



# BEYOND COPENHAGEN: DARKEST BEFORE THE DAWN

Building the good  
green society

compass

# **BEYOND COPENHAGEN: DARKEST BEFORE THE DAWN**

Building the good green society

compass

Published by Compass – Direction for the Democratic Left Ltd  
Southbank House, Black Prince Road, London SE1 7SJ  
T: +44 (0) 207 463 0632 [zoe@compassonline.org.uk](mailto:zoe@compassonline.org.uk)  
[www.compassonline.org.uk](http://www.compassonline.org.uk)

Designed by SoapBox, [www.soapboxcommunications.co.uk](http://www.soapboxcommunications.co.uk)

Compass would like to thank all those who advised us on this project and who contributed their time and energy to making it possible. We are incredibly grateful.

# Contents

Executive summary	2
The threat of climate change	4
The UK low carbon transition plan and road to Copenhagen	11
The debate outside the West	16
The alternative vision of a low carbon emissions world	17
The essential issues for Copenhagen	20
Beyond Copenhagen	21
Bibliography	22

## Boxes

Box 1 Examples of how we are eroding sustainable life	4
Box 2 Britain's energy use	12
Box 3 Some government investment in renewables	13
Box 4 Examples of indicators for sustainable human development	17

## Tables

Table 1 Key facts relating to the major carbon emitting countries	8
Table 2 Britain's public expenditure allocations 2008	14

## Executive summary

This report was originally started as an opportunity to contribute to the debate on what a good outcome from Copenhagen would look like for the UK and the world. While there is always a possibility this will change, it now seems unlikely that any binding agreement will be reached during the Copenhagen Conference.

**This report recognises that the global environmental crisis is dire and that the targets set by Europe and the USA fail to address the situation we face**

In this rather gloomier light this report looks beyond Copenhagen – and even though the picture it paints of the state we are in is dark and there seems too little hope of immediate change, real and lasting progress is rarely handed down from above – it is always fought for from below. Just as movement on voting rights, sex equality and anti-poverty measures only came about because of pressure from below, so will action on climate change.

This report recognises that the global environmental crisis is dire and that the targets set by Europe and the USA fail to address the situation we face. They fall far behind the science and fail to live up to our responsibility to the planet and the generations to come. The G8 countries, representing 13% of the world population, are responsible for more than 40% of global carbon emissions. What's more concerning is that it is likely that within the next 10 to 20 years we will reach a tipping point – a point beyond which the forces set in motion by environmental degradation will multiply in a vicious cycle.

We face difficult decisions – decisions which can only be made collectively. Decisions on how we live our lives, share our scarce resources and protect our world for our children. These are decisions that we cannot make on our own – but equally they cannot be dictated from on high. Only through making these choices collectively

and democratically can we hope to build a good green society.

Ed Miliband, the Secretary of State for Energy and Climate Change for the UK, has adopted a position that if modelled by the EU and the USA could have led to real progress at Copenhagen. While the failure to reach an agreement internationally is an issue that we must face globally, at home, the proposals put forward need support and investment.

This report recognises that the government cannot do it all on its own and as a society we all need to play our part too. So we ask the government to do five things:

- First, increase significantly investment in renewable energy. Such an increase starts to recognise the significance of the green agenda. At the moment renewables are still an afterthought.
- Second, take a lead in the international community to make a deal match what is necessary and not just what feels politically feasible – it cannot be an agreement based on the lowest common denominator.
- Third, while no panacea, carbon trading needs a fiscal stimulus to ensure it is part of the mix of policy options to deal with climate change.
- Fourth, allow local government to borrow at low interest rates, on the bond market, to invest in local green agendas. The green agenda has a significant local element – communities have a huge role to play. By devolving the funding for some of these key projects communities can be empowered to make further sustainability changes themselves – encouraging movement like Transition Towns.
- Fifth, look to establish alternative ways of measuring economic activity through green accounting and general well-being measurements as recently adopted in France.

As individuals, as part of a community, and as a society we must also all play our part. Working together, whether it is in our homes, schools, churches or workplaces we can make a difference. It is doubtful that we can deal with climate change by tweaks and reforms to the world as it is now. Our lives are taken up too often with consuming

more. This high spend, high consumption society lies at odds with the sustainability of the planet. To get the right climate change deal we need to establish a different basis for the good society, one in which we take back control over our lives and have more time for the things that genuinely make us happy. A better quality of life and not just a greater quantity of things will make us more fulfilled, as will more time to be with people we love, to reduce inequality in our society and to promote greater democracy in the world around us. A sustainable world cannot be simply grafted onto a world of advanced consumer capitalism. Instead the anxiety, insecurity and exhaustion of living in such a world must be used to help the transition to a better kind of world in which lowering carbon emissions isn't a punishment but a liberator.

Our politics may sometimes seem to have little hope – our MPs seem too interested in changing their homes rather than changing the world. But it is always darkest just before the dawn. While we should be under no delusions as to the seriousness of the situation we face, there is always massive opportunity for change.

## The threat of climate change

The continued emissions of carbon and other gases are bringing about a change in the earth's climate that seriously threatens the existence of humans and other species on this planet. While a diminishing lobby continues to question the science and the policy conclusions, there is now global political and social consensus concerning the threat and need for action.

There are numerous underlying causes of global warming, but they all cluster around a core issue: the concentration in our atmosphere of greenhouse gases, especially carbon dioxide, which trap solar radiation and result in continuous planetary warming. Since the industrial revolution, the human consumption of fossil fuels, destruction of forests and oceans, and over-use of natural resources has added 1,800 billion tons of CO<sub>2</sub> to our atmosphere, and currently human activity adds a further 1,000

tons of CO<sub>2</sub> a second. Much of this is driven by soaring levels of consumption on the part of the West, fuelled by an economic system which made consumer spending its core rationale. While there is some divergence in opinion on targets that will sustain something like our current human population, the most widely agreed target now adopted by the EU is to prevent global average surface temperatures increasing more than 2 °C above the pre-industrial (1850) level.

As well as greenhouse gas emissions, global warming creates results that increase its effects. As one of the world's pre-eminent climate scientists, Professor James Hansen of NASA, put it: 'There are tipping points in the climate system, which we are very close to, and if we pass them, the dynamics of the system take over and carry you to very large changes which are out of your control.'

The effect on our planet is potentially devastating, and what's worse, it is exacerbated by our modern consumerist lifestyle. Perhaps the most significant contributing factor is soaring consumer demand for products whose production and transportation generate massive waste and pollution of carbon dioxide and other

### Box I Examples of how we are eroding sustainable life<sup>1</sup>

- The global economy has doubled since 1985 and degraded 60% of the world's eco-systems.
- Every year we lose 13 million hectares of forests and 6 million hectares of arable land, and add 75 million to the population.
- The world's 744 largest cities emit more CO<sub>2</sub> than could be absorbed by all the world's forests. New York's eco-footprint is 1,000 times larger than the city; Tokyo's energy needs exceed Japan's bio-capacity by 200%.
- Some 20% of the population (1.3 billion people) have no access to safe drinking water. The melting of Himalayan glaciers threatens the water supply of India, China and other South Asian nations.
- The UN World Food Programme cannot feed even 70% of those in dire need because of soaring food prices resulting from top soil erosion, conversion to ethanol crops, and oil transport costs.
- In the USA, wildfires in 2006 were 125% above the ten-year average.
- The loss of the Arctic ice-cap, melting at 9% per decade, a loss of a million square miles in the last 30 years, could result in ice-free Arctic summers by 2040, and sea level rise of 23 inches by 2100. The Northwest Passage became navigable in September 2007, for the first time in recorded history.
- Up to one-third of all plant and animal species could become extinct if global average temperature increases reach 4.5 °F. An increase of 3.6 °F would destroy 97% of the world's coral reefs.
- The melting of West Siberia's 1 million square mile frozen peat-bog could release 70,000 million tons of methane, an important greenhouse gas, into the atmosphere.
- Global warming is increasing the risk of insect-borne disease. Peru's efforts to eradicate malaria have been reversed; there have been 64,000 new cases this year. Azerbaijan, Tajikistan and Turkey have been added as malaria danger zones.

<sup>1</sup> Sources: Tim Jackson, Sustainable Development Commission, March 2009; Ecosystem Appropriation by Cities (Royal Swedish Academy of Sciences); Pavan Sukhdev, Economist at Deutschbank; Greenpeace; Natural Resources Defense Council; Intergovernmental Panel on Climate Change; New Scientist; European Space Agency; World Health Organization, Witnessing Change: Glaciers in the Indian Himalayas; Birla Institute of Technology (BIT).

greenhouse gasses. This increase in consumer demand is accounted for in part by global population growth and the hyper-consumption patterns that have characterised the wealthy West over the last 50 years, and which have now become the basis for classical neo-liberal concepts of economic growth.

Our modern lifestyles have been made possible by technological advances, which in turn require and generate carbon energy, and are rapidly exhausting finite natural resources. If we continue on this trajectory even resources considered renewable will reach the point where their renewal is unlikely, because of over-use and the knock-on effects of global warming or pollution.

Scientists and politicians have understood the way in which these factors interact with global warming and the mechanisms of CO<sub>2</sub>-driven climate change since the early 1980s. Since then there have been important successful government interventions (such as that on acid rain – notably the Montreal Protocol). Research, debate and many treaties since then have been accompanied by increasingly dire predictions of what awaits our planet if we do not take momentous action. Yet while few in the west would deny the reality of what we are facing, there are far too many politicians stuck in a rhetoric of the past – of the wonder of mass consumption – and they seem to rely on the capacity of technology to solve all our problems. Although the dire warnings concerning global warming are heard and understood, human behaviour continues unchanged.

