People never appeared to reach a point where they could say "I am living sustainably" and stop. Instead, they found themselves continually negotiating trade-offs.

Often the trade-offs were imposed by factors beyond their control – for instance, what is available at the store and the constraints of local infrastructure. "Do I go for organic or fair trade coffee?" asked Alex, 33. "Stupid isn't it, but it is



The climate change deal

WHY IT MUST NOT BE A VICTIM OF THE CREDIT CRUNCH

PROFESSOR JUDITH REES, Director, ESRC Centre for Climate Change Economics and Policy



GLOBAL WARMING RUNS the risk of falling below the political radar in a world preoccupied with averting the meltdown of the global financial system. It is too easy to regard climate-change mitigation as a problem that can be put off, and to argue that we cannot increase our investments in limiting emissions until economic conditions improve.

Such views were put forward by some EU leaders at their October 2008 summit in Brussels. If they prevail, the consequences could be disastrous. Failure to deal with global warming is likely to lead to irreversible environmental changes that will have far greater consequences than the credit crunch. The world now has very little time to establish and implement a strong and effective global policy to reduce carbon emissions that can act as a framework for action by governments, private sector enterprises, community groups and individuals.

In December 2009 the 15th Conference of the Parties (COP) under the United Nations Framework Convention on Climate Change will take place in Copenhagen. Its outcomes will be crucial to efforts to stabilise the amount of greenhouse gases in the atmosphere at a level that curbs the risk of dangerous man-made climate change. Agreement is needed on the appropriate global target for greenhouse gas concentrations and on national targets or emission caps.

How risk-averse will the Copenhagen negotiators prove to be?

Some scientists see it as vital to set the global target below the current concentration of 430 parts per million (ppm) CO_{2e}, a measure of all the greenhouse gases taken together and expressed in terms of their carbon dioxide equivalent. Feedback loops are already being created through the melting of permafrost, drying soils, forest dieback and ocean warming. Supporters of a low target say these processes will release carbon dioxide and methane now 'fixed' in the Earth into the atmosphere, driving global temperatures up to dangerous and irreversible levels.

The cost of achieving a target below existing levels will be very high indeed. A more feasible level for any COP 15 agreement would seem to be between 450 and 550 ppm. The higher the target concentration, the lower the anticipated costs of achieving it and the higher the risk that we will see global temperature increases of four degrees centigrade, the level at which it is generally agreed significant and irreversible climate change will occur. According to Hadley Centre modelling, a 550 ppm concentration is associated with a 24 per cent probability of a four degree temperature rise; at 500 ppm the risk is reduced to an 11 per cent probability; and at 450 ppm the probability is about five per cent. How risk-averse will the Copenhagen negotiators prove to be?

A 500 ppm target requires emissions of total greenhouse gases to halve by 2050 relative to 1990,

and would allow each of the expected nine billion world population to emit on average two tonnes of CO_{2e} per annum. At present, per capita emissions in developed countries are running at 10-12 tonnes, and levels in the United States are twice this. This implies that cuts of at least 80 per cent will be needed by 2050. Unless reductions of this magnitude are agreed there is little chance that the rapidly industrialising countries, such as India and China, will agree to cap their own emissions.

Agreement will also be needed on a package of measures to help the developing world make the transition to a low-carbon economy without sacrificing social and economic development. The package would have to include the development and transfer of low-carbon technologies, capacity development to facilitate the implementation of mitigation strategies, and significant financial flows to help meet the costs involved. Developing countries will also need assistance to adapt to already inevitable climate change, the effects of which are falling disproportionately on them.

Once global and national targets are set, the obvious question is how they are to be implemented. One potential policy tool would be the development of an international Emissions Trading (cap and trade) Scheme building on the experience of existing regional and national schemes, such as the EU ETS. If an appropriate price could be put on carbon, market forces would provide incentives for technological innovation, for investments in low-carbon technologies and for lifestyle change. Mitigation costs would be lower since emissions reductions would be made by the companies and countries that could do so most cheaply. Costs could be reduced still further if the forest sector was included in the market, with carbon credits awarded for reforestation and prevention of deforestation. A trading system also has the potential to generate considerable financial flows into the developing countries.

Creating and regulating a well-functioning market will be a challenging task and we should not rely solely on the market to deliver the reductions we need. Governments will have to intervene to speed up the transition to a low-carbon economy. They will have to invest in research and development, support construction of demonstration plants for technology such as carbon capture and storage, provide incentives for private investment in new technologies, develop clear carbon-reduction targets between now and 2050 for different sectors of the economy, and provide carbon reduction information to companies and individuals.

Recent turmoil in the financial markets serves as a lesson of the costs of neglecting risk. This lesson must be learnt in the context of climate change. Every year that we postpone taking action increases the risk of irreversible climate change, with horrendous consequences for environmental systems and human societies. ■

<http://www.lse.ac.uk/people/j.rees@lse.ac.uk>

ARE CURRENT LEVELS OF AIRBORNE POLLUTION HARMFUL TO HEALTH?