In the countdown to the Copenhagen Conference, what was a broad scientific consensus on the ‘tipping point’ (when climate change will be irreversible regardless of what action we take) seems to be changing, and not in an optimistic direction. A few years ago, an influential body of scientists postulated that to avoid reaching that tipping point, we need to hold global average temperatures increases to a 2 °C limit, the threshold at which atmospheric concentration of carbon dioxide and other global warming gasses<sup>2</sup> [known as ‘CO<sub>2</sub>e’], cannot exceed 450 ppmv (parts per million volume). An increasing number of leading climate scientists, including notably Dr Pachauri, chair of the IPCC, argue we should be aiming to reduce concentrations of atmospheric CO<sub>2</sub> to 350 ppmv. In May 2008, the Mauna Loa observatory measured a record CO<sub>2</sub>

atmospheric concentration of 387 ppmv<sup>3</sup>. If the current average annual increase of 3.3% growth in emissions continues, the world will exceed the 4,000 ppmv measure by December 2016.<sup>4</sup>

One of the latest studies by the UK Department of Energy and Climate Change, released in September 2009, predicts that the current rate of global warming, if unchecked, will reach the 4 °C limit by 2060 over pre-industrial levels, rather than by 2100, which was the date projected by the Intergovernmental Panel on Climate Change (IPCC) in its 2007 report. The latest findings indicate that the average increases would mask much higher increases in certain parts of the world, possibly to as high as 10 °C in the Arctic, and Western and Southern Africa, which would destroy half the world’s animal and plant species, and endanger water supply to half the world’s population. A sharp reduction in carbon emissions would be needed in the next decade if the temperature rise projections are to be avoided.<sup>5</sup>

## The state of play on carbon emissions

Expert opinion suggests that global emissions must peak and begin to decline by 2015–2020. This is accepted by Obama’s chief science adviser, John Holdren, and has also been articulated by Dr Pachauri, the chair of the IPCC. However, while many had high hopes for the prospects of Copenhagen, it now looks likely that no binding treaty will be signed. Perhaps what is more concerning is that during the run-up to the UN Climate Change Conference in Copenhagen, which was originally meant to renew the Kyoto Agreements, all major pledges are predicated on technological transformation that is still in its infancy, and facing a long development and start-up period, particularly carbon capture and storage (CCS) technology.

The countdown to Copenhagen has exacerbated existing political differences, with strong divisions emerging between the developed and developing world. Most of these divisions are not new, but Copenhagen is intensifying them, and many governments are taking up positions driven by national political agendas and economic interests.

Although G8<sup>6</sup> leaders disagree over some details on how to tackle climate change, they

2 CH<sub>4</sub> – Methane, N<sub>2</sub>O – Nitrous Oxide, SF<sub>6</sub> – Sulphur Hexafluoride, HFCs – Hydrofluorocarbons, and PFCs – Perfluorocarbons.

3 [www.eoearth.org/article/Herman\\_Daly\\_Festschrift-Socially\\_Sustainable\\_Economic\\_Degrowth](http://www.eoearth.org/article/Herman_Daly_Festschrift-Socially_Sustainable_Economic_Degrowth).

4 [www.neweconomics.org/gen/uploads/sewyo355prhb-gunpscr51d2w29062005080838.pdf](http://www.neweconomics.org/gen/uploads/sewyo355prhb-gunpscr51d2w29062005080838.pdf).

5 [www.guardian.co.uk/environment/2009/sep/28/met-office-study-global-warming](http://www.guardian.co.uk/environment/2009/sep/28/met-office-study-global-warming).

6 The world’s leading industrial nations; meeting as the G6 for the first time in 1975 (Britain, France, Germany, Italy, Japan and USA); becoming the G7 when Canada was admitted in 1976; Russia joining as an observer in 1994, and becoming a full member in 1998. The G8 nations are collectively the largest per capita carbon polluters, along with Australia and leading EU economies.

broadly agree that reducing carbon emissions and returning to high levels of economic growth is perfectly compatible. They believe the crisis can be solved through a combination of technology, some relatively minor changes in public behaviour, and market-based incentives. The current recession and financial meltdown are regarded as blips, not fundamental flaws in the neo-liberal system. Technology will create more climate-friendly energy solutions, which the market will declare profitable, will create jobs, and the result will be not only a reduction of carbon emissions, but a return to the pre-recession era of economic growth. The message from G8 leaders to their nations is that although climate problems are real and urgent, and some tough choices may have to be made, a return to prosperity and our current way of life in rich countries, at least for the majority, is not in question. All we need to do is trust in technology and the market.

This position is now being challenged from a growing coalition of global-change scientists and economists including Professor Stern<sup>7</sup>, and the emerging group of economies from the developing world, especially China, India, Brazil, and Mexico, joined increasingly by other developing country allies.<sup>8</sup>

The basic message of global-change scientists and ecological economists is that we must reduce carbon emissions and take other essential actions (especially the preservation of forests and oceans) to fight climate change. This view is obviously not compatible with the continued form of market-based, largely unregulated economic growth founded on high consumption, advocated by G8 leaders and the Bretton Woods institutions.<sup>9</sup> Fighting global warming and environmental degradation more generally requires a fundamental change in our societies and economies. As citizens we can no longer sit quietly and wait for our government to act, we must now recognise that only by working together can we enact the sort of change that is necessary. Only through collective democratic decision-making can we build the good green society.

We must now as individuals and society, in our families and communities, make decisions based on our values – this is a moment when we can seize the things we really want for society and ourselves, whether that is the time to read a child a bedtime story or the space to grow our

own veg. The turbo consumerism – which drives so much of our lives; which stands us firmly on a treadmill and tells us to run; and which accompanies surging CO<sub>2</sub>, financial boom and bust, and growing national and global inequalities as part of a cycle of environmental, political, social and economic destruction – has to stop.

The standard response of the leaders of the wealthiest countries to the current recession is to restore previous levels of consumer spending, and to get the high street and the housing market operating again at their previous and hopefully increased levels. Going back to the shops and borrowing to do so is essentially what is meant by ‘green shoots’. The US and UK economies centre on the operation of the consumer market, the credit that drives them and financial trading based on these markets, which pour money into the pockets of the financiers in Wall Street and the City of London. In a world in which citizens have been turned into turbo-consumers, shopping is no longer simply functional or a source of comfort, it has become an addiction that fuels intractable debt at personal and national levels.

Neo-liberal economic philosophy is unconcerned about what is made, transported, bought and sold. It is only the economic transactions that are counted in the calculation of GDP growth. The huge carbon emissions prices incurred through the manufacture, transportation and use of these commodities are not treated as costs; they are ignored.

The last several decades of consumption in the West have produced massive personal indebtedness, which has fuelled a speculative orgy in inadequately regulated financial markets that in turn has resulted in national debt levels beyond anything imaginable a few years ago. Turbo-consumption and the speculative mechanisms that feed off this consumption have effectively mortgaged the future of our children. Add to that the harm done by massive carbon emissions, the environmental cost of this orgy, and we have a human-made disaster.

As a result of globalisation and the growth of China and other high-export developing nations, a significant proportion of soaring carbon emissions is now taking place within developing countries, manufacturing for export to the West. Chinese researchers and climate researchers at Tyndall Centre<sup>10</sup> have calcu-

7 [www.guardian.co.uk/environment/2009/sep/11/stern-economic-growth-emissions](http://www.guardian.co.uk/environment/2009/sep/11/stern-economic-growth-emissions).

8 Especially Indonesia, Malaysia, South Africa, South Korea, Taiwan, Thailand and the Bolivarian nations.

9 IMF and World Bank, along with international agencies like the World Trade Organization, take the lead in promoting the minimally regulated, global system of neo-liberal model of market-based economic growth. This advocates that state involvement in the economy, regulatory and otherwise, should be minimal beyond providing the essential infrastructure for a private-sector-driven economy, which essentially focuses on satisfying consumer spending, with a strong emphasis on exports. Built on the consumer market are elaborate systems of credit, financial speculation and trading in debts, futures and currency exchange. Increasingly the productive segment of this economic system has been rivalled and possibly surpassed by the financial speculative segment. The neo-liberal model advocates that the source of profit and wealth is of secondary importance, because accumulated wealth becomes capital, and through further investment trickles down through all socio-economic layers to reduce poverty. Because orthodox neo-liberal economists who dominate Western administrations, the Bretton Woods institutions, corporations and financial institutions insist that regulation is kept to a minimum, the system has operated for decades with almost no control of its environmental consequences.

10 [www.tyndall.ac.uk/content/carbon-emissions-scenarios-china-2100](http://www.tyndall.ac.uk/content/carbon-emissions-scenarios-china-2100).

lated that in 2004 manufacture for export to the West accounted for 23% of China's total CO<sub>2</sub> emissions. Moreover, 58% of China's exports are produced by multinational companies operating in China.<sup>11</sup> Although high rates of consumption in the West continue to drive manufacture and exports from emerging economies, the solution for growing carbon emissions in these countries cannot be seen as solely their responsibility, especially given the large role played by transnational corporations. Some have advocated that the accounting for these carbon emissions should be added to that of the countries of origin of corporations manufacturing overseas for export back to their own countries.

The global nature of the climate change threat has been reflected in the gradual enlargement of the G8 as the pre-eminent forum for negotiating (or posturing about) carbon emissions. The G8 became the G8+5, when Brazil, China, India, Mexico and South Africa, all major carbon emitters, were invited to the G8 Gleneagles meeting in 2005. This group met in Washington DC in February 2007, and although no progress was made on climate change measures, two issues of principle were finally pinned down:

- that politically there was no longer doubt that the carbon emission crisis is caused by human activity
- the agreements on what to do about them would have to include developing countries.

On 25 September 2009 the G8 was formally replaced by the G20 as the pre-eminent global negotiating group,<sup>12</sup> which represents the bulk of the global carbon emitters. Rather confusingly, the G20 exists alongside the Major Economies Forum on Energy and Climate launched by Obama in June 2009.<sup>13</sup>

The G8 countries, representing 13% of the world population, are responsible for more than 40% of global carbon emissions. However, the reduction in carbon emissions<sup>14</sup> in the industrialised West as a result of the recession is being matched by the continued increase in carbon emissions in the emerging economies. China's increase in CO<sub>2</sub> emissions has been projected at an annual average of 11% a year since 2004.<sup>15</sup> In stark contrast to the West, China's GDP growth rate is forecast at 8.9%, and India's at

7% in 2010.<sup>16</sup> Indonesia's GDP growth rate is projected at 5.4%<sup>17</sup>, and GDP growth for other East Asian countries (Hong Kong, Singapore, South Korea, Taiwan) is forecast to reach at least 5% next year. GDP growth inevitably means higher CO<sub>2</sub> emissions. The world's two largest carbon polluters are the USA and China, which between them account for just over 40% of total world CO<sub>2</sub> emissions. EU countries account for another approximately 14%. Add India and Russia, each a little more than 5%, and Japan at a little below 5%, and this bloc of nations collectively accounts for about 71% of total world CO<sub>2</sub> emissions.

**The G8 countries, representing 13% of the world population, are responsible for more than 40% of global carbon emissions.**

The political impasse on climate change action between the wealthy countries and the emerging economies bloc is well characterised by the way in which each side talks past one another when they refer to national responsibility for carbon emissions. The USA and its allies state that what matters are total global emissions, so China and other emerging economies are as much part of the problem as the West. The emerging economies bloc points out that the solutions cannot be found in that crass characterisation, because their per capita emissions are miniscule compared with the West, and treating them as equal polluters is to regard development as a Western privilege denied to them. Both sides have a point, but the fact that they are not intersecting is a major leadership failure. The basic facts illustrating these two viewpoints are shown in Table 1.