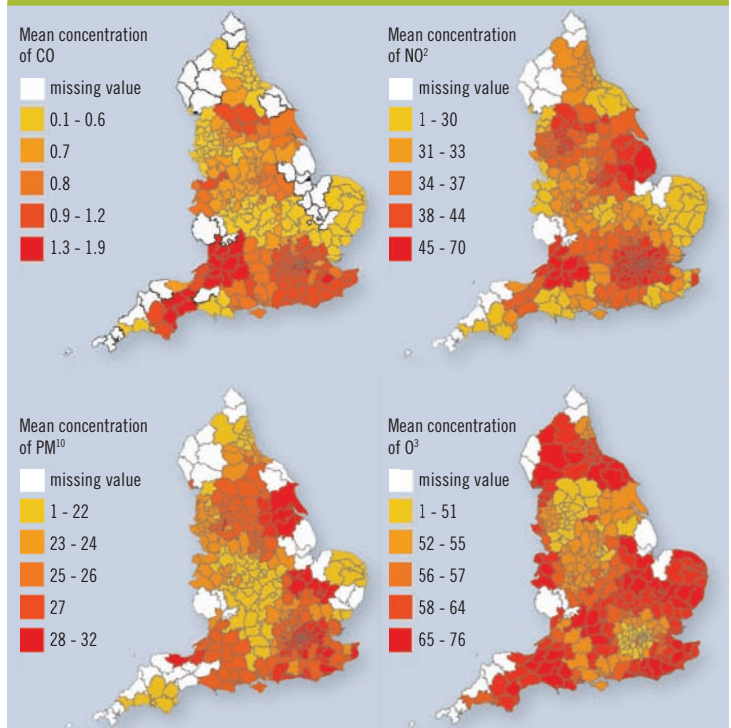
Annual levels of pollution at local authority level reveal a disturbing picture

IT IS WELL ESTABLISHED that high levels of airborne pollution are dangerous to health. The London smog of 1952 is a classic example, with a reported death toll of 4,000. By historical standards the UK now has high standards for air quality, set at levels believed not to be harmful to health. Yet recent research from the United States has shown that airborne pollution at levels similar to those allowed in many European countries can harm infants. Researchers at the Centre for Market and Public Organisation (CMPO) examined whether the levels of airborne pollution currently allowed in England are harmful to the health of the population.

This involved using an approach that had not been tried before in the UK. Most research on the health effects of air pollution looks at daily time series of measurements of pollution and health to estimate the immediate impact of pollution on health. But this approach does not pick up longer term effects. So Katherina Janke of the University of Bristol and Professor Carol Propper of the Imperial Business School examined the relationship between annual levels of pollution and mortality at local authority level. Rather than examining just one city or one specific area, as has often been done in the medical literature, they looked at all local authorities in England between 1998 and 2005.

The research focused on four commonly measured airborne pollutants: carbon monoxide, nitrogen dioxide, ozone, and particulate matter less than ten millionths of a metre. All are produced by traffic and industrial activity, and all are known to be harmful to health, particularly respiratory and cardiovascular health. Their concentrations are measured with high frequency at monitoring

FIGURE 1: MEAN CONCENTRATIONS OF AIRBORNE POLLUTANTS AT LOCAL AUTHORITY LEVEL

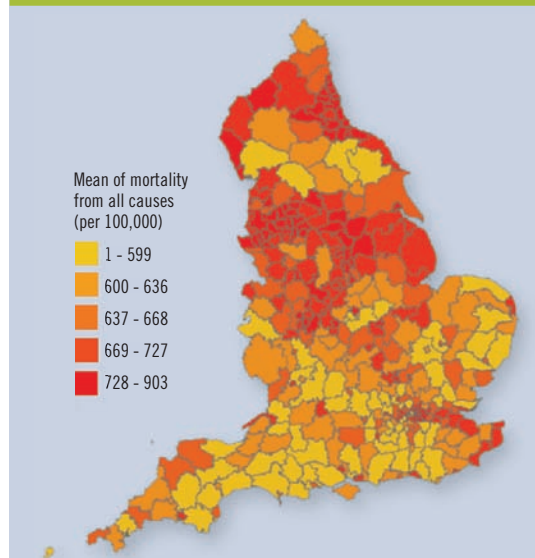


stations across England. Figure 1 shows the mean pollutant levels. The darker the shading, the higher the levels of pollution. White areas are those where there are too few monitoring stations for us to confidently assign pollution levels. Figure 2 shows the distribution of all cause mortality. Again, the darker the shading the higher the death rates.

At first sight there is little association. Mortality is higher in the north than in the south, reflecting the UK's well-known regional health disparities. But three of the pollutants – carbon monoxide, nitrogen dioxide and particulate matter – are higher in the south east and in built-up areas, while ozone is higher in rural areas. A closer look reveals a more worrying picture. Once the researchers allowed for differences in smoking, economic activity and education, they found that higher levels of particulate matter and ozone are both associated with higher death rates. The group most affected are older people, precisely the age group most likely to be affected by pollution. The link between these pollutants and death rates was considerably larger than had been previously estimated for England.

A lower limit for particulate matter will be introduced in 2010. The CMPO research suggests that it may save as many as 4,000 lives per year. ■

FIGURE 2: MORTALITY AT LOCAL AUTHORITY LEVEL



<http://www.bristol.ac.uk/cmop>

A LOW-CARBON ELECTRICITY SECTOR

Going beyond the current targets

ELECTRICAL POWER IS an ever more integral part of modern economies and societies. All the indicators point to a growing number of uses for electricity and to an increase in its use as the favoured energy source of the future. If the environmental problems associated with electricity generation can be overcome, the further electrification of the economy, and the dwindling of other energy sources, will be a welcome development.

Electricity is clean to use and can be generated in a number of ways. But for economic and historical reasons, most electricity is generated by burning fossil fuels. The electricity sector accounts for about 41 per cent of global CO₂ emissions and 31 per cent of the UK's emissions, making it the single largest source of our CO₂ emissions. This makes electricity generation central to targets and policies for emission reductions. If the UK is to meet its target of reducing CO₂ emissions by 60 per cent by 2050, substantial decarbonisation of the electricity sector is essential.

Achieving a low-carbon electricity sector is a multi-faceted and complex challenge that will take a long time. It will affect every aspect of the electricity system as we know it, from generation through delivery networks to end use and consumers. These changes will need to involve co-ordinated policy, economic, technological, and behavioural measures.

Researchers at the Electricity Policy Research Group at the University of Cambridge have addressed the main issues and the means of achieving a low-carbon electricity system. They have produced a book with contributions from researchers at the Supergen Futurenet Consortium, an interdisciplinary cross-university collaborative research programme funded by the UK Research Councils' Energy programme that is looking at the future of the UK's electricity sector.

The book emphasises the role of economic instruments in achieving a low-carbon electricity future. It also looks at how low-carbon generation technologies might be added in sufficient quantity to the electricity system. It then examines how networks and the demand side can help to decarbonise the sector. It highlights the role of innovation and discusses instruments for promoting technological progress. Finally, given the economic framework and technological possibilities, it presents a number of policy instruments and options for the future.

The transition to a low-carbon electricity future involves getting the economics of the sector right. This is particularly important in a deregulated



Electricity is clean to use, but the way we produce it is not.

electricity sector such as the UK's, where privately owned companies and market mechanisms drive investment, technological choice, and the operation of the system. The economic approach should address the issue of the environmental costs of electricity generation from conventional sources. It is particularly important to establish an efficient system for the pricing of carbon. This involves extending the scope and time horizon of the current European carbon market.

Technology is the key to the low-carbon electricity future, and there is a need for a coherent technology policy. Most low-carbon technologies are capital-intensive. At the moment they cannot compete directly with fossil fuel-based generation unless their positive environmental benefits are

Technology is the key to the low-carbon electricity future, and there is a need for a coherent technology policy

rewarded financially, or the environmental harm of fossil fuel burning is taken into account.

The future of the electricity sector is likely to involve a range of technologies. The choices between them will be partly determined by local and regional resource availability and by demand. This means that technology policy needs to keep options open. Given the wide range of technological options, picking winners does not constitute sound technology policy.

Some of the UK's technological options, such as wind power, are at a more advanced stage than others. These need support mechanisms that promote research and development, as well as commercialisation and adoption. Other technologies, such as wave, tidal or solar, are further away from large scale commercial adoption. These

AT A GLANCE

The electricity sector accounts for just under a third of the UK's CO₂ emissions. A new book examines the ways in which we may be able to produce electricity in more environmentally friendly ways.

MEAT PRODUCTION AND THE ENVIRONMENT

FARMING AND PROTECTING the environment are often seen as being at odds with each other, but is this always true? Could some farming regimes benefit plants and wildlife? A project within the Rural Economy and Land Use research programme has studied how grazing cows and sheep on natural grasslands can be good for biodiversity, human health and profits.

The team of natural and social scientists, from Exeter, Bristol and Gloucestershire Universities and North Wyke Research, looked at lamb and beef grazed on natural pastures. They showed that these grazing regimes were good for raising sheep and cattle, and also played a key role in maintaining habitats. Farms using natural and biodiverse grasslands were often helping to protect threatened and marginal ecosystems. Grazing is necessary to maintain an open and diverse sward in which a range of grasses and flowering plants, and the insects and birds that depend on them, can flourish.