It is clear from this that the emerging economies have very low per capita emission levels (albeit, in some cases, high total emissions), and show almost universal rapid increases in emissions since 1990. The position in the West is more varied, with some countries showing reductions and others increases, or (as in the case of the USA) no reductions from already high levels. The critical factor is that many of the major polluting countries have

11 [www.chinadialogue.net/article/show/single/en/1592](http://www.chinadialogue.net/article/show/single/en/1592).

12 Argentina, Australia, Brazil, Canada, China, European Union, France, Germany, India, Indonesia, Italy, Japan, Mexico, Russia, Saudi Arabia, South Africa, South Korea, Turkey, UK and USA; plus the World Bank and the IMF.

13 Australia, Brazil, Canada, China, European Union, France, Germany, India, Indonesia, Italy, Japan, Mexico, Russia, South Africa, South Korea, UK and USA, with Bangladesh, Costa Rica, Ethiopia, Lesotho, Maldives and Norway in the observer category.

14 [www.greenpeace.org/international/press/releases/g8-needs-to-take-leadership-on](http://www.greenpeace.org/international/press/releases/g8-needs-to-take-leadership-on).

15 International Energy Agency, <http://earthtrends.wri.org/updates/node/110>.

16 Asian Development Bank, [www.google.com/hostednews/ap/article/](http://www.google.com/hostednews/ap/article/)

17 World Bank, <http://seekingalpha.com/article/162593-why-indonesias-economy-and-etf-may-see-higher-growth>. ALeqM5gG2T0FM9ua W6XYdxF0p41cMTPYc.

low per capita emissions and low GDP per capita. These countries understandably regard a demand from the West that all countries cut equally as a condition for Western cuts as being nonsensical and unjust, especially when ten of the largest polluting countries are among the world's 25 wealthiest.<sup>18</sup> The GDP per capita levels for the leading emerging economies are considerably lower and in line with modest per capita CO<sub>2</sub> emission rates.<sup>19</sup> At Copenhagen, the ten developing country members of the G20/Major Economies Forum will confront the West as the leaders for the developing world, which combined represents 83% of the world's population, 2,003 million people, all in desperate need of growth, and without the technological methods or money to grow in a

non-carbon way. Copenhagen cannot succeed without producing a solution that will permit developing countries to reduce poverty and provide decent social and economic prospects for their people. So far, despite efforts by the UK and a few other European countries, there is no agreed Western commitment beyond a vague commitment in principle from the EU, with everyone expecting someone else to pay.

Although technological advance is an essential part of the battle against carbon emissions, the suggestion that improved technology alone can support a continuation of our current levels of consumption in the West, and achieve the elimination of poverty and a decent standard of living for the majority of humankind, does not stand up to rigorous economic analysis.

**Table I Key facts relating to the major carbon emitting countries**

Country	Population	Total CO <sub>2</sub> emissions (tmt*)	CO <sub>2</sub> per capita (tmt*)	% change (pre-recession: 1990–2006)	GDP per capita (\$ppp**)
<b>G8</b>					
Canada	33,765,000	639,403	16.7	+3.1	39,098
France	64,303,000	383,310	6.2	-11.4	34,205
Germany	82,046,000	808,767	9.7	-19.8	35,539
Italy	60,088,880	449,948	8.1	+ 19.7	30,631
Japan	127,590,000	1,257,963	10.1	+ 6.3	34,116
Russia	141,863,000	1,524,993	10.9	-21.6	15,948
UK	61,634,599	587,261	9.4	-6.0	36,358
USA	307,285,000	6,049,435	19	0.0	47,440
<b>Other Western G20/Major Economies Forum</b>					
Australia	21,896,000	326,757	18.1	+4.0	36,918
Netherlands	16,535,207	146,149	10.3	-8.0	40,558
Norway	4,834,000	87,602	8.6	+ 16.2	53,738
Spain	45,929,476	330,497	8	+ 35.6	30,589
Sweden	9,292,359	53,033	5.6	-6.7	37,334
<b>G20/Major Economies Forum + 5 developing countries</b>					
Argentina	40,134,425	141,786	4.4	+25.7	14,408
Brazil	191,786,000	331,795	1.9	+35.7	10,466
China	1,332,710,000	5,012,377	4.6	+119.0	5,970
India	1,168,370,000	1,342,962	1.3	+62.5	2,780
Indonesia	229,965,000	378,250	1.5	+87.5	3,980
Mexico	107,550,697	438,022	4.1	-15.2	14,534
Saudi Arabia	25,721,000	308,393	15.8	+19.7	23,814
South Africa	49,320,000	437,032	8.6	-5.5	10,136
South Korea	48,333,000	465,643	9.9	+76.8	27,692
Turkey	71,517,100	226,125	3.6	+38.5	13,139

\* tmt = thousands of metric tons \*\* ppp = purchasing power parity

18 Norway \$53,451 (3rd), USA \$46,859 (6th), Netherlands \$40,431 (9th), Canada \$39,183 (13th), Australia \$37,299 (15th), Denmark \$37,266 (16th), UK \$36,523 (18th), Finland \$36,217 (20th), Germany \$35,442 (21st), Japan \$34,100 (24th).

19 Mexico straddles these two worlds with GDP per capita income of \$14,560 (54th); thereafter, the list is Malaysia \$14,072 (60th), Brazil \$10,326 (77th), Thailand \$8,225 (86th), China \$5,963 (100th), Indonesia \$3,987 (121st), Philippines \$3,546 (123rd), Vietnam \$2,784 (128th), India \$2,762 (129th), Pakistan \$2,739 (130th). These ten countries have a combined population of 3,530 million and account for 53% of the world's population.

The choice that faces the West is whether consumption will be radically reduced involuntarily (as it has by the recession and financial collapse), through the sheer cost of energy (whether produced by conventional or renewable means), or whether West will make the decision collectively.

### Can technology save us?

It's an important question – much government policy is at least partly based on assumptions on the role of yet to be tested technology and while there can always be hope that these technological breakthroughs will make a significant impact, and it is probably fair to say they have a role to play – their potential is in danger of being overstated.

The debate over the nuclear power alternative continues. Advocates insist that it is the only credible solution to provide non-fossil electricity, that the new generation of nuclear plants is considerably safer, and that nuclear power has the best cost-benefit profile. Opponents question the accuracy of the cost structures declared by the industry, pointing out that the lifecycle carbon costs of plant construction and uranium extraction and refining are generally ignored. In addition, the long-term costs of decommissioning and the disposal and storage of radioactive waste are not properly calculated, or rely on as yet untested and technology whose cost is therefore unclear.

Even scientists like James Hansen, who support continued carbon capture and storage (CCS) research, view the technology as a distant future possibility, and not an option on which present carbon reduction targets should depend.

CCS experts acknowledge the risks in passing, usually with reassurances that they are not significant. Policy-makers never mention them. As with nuclear energy, we are being asked to back an alternative to polluting the atmosphere which depends on polluting the earth.

The other element of the technology debate, which is very attractive to politicians unwilling to suggest changes in life style, is to suggest 'miraculous' solutions that can directly change the nature of the atmosphere or the way it is constituted. These high-cost schemes are very attractive to large technology corporations because they are

likely to promise vast profits whether or not they work. The role that technology will play is as yet unknown – and this is perhaps the most important thing to remember. So although we can hope their contribution will be significant we really can never know.

### The role of carbon trading

Western nations have placed great store in carbon trading as a mechanism for reducing industrially caused carbon emissions. Although the idea began in the USA, it has been pursued most rigorously by the EU, and is currently facing mounting corporate opposition, notably from Exxon, and scepticism in the land of its birth.

Carbon trading, also known as cap and trade, is based on the idea that caps are placed on carbon emissions, and trading in carbon permits is relied upon to reduce emissions below those caps. To create any incentive for the scheme to work, the caps have to be adequate on their own; once in place the system can be tightened and reduction in carbon can be incentivised.<sup>20</sup>

There are notable critiques of the accountability, meaningfulness and workability of the trading aspects of the scheme. And there are serious doubts about whether questionable incentives operating in different ways across a vast number of autonomous commercial entities can ever end up as a coherent and reliable collective system for reducing carbon emissions. The largest industrial polluters in Western countries operate predictably on a 'least-cost, most-profit' basis, deciding whether the profits to be gained through a continuation of pollution below the carbon cap is worth more than the cost of buying permits, changing production methods or investing in improved technology that would reduce emissions. This is perhaps the biggest problem with the scheme, as the moment it begins to hurt manufacturers in the West, for example through the rising costs of permits due to scarcity as manufacturers expand carbon emissions in less developed countries, pressure will be placed on Western politicians by Big Carbon powerful interests to withdraw from such schemes, modify them so that the hard choices are watered down, or postpone or stop the tightening of caps.

<sup>20</sup> Kyoto fixed the caps below 1990 emissions levels, at the same time as the IPCC called for reductions of 60–80% below those of 1990, to stabilise CO<sub>2</sub> by 2030.

The difficulties so far of the EU scheme, caused in part by widespread manipulation of permit values and cases of outright fraud, have not reduced the enthusiasm of those G8 politicians who advocate cap and trade as their major strategy for dealing with commercially generated CO<sub>2</sub> emissions. They are opposed by an increasing lobby of scientists, notably James Hansen of NASA, who advocate simple carbon

accuracy of the amount of emissions that are already taking place and will continue, on the pace at which global warming is happening, and on its likely consequences. None of the news from this accumulating data is good news. By sticking to their modest targets, the EU and many Western governments portray themselves as out of touch and understating the problem, and are unlikely to inspire confidence either in the West or among developing countries.

A significant factor in this problem is the unwillingness of the USA, as the largest per capita polluter, to make a serious contribution to emission reductions. Not only are Obama's 2020 targets for emissions cuts – by a ludicrous 4–7% from 1990 levels<sup>21</sup> – the lowest in the West, developing countries are witnessing open congressional, corporate and public opposition to these targets. They worry that a future Republican administration might not see itself bound by any international pledges that Obama makes.

Sceptics query how genuine the West's commitments are when targets are far in the future, such as the 2050 target of the US administration.

caps, and where needed carbon taxes, to control corporate behaviour. What is clear is that no system is perfect and no system will work on its own. Carbon trading if adopted must be given a sound enough footing to ensure it can be effective and certainly must be accompanied by other measures of reducing pollution.

Debates continue on whether or not the West's commitments to reductions in emission targets will be met given the lack of resources behind them. While the UK's emission targets are radical in their outlook they now need fiscal support to make them a reality. Sceptics query how genuine the West's commitments are when targets are far in the future, such as the 2050 target of the US administration. These targets protect current administrations from having to take immediate tough action, which could spark resistance from voters and weaken their re-election hopes. As a consequence, the level of analysis that accompanies such pledges is seldom cogent and rigorous enough to explain how the targets will be reached. The determination and commitment of the leader making the pledge simply has to be trusted.