The researchers also looked at meat from animals grazed on natural habitats, including salt marsh, heath and moorland, and compared it to meat produced on 'improved' grassland. They analysed its nutritional content and asked tasting panels of consumers which they preferred.

There were significant differences. Lamb produced on biodiverse grassland – particularly heather pasture – had higher levels of vitamin E and beneficial fatty acids than the control samples, and lower levels of skatole, a substance that can make meat smell unpleasant. Beef from longhorn cattle grazed on natural pastures also had higher levels of beneficial fatty acids than beef from conventional grassland. The longhorns, and other breeds that do well on traditional pastures, produced more tender and flavoursome meat.

So it's good for health and for the environment, but can the farmer be a winner too? Livestock farmers face an increasing variety of pressures. So if they can add value to their products that is good news for their businesses. Demand for high-quality local food is increasing, and the project found that consumers are willing to pay a premium for distinctive 'terroir' products. This can help to offset the lower stocking densities and production levels associated with less intensive farming.

Some of the producers exploiting these niche markets are a new generation of inventive business entrepreneurs. But there are also longstanding farm businesses seeking to realise the value of their traditional grassland and to respond to their customers' tastes. ■

<http://www.relu.ac.uk>



will need more public and private research and development support.

The demand side must also be an active participant in the electricity sector. Consumers can improve their energy efficiency. New technologies such as micro-generation and smart metering can help them adapt to changes in market prices, though steps to cut demand are also part of the picture. An active demand side can also help improve security of supply by better matching demand to available supply, especially where supply from renewables depends on the weather, for example sunshine or the wind. But improved supply and demand side technologies are not automatically adopted en masse. There are significant barriers to the adoption and diffusion even of relatively cost-effective new technologies, by producers and users of electricity. Progress is needed on lowering these barriers to realise the benefits of the new technologies that are becoming available.

Achieving a low-carbon electricity sector is a long-term goal and there are bound to be economic and political challenges. Overcoming them will call for political commitment, policy and regulatory consistency, and public acceptance. The low-carbon policy framework needs to be flexible to respond to changing conditions of the sector but it also has to offer stability. Policy and regulatory uncertainty in a market and incentive-driven sector can undermine efforts to reach a low-carbon system. ■

<http://www.electricitypolicy.org.uk>

Delivering a Low-Carbon Electricity System: Technologies, Economics, and Policy, Michael Grubb, Tooraj Jamasb and Michael Pollitt, Eds. Cambridge University Press, Cambridge (2008).

<http://www.cambridge.org/uk/catalogue/catalogue.asp?isbn=9780521888844>

AT A GLANCE

Lamb and beef grazed on natural pastures is nutritionally superior to that grazed on 'improved' pastures. It also tastes better and benefits the land's biodiversity. And it generates higher profits for farmers. ■



RUNNING BUSES ON GIANT COMPOST HEAPS

AGRICULTURE CONTRIBUTES ten per cent of Europe's greenhouse gas emissions, but farms could reduce this by installing anaerobic digesters, which convert waste into green energy. Doing so would also be beneficial for rural businesses in the UK.

Professor Charles Banks is leading a group from Southampton and Reading Universities investigating the potential benefits and drawbacks of anaerobic digestion as part of the Rural Economy and Land Use research programme.

Anaerobic digestion uses bacteria to produce biogas from organic matter. Food waste, manure, crop residues and crops grown for the purpose can all be fed into the digester. The resultant biogas is rich in methane and can fuel vehicles or provide electricity and secondary heat. Digesters also dispose of organic farm wastes safely and avoid pollution.

Germany already has some 3,500 farm digesters converting animal slurry and energy crops (mainly maize) into energy, with the spare heat supplied to local industry and village communities. Danish farmers have formed co-operatives that operate large-scale digesters that use food-processing wastes and animal slurries. These large plants produce electricity and feed heat directly into district heating schemes. In Sweden the emphasis has been on using biogas to run vehicles; many buses there use this environmentally friendly, sustainable fuel.

So why haven't more farmers in the UK taken up the technology? Governments in some other European countries have provided financial support for such schemes, but there have been counter-arguments. Ecological campaigners and organisations concerned about poverty in the developing world have expressed concern about growing food crops to fuel vehicles. Such criticism has grown as food prices have risen, and biofuels have taken some of the blame for food shortages.