The time-scale of the targets is not the only problem. The targets themselves are viewed by developing countries and an increasing body of climate experts as being far too low. Every month, scientific evidence casts doubt on the adequacy of the 2 °C, 450 ppmv, thresholds to prevent irreversible climate damage, on the

21 [www.guardian.co.uk/environment/2009/nov/02/barcelona-us-climate-talks](http://www.guardian.co.uk/environment/2009/nov/02/barcelona-us-climate-talks).

## The UK low carbon transition plan and road to Copenhagen

In the UK our position on Copenhagen is something to be proud of. The Secretary of State for Energy and Climate Change, Ed Miliband, has put forward a comprehensive and impressive position on climate change and the necessary green agenda, which is arguably one of the most ambitious in Europe:

- The UK is one of the few Western nations to commit to intermediate date targets (between now and 2020). The path has been set for Britain's greenhouse gas emissions to fall by 22% by 2012, by 34% by 2020 (18% on 2008 levels) and by at least 80% by 2050, compared with the levels in 1990.
- There is a commitment to local community participation, 'clean energy cash-back' schemes so that people, businesses and communities will be paid if they use low carbon sources to generate heat or electricity.
- The government will reward financially small-scale low carbon electricity generation, with feed-in tariffs from April 2010.
- The government has supported a number of community action initiatives to help people live more sustainably.
- An effective way of reducing energy demand is by introducing minimum energy efficiency standards for new products on sale. EU countries agree the rules on minimum energy efficiency standards for products such as white goods and televisions.
- The government is pushing to extend the ambition set out in the 2007 Energy White Paper, aiming to doubling the emissions savings expected by the measures agreed so far, by 2020.
- Over three-quarters of the energy used in homes is for heating rooms and water, most of which comes from gas-fired boilers. This accounts for 13% of the UK's greenhouse gas emissions, but by 2050 emissions from homes need to be almost zero. The Transition Plan,

along with wider policies, will cut emissions from homes by 29% on 2008 levels.

Notwithstanding these positive aspects, there are a number of serious questions about the government's stated policy.

### The size of emission reduction targets

Although the UK has set more impressive targets than the EU requires, they appear inadequate given the accumulating evidence that the 2 °C/450 ppmv thresholds are too high, that past and current emissions have been seriously understated, that global warming is happening much faster and at a greater scale than was believed just two years ago, and that the consequences will be even worse than forecast. The intermediate target date of 2012 adds credibility to the proposals, but the aim to reduce emissions by 22% seems modest. Given the government's reliance on the nuclear and CCS coal options, and what many see as an inadequate commitment to renewables, there may be no simple way of accelerating the targets and pace, without rethinking the strategy. As Britain wishes to be seen as the world leader in the global climate change campaign, it is essential that the government acknowledges the new conclusions about the size and speed of the emission cuts required, as has been done recently by Lord Stern,<sup>22</sup> whose report formed the basis of the government strategy. It is to be hoped that Copenhagen will prompt a rethink of the strategy and targets.

### The credibility of the strategy

Like most other Western carbon reduction pledges, the UK's is stronger on claims and commitments than it is on strategy. It is not at all clear how the emission reductions pledged will be achieved. The UK Low Carbon Transition Plan, the government's chief document addressing its climate change programme, fails to provide a cogent economic analysis and appraisal of how this will happen, or a credible strategy for how it will be implemented and monitored. It is disingenuous of the government to promote the view that the claimed 21% reductions achieved since 1990 are the result

<sup>22</sup> [www.publications.parliament.uk/pa/cm/cm200809/cmselect/cmintdev/177/17709.htm](http://www.publications.parliament.uk/pa/cm/cm200809/cmselect/cmintdev/177/17709.htm).

of government policy, rather than the drop in economic activity due to the financial collapse and recession, together with carbon reductions 'bought' in the developing world, which may or may not be real or have happened anyway.

The problem of cutting CO<sub>2</sub> by more than the target 34% carbon emissions by 2020 is underlined by the weak investment in renewable energy stated in The UK Low Carbon Transition Plan. The major point of contention in the government strategy is the relatively low investment in renewable energy sources, compared with its reliance on nuclear power and clean coal based on carbon sequestration, and its open admission that 'during the transition' there will be an intensification of the use of Britain's oil and gas resources. Because of their lead time, neither nuclear nor clean coal alternatives have much relevance to the 2020 target time frame. Even leaving aside the major problems of disposal of radioactive waste, the high cost of development and decommissioning, and the risk factor, additional nuclear power would probably begin operation no sooner than the 2020s, despite the confidence of the government; developers like E.ON have told the government that new nuclear energy production will not be online until at least 2020.

It is unlikely that the contention over nuclear power and CCS will be easily resolved politically, because there are few fundamental differences between the Tories and Labour. The major issue is the extent to which a reliance on these two options has and will continue to restrict the government's investment in renewable energy, with a target of obtaining only 30% of electricity from renewable sources by 2020. As it is unlikely that there will be new nuclear energy or commercial scale CCS before 2020, we will continue to rely on fossil fuels for the next 11 years. Although the goal of reducing global warming is stated as a national and global priority, the means of accomplishing this goal, in the UK as in the USA, relies heavily on commercially attractive strategies.

## The UK's alternative energy potential

The core of the debates surrounding climate change technology centres on two main issues:

- Are strictly renewable and safe methods of generating energy sufficient, or is it unavoi-

able that heavy reliance is placed on risky or unproven solutions?

- Are there technological miracles within our reach which will remove the dangers and pressures on us to modify our behaviour, and allow us to return to 'living as normal'?

The conventional wisdom in Westminster is that renewable energy sources, while highly important, will not be sufficient, and we will continue to depend on a more controlled use of fossil fuels and a few other problematic options: nuclear power, clean coal and potentially unsustainable renewable sources like bio-fuels.

### Box 2 Britain's energy use

#### Where energy is used:

• Transport	36%
• Households	30%
• Industry	21%
• Agriculture and services	13%

#### Sources of electricity:

• Gas	38%
• Coal	35%
• Nuclear	22%
• Renewables	3%
• Oil	1%
• Hydro	1%
• Imports	1%

Source: [www.neweconomics.org](http://www.neweconomics.org) [www.berr.gov.uk/files/file29698.pdf](http://www.berr.gov.uk/files/file29698.pdf).

By European standards, Britain has abundant renewable energy sources. NEF has calculated that Britain has 40% of Europe's wind resources, enough to provide 800% of the country's electricity.<sup>23</sup> Wind Power in the UK, published by the government's Sustainable Development Commission, states that 'technological advances mean there are no limits to the amount of wind capacity that can be added to an electricity system... Wind power may even become one of the cheapest forms of electricity generation over the next 15 years.'<sup>24</sup>

Wave power alone has the potential of contributing 15% and tide power 6.5%. Small-scale hydro has been seriously neglected, and is one of the cheapest and most reliable sources of energy, capable of generating 200 MW per year.<sup>25</sup> Solar

23 [www.neweconomics.org/gen/12345news\\_mirageandoasis.aspx](http://www.neweconomics.org/gen/12345news_mirageandoasis.aspx).

24 [www.sd-commission.org.uk/file\\_download.php?target=/publications/downloads/Wind\\_Energy-NovRev2005.pdf](http://www.sd-commission.org.uk/file_download.php?target=/publications/downloads/Wind_Energy-NovRev2005.pdf).

25 [www.nef.org.uk/renewableenergy/hydro.htm](http://www.nef.org.uk/renewableenergy/hydro.htm).

PV could contribute between 5% and 10%. The objection to solar used to be cost, but costs have dropped by up to one-third since 1980. The government has largely withdrawn from this sub-sector. As a result, the UK target was to install only 6,000 roof-mounted PV cells, compared with targets of installing 140,000 in Germany and 400,000 in Japan.<sup>26</sup>

Geothermal sources are also under-used; they could meet 2% of Britain's electricity needs from south-west England alone, and their potential is virtually limitless. The UK has some of the largest biomass applications in Europe<sup>27</sup> (the Tees Renewable Energy Plant based on biomass will be the largest in the world<sup>28</sup>) and has been assessed as capable of providing 4,000 MW by 2020. Landfill gas is capable of providing 1,000 MW by 2010. Decentralised renewables' microgeneration, in addition to using renewable sources, has great value in harnessing community participation and building self-reliance and respect for energy use. If progress can be accelerated in providing simple and low cost connectivity to the grid, the Network for Alternative Technology and Technology Assessment calculates that micro-generation 'could supply as much power as the UK nuclear programme'.<sup>29</sup> Because renewables are intermittent, the optimum solution lies in the combination of all available renewable sources, which, if combined with domestic combined heat and power (dCHP),<sup>30</sup> could according to the Oxford Environmental Change Institute meet all of Britain's electricity needs without dependence on nuclear power.<sup>31</sup>

A study released in late September by Poyry, Europe's leading independent energy consultants, reached the conclusion that the intermittent nature of wind energy is an overstated problem, and that there is no technical obstacle to the significant use of wind-based energy. Another Poyry study showed that if the UK was to meet its existing renewables and existing efficiency targets there would be no requirement for any new nuclear or coal capacity before 2020.<sup>32</sup>

## The issue of public investment

If renewable energy technology is not sufficiently commercially viable to allow a reliance on the private sector, it is clearly essential that the UK

government supports funding renewables as part of a green new deal.

Although the government's commitment to renewable energy has been made clear in principle, the investment is not ambitious enough. Reliance on measures like the Renewable Option (RO)<sup>33</sup> may have tripled renewable energy sourcing of electricity, but this was from a very low base of only 1.8%, and at this rate, by 2026 only 21.2% of electricity would be based on renewable sources. The government announced that 'the wind farms under construction today and those awaiting construction will together produce enough electricity for another 5.5 million UK homes'.<sup>34</sup> That is still only one-fifth of the total number of homes in the UK.<sup>35</sup> We need to think bigger.

### Box 3 Some government investment in renewables

- £60 million on wave and tidal sources
- £120 million for offshore wind
- £10 million for accelerated development of electric cars
- £11 million for improved planning of renewable energy projects
- £6 million to launch development of the Smart Grid
- £6 million to fund deep geothermal energy exploration.

The government has stated that its overall energy transition plan will cost between £25 billion and £29 billion. Yet the latest investments in renewable schemes announced by Ed Miliband in July 2009, although rightly welcomed, seem insufficient (just £405 million) within this cost framework. What's more, this is around half of the sum received by failed RBS bankers in bonus payments.

Ed Miliband reported that his department spent £4,085 million in the latest fiscal year. The commitment outlined above of spending £405 million on renewable schemes, which are probably multi-year, would represent about 10% of his expenditure, and 0.8% of the total UK resource budget. It would be difficult on that basis alone to conclude that development of renewable energy sources is a top government priority. This is thrown into further relief when

26 [www.neweconomics.org/gen/12345news\\_mirageandodis.aspx](http://www.neweconomics.org/gen/12345news_mirageandodis.aspx).

27 [www.nef.org.uk/renewableenergy/biomass.htm](http://www.nef.org.uk/renewableenergy/biomass.htm).

28 [www.renewableenergyworld.com/rea/news/article/2009/07/uk-announces-long-term-carbon-reduction-and-renewables-strategies](http://www.renewableenergyworld.com/rea/news/article/2009/07/uk-announces-long-term-carbon-reduction-and-renewables-strategies).

29 Renew, 155, May/June 2005, Network for Alternative Technology and Technology Assessment.

30 The use of boilers with fuel cells that provide both heat and power domestically, generating high value electricity from a low cost fuel.

31 Bergman, N., Hawkes, Brett, Baker, Barton, Blanchard, Brandon, Infield, Jardine, C., Kelly, Leach, Matian, Peacock, Staffell, Sudtharalingam, Woodman, UK Microgeneration. Oxford Environmental Change Institute, 2009.

32 [www.renewableenergyworld.com/rea/news/article/2009/07/uks-cbi-calls-for-energy-policy-shift-away-from-wind#](http://www.renewableenergyworld.com/rea/news/article/2009/07/uks-cbi-calls-for-energy-policy-shift-away-from-wind#).

33 RO obligates electricity suppliers to obtain a proportion of their electricity from renewable sources.

34 Department of Energy and Climate Change, The UK Low Carbon Transition Plan, 20 July 2009.

35 <http://news.bbc.co.uk/1/shared/spl/hl/guides/456900/456991/html/>.

you look at the fact that it is estimated that nearly half of the Department for Energy and Climate Change's budget each year is needed for dealing with nuclear waste.

**Table 2 Britain's public expenditure allocations 2008**

Department	£ million	%
Work and Pensions	132,732	25.6
Health	104,464	20.1
Education and Skills	68,060	13.1
Defence	38,986	7.5
Tax, Excise and Treasury	30,802	5.9
Communities & Local Gvt	28,186	5.4
Scottish Government	26,469	5.1
Northern Ireland Executive	14,667	2.8
Home Office	13,877	2.7
Welsh Assembly Government	12,785	2.5
Transport	10,150	2.0
Cabinet Office	10,090	1.9
Trade and Industry	6,015	1.2
Culture, Media and Sport	5,042	1.0
International Development	4,772	0.9
Ministry of Justice	4,086	0.8
Environment	3,099	0.6
Foreign & Commonwealth Office	1,859	0.4
Northern Ireland Office	1,370	0.2
Law Officers' Departments	718	0.1
Dept Expenditure Limit Reserve	600	0.1
Unallocated Special Reserve	400	0.1
Total resource budget	519,229	100.0

Source: HM Treasury, <http://webarchive.nationalarchives.gov.uk>.

## The role of the market

The UK government has over-rated the role of the market and the private sector in the battle to stop global warming. There is little evidence that market-driven incentives and an accumulation of hundreds of thousands of decisions made by individual companies can possibly result in the achievement of meeting carbon reduction targets. In principle, this approach is like a lottery. There may be theories and schemes about how it will work and what it takes to win, but it remains an unmanageable situation and the approach thoroughly unstrategic. In the battle against global warming, we should not be held ransom to the

possibility of 'unforeseen market failure'. The private sector will undoubtedly contribute in terms of research into and building of alternative renewable technologies, helping to market and distribute products relevant to fighting climate change, and co-investing in developing country schemes to build self-reliance in low carbon energy. But all of these important roles will have to take place within a defined and carefully managed public-sector framework operating at national and international levels, with substantial public funding. Ed Miliband needs to go further than simply moving towards a less-market focused, more strategic approach to dealing with Britain's climate and energy woes.

## Failure to account for carbon costs

GDP growth has been calculated for decades without any acknowledgement of the carbon emissions costs of that growth. It is not surprising, therefore, that the government continues to be somewhat cavalier in comparing the price of renewable technologies with modified fossil fuel and nuclear alternatives without factoring in the full carbon lifecycle cost of the alternatives (the mining and transportation of the coal, the extraction and processing of uranium, the carbon costs of transport and storage of waste and sequestration). There has been far too much reliance on commercial proposals that are bound to undercount the carbon costs. Treating the choices involved in this challenge as commercial, within the private sector, does not do justice to the gravity of the choices, and could very well result in the wrong decisions in the long term based on short term cost imperative.

## Reliance on carbon trading markets

The UK government is one of the most enthusiastic promoters of carbon trading as the main instrument for reducing carbon emissions caused by the private sector. At the heart of the plan is the EU Emissions Trading System, the single most important policy to reduce UK emissions, which is expected to deliver emissions reductions from the power sector and heavy industry of 22% on 2008 levels by 2020.<sup>36</sup>

<sup>36</sup> Department of Energy and Climate Change, The UK Low Carbon Transition Plan, 20 July 2009.

As this is an EU scheme, the mechanism provides little scope for the government to reduce carbon caps faster than the scheme will do. It is essential that the British government remains vigilant and critical, and does not allow its programme to be held hostage to a deficient scheme. The main deficiency remains the inherent incentive structure that relies on a modest cap. Another problem from the government's perspective is that the scheme was originally envisaged as one that would grow to incorporate at least all major Western high polluting nations, and ideally extend to the larger emerging economies from the developing world. However, the EU scheme remains the world's only long-term carbon trading system, and other potential country members are showing increasing reluctance to join.

The UK's stated policy position towards the Copenhagen summit is one of the most enlightened in the G8 bloc. The government has:

- stated that the contributions of all nations is an investment in saving the planet from catastrophe
- recognised that conventional measurements of economic progress have become inadequate
- recognised that the capacity of developing countries to adjust to a low carbon world will require a significant financial contribution from the West
- stated that the West has to transfer resources to developing countries for climate change programmes in addition to already pledged development assistance<sup>37</sup>
- established a target figure for transfers from the West for low carbon adaptation
- recognised the right for developing countries to be fully represented in global climate change governance.

There are a number of other important issues that the government will have to face before and during Copenhagen itself:

- The 100 billion euros of combined public and private money a year by 2020 is too little – as Ban Ki Moon and Nick Stern have argued. All the EU has agreed is the principle of the

transfer with no internal EU agreement on the source of funds, the mechanism for such a transfer, or individual contributions. The USA has not even approved the principle.

- There is not the strong, widespread conviction that, as the EU and Britain hopes, the EU carbon trading system can provide a principle source of funds for such a transfer without the risk of 'double counting' emission reductions.

<sup>37</sup> In fact, the Prime Minister announced that up to 10% of regular development assistance can be spent on climate-related programmes, because 'all official development assistance will now have to be climate-proofed', *ibid*.

## The debate outside the West

High exporting developing countries are making a strong case that current market prices for their raw materials and commodities purchased by the West do not reflect the environmental costs of their production. This happens when, as is usually the case, the producers are private, unregulated and unconcerned about real costs (often social as well as environmental). In addition, despite growing awareness now, most developing country governments have been either oblivious to or unconcerned about these costs.<sup>38</sup>

In the run up to Copenhagen, the developing country bloc under the leadership of Brazil, China, India, Mexico and South Africa (with Indonesia, South Africa and the Bolivar nations as strong supporters) have seized the initiative, and have emerged as a formidable force. There are four important principles and ideas that unify their position:

- Western governments should accept the principle of the historic responsibility and burden for carbon emissions, because rapid and inadequately regulated economic growth has been responsible for the current disastrous levels of atmospheric pollution, and because of their failure to act when the science became clear 20 years ago; most developing countries would agree with the principle that the West has a major responsibility to find and finance the solution; some (such as India and Bolivia) have stated this position in particularly tough terms, calling for a penalty or carbon tax to be levied on the West.
- Major developing countries will not be willing to make verifiable commitments to emissions cuts and the kind of monitoring the West requires, while the West is unwilling to make its own dramatic cuts and be subject to the same monitoring; by and large, the emission reduction targets offered by OECD countries are seen as grossly inadequate.
- The West has to commit not only to major cuts but also to transfers of wealth adequate to enable developing countries to establish and

use renewable, non-carbon energy sources in their pursuit of poverty reduction and accomplishing a standard of living taken for granted in the West.

- The G8 does not have a monopoly over dictating what measures are needed to reduce carbon emissions, and in that spirit a number of emerging economies have tabled their own innovative proposals and commitments.

The leading developing countries are demanding that the West commits to emission cuts that are in line with the latest scientific projections, which require reductions of 40% or more by 2020. The major Western countries are offering between 12% and 19%. Within the G8 and the EU, there are few countries that appear willing to act on the developing country bloc demands. Japan has emerged alongside Britain with the most ambitious carbon emissions reduction target of any developed country with the exception of Norway, offering a cut of 25% by 2020 on 1990 levels.<sup>39</sup> Meanwhile, the USA and the EU continue to resist the call for deeper cuts, as well as the scale of transfer of resources to developing countries, and remain insistent that developing countries set tough carbon reduction targets. Despite the differences, for example between India and China, there is enough consensus in the 'plus five bloc' to remain firm on their principal demands, and at the time of writing, there is an impasse.

Meanwhile, many developing countries have been upstaging the G8 and EU by announcing ambitious climate-change programmes that place them in the vanguard of commitment to tackling global warming. Indonesia has announced it will cut its emissions by up to 41% by 2020 below business as usual;<sup>40</sup> India has produced an ambitious plan to generate 20 GW of solar power by 2020;<sup>41</sup> Mexico has proposed a global fund to finance transition to carbon-free economies,<sup>42</sup> and received praise from the Inter-American Development Bank for its ambitious climate change programme with a reduction of carbon emissions of 18% by 2012;<sup>43</sup> Brazil has offered a target of a cut of almost 40% below its business as usual trajectory;<sup>44</sup> and China is now ranked fourth in the world in terms of energy derived from windpower, and is progressing towards meeting its goal of producing 15% of its energy from renewables by 2020.

38 For example the destruction of mangroves in countries (such as Bangladesh, Honduras and Brazil), farming and exporting shrimp, environmental destruction caused by gold and copper mining in Peru, and bauxite mining in Orissa; see [www.eoearth.org/article/Herman\\_Daly\\_Festschrift\\_Socially\\_Sustainable\\_Economic\\_Degrowth](http://www.eoearth.org/article/Herman_Daly_Festschrift_Socially_Sustainable_Economic_Degrowth).