But anaerobic digestion is a flexible technology that can produce methane from a wide range of organic materials. The researchers point out that appropriate government policies could encourage operators to use waste products and the non-edible parts of crops, rather than food materials. Carbon trading would also be an incentive to move into this kind of energy production. Local businesses and social enterprises would then be the winners. ■

<http://www.relu.ac.uk>

MEASURING PROGRESS TOWARDS CARBON REDUCTION IN THE UK

Shifting the burden does not solve the problem

AT THE LABOUR PARTY conference in September, Gordon Brown announced that he was asking the Climate Change Committee to urgently consider whether the UK should aim to reduce its carbon emissions by 80 per cent or by only the planned 60 per cent by 2050. The Climate Change Bill, which will enshrine this target in law, may be one of the most important pieces of legislation in history. But how far are we towards either target? The answer depends on how you count the emissions. A study carried out by Dr Angela Druckman and Professor Tim Jackson at RESOLVE, the Research Group on Lifestyles, Values and Environment, reveals that we are still going fast in the wrong direction.

At the heart of the matter is a question of responsibility. When we consume goods produced in another country, the emissions that occurred during manufacture are said to be 'embedded' in the traded goods. The question is: who should be held responsible for the embedded carbon in that latest, must-have, flat-screen TV that adorns the living room? Should it be China, where it was made? Or the UK, where it is used?

Carbon reduction targets such as those in the Kyoto Treaty usually follow a production-based perspective. Under this regime, emissions arising in the production of goods are attributed to the producer, not the consumer. But this approach tends to mask the problem of 'burden shifting', in which carbon-intensive industries are 'exported' to other,

Biosecurity – more than badger culls

BOVINE TUBERCULOSIS (bTb) has been on the increase over the past 15 years, and infected badgers have been accused of spreading the disease among cattle. The government has been committed to finding solutions to bTb since 1997, creating partnerships with a range of stakeholders, including farmers, and encouraging farmers to implement biosecurity measures. But a study led by Dr Gareth Enticott shows that communication to farmers about bTb prevention has had only limited success. Farmers distrust government and are sceptical about the science itself.

His project studied partnerships involving

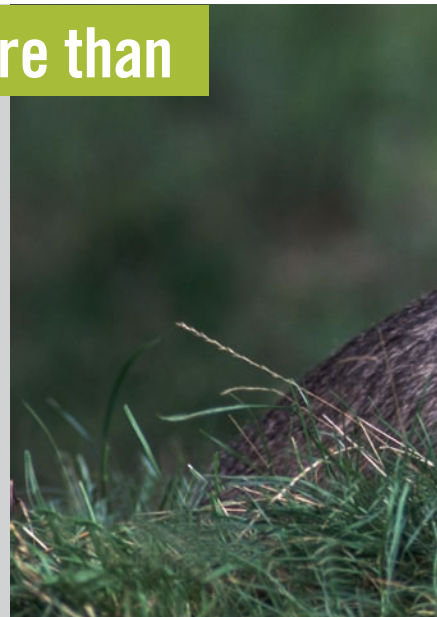




Illustration: Sarah Hanson

often less developed, countries. Consumption of final products continues to rise, relying increasingly on the import of finished or semi-finished products.

A consumption-based perspective might solve this problem. It would account for all the emissions attributable to the consumption activities of each nation, wherever they took place. Upstream emissions that occur in producing goods are allocated to the nation that purchases the final item, wherever production takes place. The difference between the emissions counted under the production perspective and the consumption perspective is known as the 'carbon trade balance'.

RESOLVE researchers have shown that the choice of accounting convention for reporting carbon emissions radically changes conclusions about the UK's progress towards its carbon reduction targets. According to Kyoto reporting, carbon emissions have fallen by around six per cent since the Kyoto base year of 1990. If we include

Who should be held responsible for 'embedded' emissions?

AT A GLANCE

If we calculate carbon-equivalent emissions from the perspective of consumption rather than production, our contribution is actually going up.

aviation and shipping emissions, which are excluded from the Kyoto accounts, progress in reducing carbon emissions appears to be wiped out.

But worse is to follow. When emissions are estimated according to the consumption perspective, it turns out that they have risen by at least eight per cent since 1990. The RESOLVE study also shows that the UK's carbon trade balance has worsened significantly over this period, illustrating the extent to which the nation is increasingly shifting its heavy industries overseas.

Climate change is a global problem, and shifting emissions from one place to another does not solve it. It is misleading to believe that exporting dirty industries produces a genuine reduction in carbon emissions. Policy must consider all carbon emissions induced by UK consumption. Viewed in this way, the UK's task ahead is truly daunting. ■

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farmers, local authority field officers, vets and others in Devon in England and in Monmouthshire in Wales. It showed that the farmers are sceptical about the idea of biosecurity that government wants to pursue. They often equate it with 'Colditzing' the farm. They doubt its effectiveness and take a fatalistic view of bTb, which for many is simply an everyday expectation.

The farmers in Devon often said that external experts lack knowledge of farming, and reject attempts by Defra, the government department in charge of farming, to impose science-based solutions to the bTb problem. Farmers prefer their own experience-based beliefs about what sort of farm is vulnerable to bTb to research finding. A comparison between developments in England and Wales suggests that the Welsh partnership was more successful than the English one. It was more

collaborative, and made better use of vets, who seem to be one science-based group of experts who have the trust of farmers.