39 <http://en.cop15.dk/news/view+news?year=2009&month=8&newsid=2124>

40 [www.brisbanetimes.com.au/blogs/greenlines/no-money-no-action/20091001-ge5q.html](http://www.brisbanetimes.com.au/blogs/greenlines/no-money-no-action/20091001-ge5q.html).

41 [www.greenchipstocks.com/articles/india-solar-power/456](http://www.greenchipstocks.com/articles/india-solar-power/456).

42 [www.isria.com/pages/30\\_September\\_2009\\_63.php#](http://www.isria.com/pages/30_September_2009_63.php#).

43 <http://zikkir.com/health/2688?wscr=1440x900>.

44 <http://en.cop15.dk/news/view+news?year=2009&month=8&newsid=2124#>.

## The alternative vision of a low carbon emissions world

The predominant model proposed by Western leaders relies on some combination of factors. Most proposals combine:

- use of technology to reduce the carbon emissions of high-usage fossil fuels (by treating coal and oil to sequester or reduce carbon, or modifying the operation of machinery and internal combustion engines to reduce emissions or increase efficiency)
- use of commercially attractive alternatives such as nuclear and ethanol
- energy-usage efficiencies in buildings
- market mechanisms such as carbon trading to 'send price signals' about carbon costs and create incentives to reduce or compensate for carbon emissions
- research into atmospheric alteration technologies
- relatively small investments in proven and promising renewable energy resources
- long-term targets for reducing emissions based less on current methods and more on hoped-for breakthroughs
- exhortation on developing countries, especially the emerging economies, to cut or avoid technologies on which the West is reliant and will continue to use in some form, to preserve resources essential to halting global warming (especially forests and water sources), and reduce population growth.

The EU and other G8 members have given only the most generalised support to Britain's call for financial transfers from the West to assist this transition; at the time of writing, no money is on the table.

Almost any serious approach to climate change would contain some of these components, especially research on carbon alternatives, and efficiency measures. However, the alternative approach insists on a full integration of climate and natural resource management into

socio-economic management of change. The work of ecological economists like Herman Daly has created a powerful international movement, strongly represented in the UK by Tim Jackson's Sustainable Development Commission<sup>45</sup> and Prosperity Without Growth, and elsewhere by a number of organisations.

Although there are differences in emphasis among these increasingly influential agencies and their alternative vision, they appear to share a rigorous dedication to empirical data on climate change.

### Box 4 Examples of indicators for sustainable human development<sup>46</sup>

Green accounting incorporates the source and sink functions of environmental assets into national and corporate accounts.

Integrated environmental and economic accounting (UN, 2003) incorporates:

- data on industrial inputs of energy and materials and generation of waste and pollution
- data on industry, government and household costs to protect the environment and natural resources
- data on baseline natural resource stocks (land, fish, forest, water and minerals) and changes
- adjustments of macroeconomic aggregates for depletion and degradation costs.

Pressure-State-Response Framework (PSRF)  
OECD: a system of environmental indicators

Environmental Sustainability Index (ESI), the Sustainable Development Index (SDI) and the Wellbeing Index (WI), which supplement the UN's Millennium Development Goals, and Human Development Index

Ecological Footprint (EF) measures whether a country, region, city or other entity is operating within criteria of ecological sustainability.

These alternative visions have demonstrated that the only way in which the world can make the transition to a renewable, non-carbon global economic system, and allow the poorer countries

<sup>45</sup> [www.sd-commission.org.uk](http://www.sd-commission.org.uk).

<sup>46</sup> Sources and more information: [www.eoearth.org/article/Green\\_accounting](http://www.eoearth.org/article/Green_accounting), [www.eoearth.org/article/Indicators\\_of\\_sustainable\\_development](http://www.eoearth.org/article/Indicators_of_sustainable_development), <http://unstats.un.org/unsd/envaccounting/seea.asp>.

to achieve an acceptable standard of living, is for economic and energy consumption in the West to drop, even out equitably, and stabilise. This will permit the transfer of resources from the West to developing countries, to help them establish the non-carbon renewable energy resources that will allow them to improve standards of social justice, incomes and essential services, while protecting the world from the dangers of further disastrous global warming.

The goal of many of these indicators is to present a different view from the belief that human happiness and welfare can be measured simply in terms of disposable income and the wealth of countries by their GDP.

In recent years, the comprehensive and integrated approach to global sustainability has gone beyond calculations and concepts, and has evolved into sophisticated systems. The tools that have been developed challenge the assumption underlying neo-liberal economics, that resources can be treated as if they are unlimited, and that only if they have to be purchased is their market cost at the point of use of concern. Instead, specialists like Professor Peter Bartelmus of Bergische Universität Wuppertal, working with the UN Environmental Programme (UNEP), is tackling the task of bringing together the mass of separate indicators that have emerged over the last decade to replace reliance on classic GDP growth, and together constitute 'indicators for and of sustainable development' – the economic, environmental, social and institutional dimensions essential for sustainable human development, quality of life, and socioeconomic welfare. The goal of many of these indicators is to present a different view from the belief that human happiness and welfare can be measured simply in terms of disposable income, and the wealth of countries by their GDP.

Establishment economists have fought back, claiming that climate change does not require any fundamental restructuring of Western societies or any departure from models of perpetual growth.

Although the ecological economics movement has yet to penetrate the policy thinking of G8

leaders, it has found strong support among developing country's environmental movements, and has even had some marginal influence on conservatives like Lord Stern, who has conceded that economic growth cannot continue forever. The principles of this movement can be summarised as follows:

1. The population and needs of the earth have reached the point at which environmental resources present a clear limit to economic activity, and require us to make choices individually, as communities and as nations. Growth will not be unlimited, and so it is necessary to decide what is essential and what is optional. As the world's global economic system is driven by consumer markets, consumption itself will have to be managed, cut back where it is out of control, and made not just more relevant to genuine sources of happiness, but also affordable. Credit-driven consumption has been the foundation for the worst economic collapse since the Great Depression, and despite the hopes of G8 political leaders that that economy can be restored, that is simply ignoring the most obvious lessons of the current financial collapse and recession, and out of kilter with soaring carbon emissions caused mainly by the drive for unmanaged consumer and profit-driven economic growth.
2. A recognition that our environmental resources represent a limit to economic activity, and that gratuitous and irresponsible use of fossil fuel energy has created a global climate warming crisis, must result in the conclusion that the world's wealthiest societies cannot engage in unlimited continuous economic growth, but instead have to focus on how best to safeguard the scarce resources available, improve the distribution of assets and wealth, and make sustainability rather than the speculative activities of the financial sector the key priorities for government. Because it is unlikely that any G8 politicians will have the courage to tell their populations the truth about the adjustments needed, it is most probable that the sheer increasing cost of using both polluting energy sources and renewable energy sources

will reduce consumption involuntarily, and force consumers to make more educated choices. There will, of course, be organisations and public action groups which have already anticipated the choices that have to be made. Hopefully some part of society in developed countries will come to its senses before being forced to do so. Their positive impact will be greater where critical thinking is valued more than conformity and respect for authority. Elsewhere, they will be regarded as catastrophists.

3. There is no way in which the progress of developing countries and especially the emerging economies can be halted. The West has no choice but to make space for their progress, support their drive to defeat poverty and achieve a decent standard of living. Making space means two things: cutting back on the carbon-emissions-intensive consumption and growth, and transferring wealth to enable developing countries to develop and use renewable energy resources. If the West refuses to make these transfers, there will be no end to global warming, because much of the developing world will simply continue to rely on fossil fuels and the destruction of forests.
4. While technological progress will make an important contribution, it will not fundamentally change the choices that have to be made today. Technology will not make endless and unlimited economic growth possible. Ultimately, the G8 politicians are positing a false choice: the use of technology to make continued economic growth possible. The realistic goal is a reshaping of the national and individual lifestyles in the West that are possible within the limits that future renewable energy sources define.

lives but it is collective action that will make a real difference. Personal decisions matter but they can feel isolating and ineffectual. Communities need to take power and act and be empowered to do more. Local government is a key stepping stone to a good green society, but local authorities need the resources to act – to invest in renewable and local priorities around a green new deal. Saving the environment is the perfect reason to allow greater autonomy in revenue raising. For verifiably approved green schemes local authorities should be able to issue bonds to raise new finance on investment markets. It works for local spending in towns and cities across the globe – so why not now in Britain to build the good green society? It would help build and sustain the Transition Town movement, one of the most exciting grass roots developments of recent decades.

## Going local

Big global climate change deals will only happen and work if they are reflected in changes of values and action on the ground. It is not just Copenhagen that matters but Coventry and Carlisle. People can recycle and downsize their

## The essential issues for Copenhagen

Even though it is wise to approach Copenhagen with diminished expectations, there are key issues that must be addressed. If solutions cannot be found at the conference itself, a decision must be made on how to reach those solutions.

### The size and timing of carbon emission cut targets

Growing scientific evidence has cast serious doubt on the 2 °C/450 ppmv targets, which has been used in the West to underpin policy, and the intermediate emission cuts set by the EU and referenced by others, at 20% from 1990 levels by 2020, or 30% with a global agreement. These targets are being challenged as inadequate, and Copenhagen has to agree to a review and more systematic mechanism to incorporate scientific findings and translate them effectively into policy goals. Climate change cannot be effectively tackled with the prevailing gap between the science and the policy.

### The mechanism and timing for agreements on carbon reduction commitments

We know Kyoto is now inadequate, there is no replacement treaty, and pledges on carbon emissions are being made as individual grand-standing exercises, with no verifiable plans and dubious strategies. Copenhagen has to agree on a set of standards and protocols which will ensure that commitments to carbon reductions are made fairly and are accompanied by credible and monitorable strategies.

### Agreement on the ground rules for carbon reduction programmes in developing countries

The current impasse is largely the result of differences of perception and attitude between

developing countries and the West on how the West will tackle its own carbon reductions, and how developing countries should participate in a global programme to cut carbon emissions.<sup>47</sup> There is at least agreement in principle within the EU that financial transfers to developing countries will be needed. That needs the commitment too of the USA, Canada, Australia, New Zealand, Japan and Saudi Arabia. The West has to concede that the global carbon solution and targets allow the emerging economies the same privileges of growth as the West, and the poor countries the opportunity to defeat poverty and reach the millennium goal targets. These groundrules will have to deal with the carbon-free energy requirements for developing countries, and take account of the future programme of official development aid and debt forgiveness, and an agreement on global trade in which the West removes its subsidies, commits to halting the dumping of cheap agricultural products, and dismantles import protections.

### Agreement on mechanisms and accountability

The recognition of the G20/Major Economies Forum structure already recognises the growing power of the emerging economies bloc. It is essential that Copenhagen takes the next step and commits to full partnership in place of the current situation of there being two powerful opposing forces. The battle against climate change needs to be fully democratised, which means that developing countries should have the right to expect that they will no longer be receiving orders from the West. This spirit must be reflected in a management mechanism to guide the aftermath of Copenhagen, a permanent institution that is not dominated by the great powers, has the authority to gather commitments and monitor accountability, and will openly share scientific data and access to expertise and technology. As part of this agreement, it is essential that participants agree to modifications in laws governing patents and intellectual property rights, so that a free exchange can occur among all participants. That may require countries that lead in the technological field to purchase patents and place the technology in the public domain. There will

<sup>47</sup> Naomi Klein has characterised the posture by the EU and the West, 'Flash forward to the high-stakes climate negotiations that just wrapped up in Bangkok. The talks were supposed to lead to a deal in Copenhagen this December that significantly strengthens the Kyoto Protocol. Instead, the United States, the EU and the rest of the developed countries formed a unified bloc calling for Kyoto to be scrapped and replaced. Where Kyoto set clear and binding targets for emission reductions, the US plan would have each country decide how much to cut, then submit its plans to international monitoring (with nothing but wishful thinking to ensure that this all keeps the planet's temperature below catastrophic levels). And where Kyoto put the burden of responsibility squarely on the rich countries that created the climate crisis, the new plan treats all countries the same.' See [www.zmag.org/znet/viewArticle/22904](http://www.zmag.org/znet/viewArticle/22904).

never be an agreement with developing countries if the battle to reduce carbon emissions is seen as yet another case of commercial exploitation. The world has already experienced the battle over HIV/AIDS medications and cannot afford to travel down that sorry path again.

Finally, there will be the 'elephant in the room'. The USA is the largest overall and per capita polluter, and is unlikely to commit enough at Copenhagen. This is a significant obstacle to progress. The only immediate mechanism for coping with this is for the other participants at Copenhagen to press forward and reach the best decisions possible.

## Beyond Copenhagen

The current impasse in the pre-Copenhagen negotiations seems to point to a largely cosmetic outcome: commitments to general principles and further talks. It is unlikely that any binding decisions will be reached and if anything it will demonstrate that, despite all the promises, Western governments will continue to seek easy solutions that involve limited public funding.

In the UK the fact that Britain has taken a position that if modelled by the EU and the USA could have led to real progress at Copenhagen must be seen as a good step in the right direction but equally such progress must be followed up with the necessary investment and support. If global warming is to be brought under control it is essential that not only the government but also we as a society recognise the need to change. The Labour government's policy does grant some funding – although more is always needed – for community activism; this must be supported and taken further in manifesto commitments and in the run-up to the next election. What's more, local government must also be empowered to enact real change at a local level through allowing it to borrow money on the bond market. Perhaps the most critical task ahead is to educate the public on the nature and scale of the climate problem, and promote the alternative vision for a world willing and able to live within available clean energy resources, and redistribute resources both domestically and with the developing world.

In Britain there is a growing awareness and concern over global warming and a sense of urgency about the need for action, yet there is still significant confusion about the vital details. As a society we must now recognise that there is no greater priority – there is certainly no bigger challenge. There is a huge opportunity for change – but only if we seize it.

## Bibliography

This bibliography is not an attempt to produce a comprehensive listing on climate change and ecological economics. Many other readings were consulted. These are contained in the bibliographies of web-based organisations at the end of this list.

Ackerman, Frank et al., Can climate change save lives? A comment on 'Economy-wide estimates of the implications of climate change: human health', GDAE, September 2006, [www.ase.tufts.edu/gdae/Pubs/wp/06-05ClimateHealth.pdf](http://www.ase.tufts.edu/gdae/Pubs/wp/06-05ClimateHealth.pdf).

Alier, Joan Martinez, Herman Daly Festschrift: Socially Sustainable Economic Degrowth, 2009, [www.eoearth.org/article/Herman\\_Daly\\_Festschrift~\\_Socially\\_Sustainable\\_Economic\\_Degrowth](http://www.eoearth.org/article/Herman_Daly_Festschrift~_Socially_Sustainable_Economic_Degrowth).

Attarian, John, The Steady-State Economy: What It Is, Why We Need It, Negative Population Growth, 2004, [www.npg.org/forum\\_series/steadystate.html](http://www.npg.org/forum_series/steadystate.html).

Beddoe, R. et al., Climate Change and the Collapse of the Akkadian Empire, 2000, <http://geology.geoscienceworld.org/cgi/content/abstract/28/4/379>.

Bergman, N., Hawkes, Brett, Baker, Barton, Blanchard, Brandon, Infield, Jardine, C., Kelly, Leach, Matian, Peacock, Staffell, Sudtharalingam, Woodman, UK Microgeneration, Oxford Environmental Change Institute, 2009.

Carraro, Carlo et al., An Analysis of Adaptation as a Response to Climate Change, Copenhagen Consensus Center, 21 August 2009, <http://fixthecimate.com/component-1/the-solutions-new-research/adaptation/#c517>.

Chomsky, Noam, Coups, UNASUR, and the US, 2009, [www.zmag.org/zmag/viewArticle/22733](http://www.zmag.org/zmag/viewArticle/22733).

Climate Change Science Compendium, UN Environment Programme. The compendium is a review of some 400 major scientific contributions to our understanding of Earth Systems and climate that have been released through peer-reviewed literature or from research institutions over the last three years, since the close of research for consideration by the IPCC Fourth Assessment Report, 2009, [www.unep.org/compendium2009/](http://www.unep.org/compendium2009/).

Czech, Brian, Ecological Economics, Center for the Advancement of the Steady State Economy, Virginia, 2009, [www.steadystate.org/Files/Czech\\_Ecological\\_Economics.pdf](http://www.steadystate.org/Files/Czech_Ecological_Economics.pdf).

Czech, Brian, Prospects for reconciling the conflict between economic growth and biodiversity conservation with technological progress, *Conservation Biology*, 22, 2008, [www.steadystate.org/Files/Czech\\_Technological\\_Progress.pdf](http://www.steadystate.org/Files/Czech_Technological_Progress.pdf).

Daly, H. E. and Farley, J., *Ecological Economics: Principles and Applications*, Island Press, Washington, DC, 2003.

Daly, Herman, Economics in a full world, *Scientific American*, 2005, [www.publicpolicy.umd.edu/faculty/daly/sciam-Daly5%20copy%201.pdf](http://www.publicpolicy.umd.edu/faculty/daly/sciam-Daly5%20copy%201.pdf).

Daly, Herman, A Steady-state Economy, Sustainable Development Commission, 24 April 2008, [www.theoildrum.com/node/3941](http://www.theoildrum.com/node/3941).

Department of Energy and Climate Change, The UK Low Carbon Transition Plan, 2009, <http://centralcontent.fco.gov.uk/central-content/campaigns/act-on-copenhagen/resources/en/pdf/DECC-Low-Carbon-Transition-Plan>.

Duchin, Faye et al., Human Ecology: Industrial Ecology, 2006, [www.economics.rpi.edu/workingpapers/rpi0603.pdf](http://www.economics.rpi.edu/workingpapers/rpi0603.pdf).

Farley, J. et al., Establishing indicators for biodiversity, *Science*, 308, 2005, 791–792, [www.steadystate.org/Science\\_Letter\\_on\\_GDP.pdf](http://www.steadystate.org/Science_Letter_on_GDP.pdf).

- Ferrer-i-Carbonel, Ada I. et al., Environmental Awareness and Happiness, Rensselaer Polytechnic Institute, 2004, [www.economics.rpi.edu/workingpapers/rpi0503.pdf](http://www.economics.rpi.edu/workingpapers/rpi0503.pdf).
- Fischer-Kowalski, Marina, Socio-ecological transitions in human history and present, and their impact upon biodiversity, 2007, [www.pik-potsdam.de/infodesk/education/alter-net/programme/11-09.2007/fischer-kowalski](http://www.pik-potsdam.de/infodesk/education/alter-net/programme/11-09.2007/fischer-kowalski).
- Gowdy, John M., Behavioral Economics and Climate Change Policy, Rensselaer Polytechnic Institute, 2008, [www.economics.rpi.edu/workingpapers/rpi0701.pdf](http://www.economics.rpi.edu/workingpapers/rpi0701.pdf).
- Hansen, J., The threat to the planet, New York Review of Books, 53, 13 July 2006, [www.nybooks.com/articles/19131](http://www.nybooks.com/articles/19131).
- Hansen, James, Can We Defuse the Global Warming Time Bomb, NASA, 2003, [http://pubs.giss.nasa.gov/docs/2003/2003\\_Hansen.pdf](http://pubs.giss.nasa.gov/docs/2003/2003_Hansen.pdf).
- Hansen, James et al., Target Atmospheric CO<sub>2</sub>: Where Should Humanity Aim?, Columbia University, 2008, [www.columbia.edu/~jeh1/2008/TargetCO<sub>2</sub>\\_20080407.pdf](http://www.columbia.edu/~jeh1/2008/TargetCO2_20080407.pdf).
- Illge L. and Schwarze, R., A Matter of Opinion: How Ecological and Neoclassical Environmental Economists Think about Sustainability and Economics, German Institute for Economic Research, 2006, [www.diw.de/deutsch\\_produkte/publikationen\\_diskussion\\_spapier\\_e\\_docs/papers\\_dp619](http://www.diw.de/deutsch_produkte/publikationen_diskussion_spapier_e_docs/papers_dp619).
- Intergovernmental Panel on Climate Change, Climate Change 2007: The Physical Science Basis – Summary for Policymakers, February 2007, [www.ipcc.ch](http://www.ipcc.ch).
- Jackson, Tim, Prosperity Without Growth? – The transition to a sustainable economy, Sustainable Development Commission; 30 March 2009, [www.sd-commission.org.uk/publications.php?id=914](http://www.sd-commission.org.uk/publications.php?id=914).
- Johansson, McCormick, Neij, Turkenburg, The potentials of renewable energy, thematic background paper, International Conference for Renewable Energies, Bonn, 2004.
- Kaufman, Darrell S. et al., Recent warming reverses long-term arctic cooling, Science, 4 September 2009, [www.sciencemag.org/cgi/content/short/325/5945/1236](http://www.sciencemag.org/cgi/content/short/325/5945/1236).
- Lawson, Neal, All Consuming, Penguin Books, 2009, [www.amazon.co.uk/All-Consuming-Neal-Lawson/dp/0141029412](http://www.amazon.co.uk/All-Consuming-Neal-Lawson/dp/0141029412).
- Mudd, Gavin, Sustainability of uranium mining and milling: toward quantifying resources and eco-efficiency, Environmental Science and Technology, December 2007, 42, 2624–2630.
- Pearce, Fred, Climate warning as Siberia melts, New Scientist, 11 August 2005, [www.newscientist.com/article/mg18725124.500](http://www.newscientist.com/article/mg18725124.500).
- Rahmstorf, S. et al., Recent climate observations compared to projections, Science, 316 (709), 2007, [http://pubs.giss.nasa.gov/docs/2007/2007\\_Rahmstorf\\_etal.pdf](http://pubs.giss.nasa.gov/docs/2007/2007_Rahmstorf_etal.pdf).
- Rees, William E., Is humanity fatally successful?, Journal of Business and Public Administration, 30–31, 2002/03, 67–100, [www.steadystate.org/HumanityFatallySuccessful.pdf](http://www.steadystate.org/HumanityFatallySuccessful.pdf).
- Rochon, Emily, Why Carbon Capture and Storage Won't Save the Climate, Greenpeace International, May 2008, [www.greenpeace.org/raw/content/australia/resources/reports/climate-change/false-hope-why-carbon-capture.pdf](http://www.greenpeace.org/raw/content/australia/resources/reports/climate-change/false-hope-why-carbon-capture.pdf).
- Stern, D. I., The rise and fall of the environmental Kuznets curve, World Development, 32 (8), 2004, 1419–1439, [www.steadystate.org/KuznetsCurve-Stern.pdf](http://www.steadystate.org/KuznetsCurve-Stern.pdf).
- Stern, Nicholas Herbert, The Economics of Climate Change: The Stern Review, HM Treasury, 2006, [www.hm-treasury.gov.uk/sternreview\\_index.htm](http://www.hm-treasury.gov.uk/sternreview_index.htm).