Dr Enticott and his colleague Alex Franklin warn that although partnership in Wales seems to be more close than in England, it did not translate into better practices and policy initiatives nationally in Wales.

The field officers supported by national and local government to inspect farm practices emerge from the research as a key group. They need a higher profile and more definite funding. At present, farmers reduce the zeal with which they carry out safety practices, such as disinfecting lorries, at weekends when the field officers are off duty, or when it is known that they are away at an agricultural fair. ■

<http://www.cardiff.ac.uk/cplan/contactsandpeople/stafflist/c-f/enticott-g-dr-overview.html>

BETTER PROJECT MANAGEMENT CAN SAVE THE PLANET

Traditional techniques are outdated



The Itapu dam in Brazil is the world's largest provider of hydro-electricity.

WHETHER YOU ARE aware of it or not, every single aspect of your life today has been defined by CoPS. Complex Products and Systems is a term that encapsulates the highly engineered, fantastically expensive and complex artefacts and systems that have become emblematic of 21st century human existence. They include transport systems such as London Underground, energy generating facilities like the Itapu project in Brazil, currently the world's largest hydro-electricity provider, and complex communication systems such as mobile phone networks. Even if you don't directly use CoPS in your daily existence you will certainly use things that have been produced by them.

What has not been recognised up to now is the pre-eminent role of CoPS in determining our planet's future sustainability. In industry, energy used in manufacturing is consumed by machine tools that are CoPS. In the transport sector, the aeroplanes that burn fuel are CoPS. And industrial and commercial buildings consuming energy in their complex heating and lighting systems are CoPS too. It is estimated that 55 per cent of world energy consumption is accounted for by CoPS. If we want to reduce world energy consumption, we need to figure out a way to design and implement CoPS that has energy usage as one of its priorities.

CoPS are designed and implemented using a discipline known as project management. Project

management has traditionally been associated with a set of graphical or mathematical tools and techniques; it was developed by engineers and scientists working in defence and aerospace organisations, such as the RAND Corporation and NASA, in the late 1950s. At the time it evolved, CoPS designed by project management methods were viewed as successful if they were completed on time and did what it was said they were going to do. Issues such as energy usage or sustainability were never considered and project management was not designed to deal with wider societal imperatives.

Now traditional project management is creaking at the seams when required to deal with CoPS that have a much wider range of interested stakeholders and far more complex success criteria than they had in the past. Existing project management techniques cannot easily design truly sustainable CoPS.

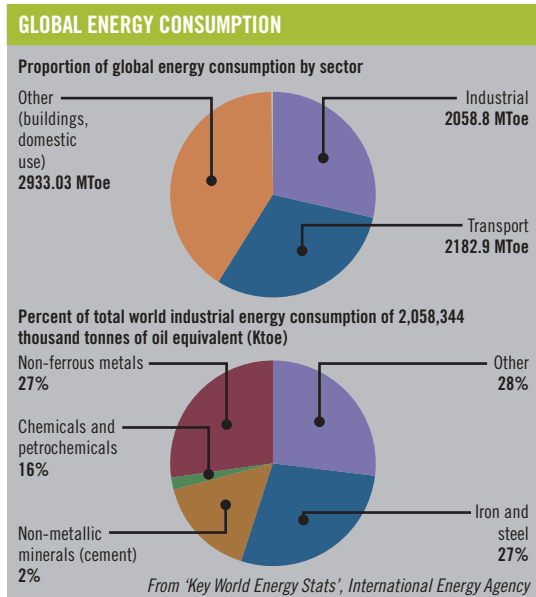
In searching for a solution to this problem, project practitioners and researchers are increasingly looking to the disciplines of social science. Svetlana Cicmil and Damien Hodgson's book *Making Projects Critical* has prompted wide debate in the project management research community, forcing the reconsideration of traditional practice and thinking.

This shake-up highlights potential ways forward in thinking about projects in general, and CoPS in particular, that enable researchers to absorb ideas of sustainability. At Aston Business School, the Centre for Project Management Practice has been working with colleagues from Loughborough University to take these ideas to project practitioners from the automotive, manufacturing and construction sectors so they can inject this thinking into their practices.

Dr Naomi Brookes, the Centre's director, points out that we have some way to go before we can make the impact we need with this sort of thinking: "We have started on a journey but we still have a long way to go before we can give practitioners and stakeholders a pragmatic way of incorporating a critical management perspective into the actual way in which they can design and implement CoPS. We've got to do this if we are to achieve the socially responsible and sustainable design of CoPS."

Critical project management for CoPS may provide part of the answer to making large projects sustainable. But we have some way to go before it really will be able to save the planet. What is in no doubt is that innovative social science is going to provide us with part of the way to get there. ■

<http://www.abs.aston.ac.uk/cmpm>



AT A GLANCE

Complex Products and Systems (CoPS) account for over half of the world's energy consumption, yet traditional project management of CoPS does not consider issues like energy consumption and sustainability.

YOUNG PEOPLE WORRY ABOUT CLIMATE CHANGE BUT RESIST LIFESTYLE CHANGE

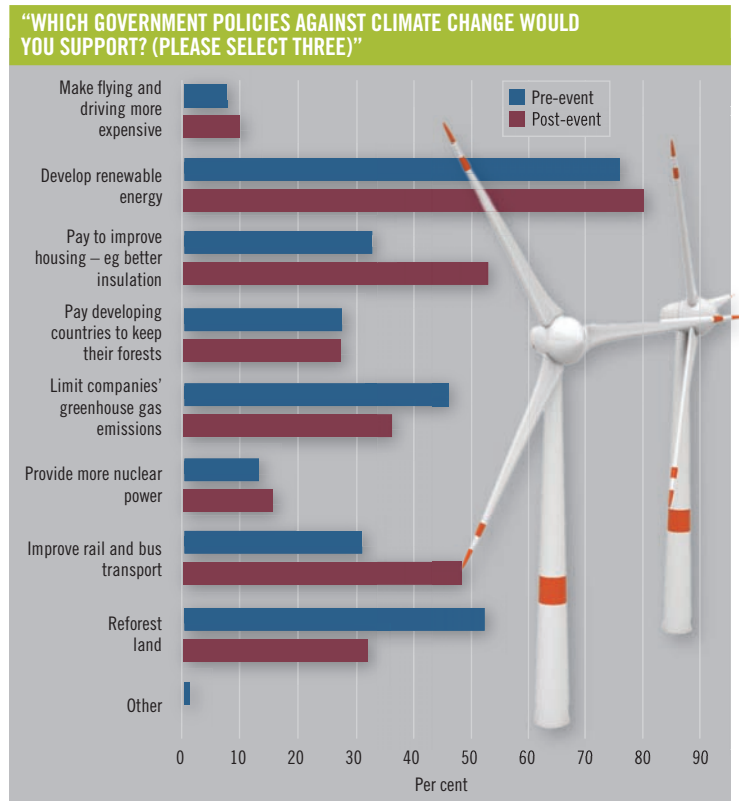
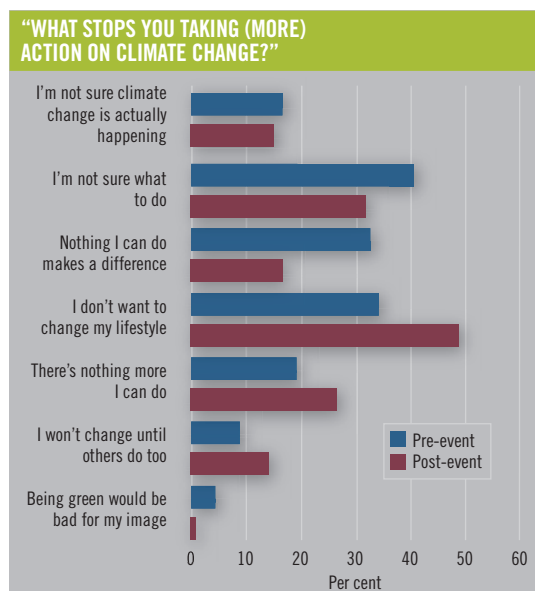
They see a need for radical change but only take small steps

ADOLESCENTS' ATTITUDES towards climate change are important. They have a greater stake in solving the problem than older people. Adolescence is also a key formative stage, sometimes seen by educational researchers as a time when cynicism sets in.

To date, studies have painted a mixed picture of teenagers' responses to climate issues. A report by the Department for the Environment, Food and Rural Affairs finds that as few as 16 per cent are taking any action themselves, while research commissioned by British Petroleum puts the figure at 85 per cent. There is more consensus, however, on their generally low level of concern. The same two studies report that although youngsters are aware of the phenomenon, 45-50 per cent of those surveyed were relatively unconcerned about it.

A key problem here is that climate change is a complex and multifaceted issue, and traditional research methods elicit 'top of the head' views rather than considered judgements. Dr Nicholas Bardsley of the National Centre for Research Methods and Dr Corinne Wales from Southampton University conducted a deliberative forum to explore some key questions with 90 Hampshire teenagers as part of the ESRC's Festival of Social Science. The aim was to combine polling with information and exercises to enable them to have a more considered view. Opinions were polled before and after the group had listened to presentations, quizzed a panel of experts and formulated group statements on appropriate individual and government actions.

Beforehand, results were broadly consistent with the accepted picture: 40 per cent of the group were



relatively unconcerned. But this dipped below 30 per cent after deliberation. More strikingly, 95 per cent of the group reported taking at least some action themselves. The difference between this result and other studies may be down to the questions used. Checklists of specific actions produce higher figures than asking whether respondents are personally tackling climate change. But it was also found that actions do not match values. Most teenagers thought they should be talking to their families about eco-friendly behaviour, eating organic food, buying fewer new things and flying and driving less. But in each case only a minority were doing so. The reasons they gave for their inaction are revealing. After deliberation, the most common reason was a reluctance to change lifestyle, with fewer participants expressing feelings of powerlessness or uncertainty.

The results seem to reflect consumer culture, showing little support for lifestyle change, either voluntarily or via policy change. Such attitudes could be a significant challenge to climate change policy. Scientists are calling for drastic cuts in greenhouse gas emissions that seem impossible to square with current trends in production and consumption. ■

AT A GLANCE

Polling young people on their attitudes towards acting to prevent climate change both before and after they have been allowed to deliberate on the topic produces contrasting results.

<http://www.ncrm.ac.uk>

WATER USE: HABIT OR NEED?

There are differences in how we are adjusting our domestic water consumption

WATER DEMAND IS one of the most significant long-term challenges for environmental policymakers, while consumers are being urged to adjust their habits to help avoid severe restrictions on their water use. To help understand the routines and habits that contribute to water consumption, and to explore which everyday water practices are amenable to long-term change, Dr Will Medd and Dr Heather Chappells of Lancaster University carried out research among householders, water resource managers and regulators during the droughts which hit many parts of the south east of England in the summer of 2006. They find that water use is often based on hard-to-shift practices and expectations.

The drought reopened questions about water management, demand forecasting and possible alternatives and solutions. It led to sharp debate about the strategies used by the Government, regulators and water companies to shape domestic water demand. Needs, rights, and responsibilities were all contested. The research is co-funded by the ESRC, UK Water Industry Research, DEFRA, the regulator OFWAT, the Environment Agency, and five water companies, Anglian Water, Essex and Suffolk Water, Folkestone and Dover Water, Three Valleys Water and South East Water.

The research finds considerable variation in everyday water practices and in what is regarded as normal or legitimate consumption in similar households. This echoes work on energy use, which has shown that one household can use twice as much energy as the one next door despite having the same number of people in an identical building.



Householders are more likely to adapt their outdoor water use than their indoor water use.

The diversity of water consumption was not about attitudes, but habits and routines. Many are shaped by social obligations such as childcare, leisure and work. Water-consuming practices in the home – showering, flushing the toilet, washing clothes – were not particularly negotiable in terms of how people define necessity or waste, even though they differ widely in their views on which of these is which. Householders were more likely to adapt their outdoor activities than to change their indoor activities, many of which are unconscious routines.

The research also indicates that existing institutional frameworks limit debate about more innovative solutions to water management, including the option of providing water ‘fit for purpose’. While consumers saw the benefits of water recycling and rainwater collection, many water managers highlighted concerns over the cost of such measures, their efficiency, and their uncertain impact on demand. ■

http://www.lec.lancs.ac.uk/cswm/drought_demand.php

AT A GLANCE

There are wide variations in attitudes, habits and routines in relation to domestic water use between apparently similar households.



Promoting greener pest controls

POLITICAL AND NATURAL scientists at Warwick University under the Rural Economy and Land Use programme (RELU) have been examining why so few new biological controls have been licensed for use against crop diseases.

The licensing process used to approve new controls was devised for chemical pesticides. It had difficulties dealing with ‘biopesticides’. The RELU team, led by Professor Wyn Grant, looked at what changes might be needed to get biopesticides a fair hearing.

Biopesticides include fungi, nematodes and other micro-organisms, predatory insects, and some naturally occurring chemicals, such as plant extracts and pheromones, that can be used against pests that attack crops.

They are becoming more important because natural resistance and the withdrawal of some chemical pesticides have left growers with fewer weapons. Many retailers would also like to see greener options used to protect crops. Most biopesticides are less toxic than conventional controls and may be more attractive to consumers.

But the Pesticides Safety Directorate (PSD), which is part of DEFRA and responsible for regulation, has been geared to licensing chemical pesticides. The Warwick team is clear that biopesticides need to be controlled and regulated. Just because something is ‘natural’ doesn’t mean it is safe. But the processes could be made easier for developers who want to get new,

biologically-based products onto the market. Trials of new products can be much more complex if biological systems are involved, and expensive repeat tests may be needed. Chemical pesticides, on the other hand, can be tested in relatively small trial areas.

The researchers contributed to important changes within the PSD. A biopesticides champion and team are now in place and the expertise of the organisation has been enhanced. The PSD also launched a pilot biopesticides scheme, offering reduced fees for registration. This has now become permanent and is a unique pathfinder scheme for other European states. ■

<http://www.relu.ac.uk>