Tao, Wang et al., Is the west to blame for China's emissions?, Chinadialogue, December 2007, [www.chinadialogue.net/article/show/single/en/1592](http://www.chinadialogue.net/article/show/single/en/1592).

van Kerkhoff, Lorrae, Making a Difference: Science, Action and Integrated Environmental Research, Australian National University, 2002, [http://fennergchool.anu.edu.au/publications/reports/sres/making\\_a\\_difference.pdf](http://fennergchool.anu.edu.au/publications/reports/sres/making_a_difference.pdf).

Veblen, Thorstein, Conspicuous Consumption, Penguin, 1902, [www.amazon.co.uk/Conspicuous-Consumption-Penguin-Great-Ideas/dp/0141023988](http://www.amazon.co.uk/Conspicuous-Consumption-Penguin-Great-Ideas/dp/0141023988).

Weitzman, Martin, On Modelling and Interpreting the Economics of Catastrophic Climate Change, 6 May 2008, [www.economics.harvard.edu/faculty/weitzman/files/REStatModeling.pdf](http://www.economics.harvard.edu/faculty/weitzman/files/REStatModeling.pdf).

Weyler, Rex, Deep Green: Ecological Economics – The Best New Idea for 2009, Greenpeace, [www.greenpeace.org/international/about/deep-green/deep-green-jan-2009](http://www.greenpeace.org/international/about/deep-green/deep-green-jan-2009).

Weyler, Rex, Deep Green: Overshoot and Tech Dreams, Greenpeace International; June 2009, [www.greenpeace.org/international/about/deep-green/deep-green-june-09](http://www.greenpeace.org/international/about/deep-green/deep-green-june-09).

Williams, Juliana, Carbon Capture and Storage Still a Pipe Dream?, Solve Climate.com, 13 October 2009, <http://solveclimate.com/blog/20091013/carbon-capture-and-storage-still-pipe-dream>.

Yarra Valley Climate Action Group, Experts: Carbon Tax needed and NOT Cap-and-Trade Emission Trading Scheme (ETS), 2009, <http://sites.google.com/site/yarravalleyclimateactiongroup/carbon-tax-needed-not-cap-and-trade-emission-trading-scheme-ets>.

## Organisations with web-based publications

Carbon Capture Report This site contains valuable information and surveys concerning carbon emissions and global warming, [www.carboncapturereport.org/](http://www.carboncapturereport.org/).

Celsius A blog about doing practical things to combat climate change, [www.celsius.com](http://www.celsius.com).

Centre for the Advancement of the Steady State Economy CASSE is dedicated to help change the goal of the economy from growth to sustainability, and support a straightforward and scientifically sound position on economic growth, [www.steadystate.org/](http://www.steadystate.org/). CASSE has many online publications by the most renowned advocates of the steady-state economy, including Tim Jackson, Herman Daly, Peter Victor, Joseph Stiglitz and others; see [www.steadystate.org/CASSEBibliography.html](http://www.steadystate.org/CASSEBibliography.html).

Chinadialogue A website in which China and the world discuss the major environmental issues facing humanity. Excellent source of articles from a Chinese perspective [www.chinadialogue.net/](http://www.chinadialogue.net/).

CICERO Centre for International Climate and Environmental Research, Oslo, Norway CICERO's mission is to provide reliable and comprehensive knowledge about all aspects of the climate change problem. There are publications available at [www.cicero.uio.no/publications/searchpub.aspx?lang=en](http://www.cicero.uio.no/publications/searchpub.aspx?lang=en) and [www.cicero.uio.no/Home/index\\_e.aspx](http://www.cicero.uio.no/Home/index_e.aspx).

Copenhagen Consensus Centre A panel of experts on climate change, <http://fixtheclimate.com>.

Deep Green A series of climate change articles written by Rex Weyler, published online by Greenpeace International, [www.greenpeace.org/international/about/deep-green](http://www.greenpeace.org/international/about/deep-green).

Earth Stream An excellent source for the latest environmental news, [www.earth-stream.com/](http://www.earth-stream.com/).

The Ecologist British climate change magazine with articles on climate change news can be read at [www.theecologist.org/\\_tag/0/0/0/25/Climate%20Change/](http://www.theecologist.org/_tag/0/0/0/25/Climate%20Change/).

Encyclopedia of the Earth This is a comprehensive web-based reference source about the Earth, its natural environments, and their interaction with society. Publications can be found at [www.eoearth.org/articles](http://www.eoearth.org/articles).

Energy Resource Institute (TERI) A New Delhi based organisation established with the purpose of tackling and dealing with the immense and acute problems that mankind is likely to be faced with in the years ahead, on account of the gradual depletion of the earth's finite energy resources, which are largely non-renewable, and on account of the existing methods of their use, which are polluting. TERI has a rich and valuable list of research documents from an Indian and developing world perspective, [www.teriin.org/index.php?option=com\\_publication&task=level](http://www.teriin.org/index.php?option=com_publication&task=level).

Fenner School of Environment and Society, Australian National University This is a world-class, nationally distinctive school at the ANU for interdisciplinary research and education on complex environment-society systems. A number of online reports are available at <http://fennerschool.anu.edu.au/publications/reports/>.

Friends of the Earth (FOE) Making life better for people by inspiring solutions to environmental problems. Reports are available at [www.foe.co.uk/resource/index.shtml](http://www.foe.co.uk/resource/index.shtml).

Global Development and Environment Institute, Tufts University In our effort to understand actual and possible trajectories of economic development, GDAE researchers emphasise ecological health and the correlation between social and economic well-being. There are many publications available at [www.ase.tufts.edu/gdae/policy\\_research/healthEnvironment.html#publications](http://www.ase.tufts.edu/gdae/policy_research/healthEnvironment.html#publications).

Green Chips Stock A business and investment blog on green technology, [www.greenchipstocks.com/](http://www.greenchipstocks.com/).

Greenpeace Publications In the UK and internationally, Greenpeace is a rich source of information about global warming and the world's premier investigative organisation into corporate and governmental behaviour that is encouraging carbon emissions. This website provides access to many publications, [www.greenpeace.org/international/campaigns/climate-change/our\\_work/expeditions](http://www.greenpeace.org/international/campaigns/climate-change/our_work/expeditions).

International Society for Ecological Economics (ISEE) A not-for-profit, member-governed organisation dedicated to advancing understanding of the relationships among ecological, social and economic systems for the mutual well-being of nature and people. ISEE has many free and member-subscription papers on key ecological themes, [www.ecoeco.org/publications\\_papers.php](http://www.ecoeco.org/publications_papers.php).

Jubilee Debt Campaign Campaign for climate justice. Publications available at [www.jubilee-debt-campaign.org.uk/?lid=5088](http://www.jubilee-debt-campaign.org.uk/?lid=5088).

National Energy Foundation Online materials on renewable energy sources, see [www.nef.org.uk/index.asp](http://www.nef.org.uk/index.asp).

National Footprint Accounts Global Footprint Networks, 2008, a comprehensive ecological accounting system that calculates the ecological footprint and biocapacity of the world and 200 nations from 1961 through the present, with annual reports, [www.footprintnetwork.org/en/index.php/GFN/page/data\\_sources/](http://www.footprintnetwork.org/en/index.php/GFN/page/data_sources/).

Negative Population Growth (NPG) A national membership organisation founded to educate the US public and political leaders about the detrimental effects of overpopulation on our environment, resources and quality of life. Many online publications can be found at [www.npg.org/library.html](http://www.npg.org/library.html).

Network for Alternative Technology and Technology Assessment, Faculty of Technology, Open University, Milton Keynes Produces a newsletter, Renew, which covers news and developments in the field of renewable technology, <http://eeru.open.ac.uk>.

New Economics Foundation Publications 'NEF is an independent think-and-do tank which aims to improve quality of life by promoting innovative solutions that challenge mainstream thinking on economics, environment, and social issues, works in partnership and puts people and the planet first', [www.neweconomics.org/](http://www.neweconomics.org/) and [www.neweconomics.org/programmes/climate-change](http://www.neweconomics.org/programmes/climate-change).

Oxford Environmental Change Institute Centre for research in environmental change and management; publications at [www.eci.ox.ac.uk/publications/index.php](http://www.eci.ox.ac.uk/publications/index.php).

People & Planet UK students campaigning on world poverty, human rights and the environment. Campaign materials on climate change, <http://peopleandplanet.org/resources/>.

Renewable Energy World A blog focusing on renewable energy alternatives to fossil fuels, [www.renewableenergyworld.com/rea/home](http://www.renewableenergyworld.com/rea/home).

Rensselaer Polytechnic Institute, Troy, New York RPI has many online articles with ecological and environmental themes, [www.economics.rpi.edu/index.php?siteid=18&pageid=337](http://www.economics.rpi.edu/index.php?siteid=18&pageid=337).

Royal Society publications on climate change See <http://royalsocietypublishing.org/search?fulltext=climate&submit=yes&journalcode=roybiogmem%7Croyobits%7Croybiolett%7Croyinterface%7Croynotesrec%7Croyprs%7Croyprsa%7Croyprsb%7Croypt%7Croypta%7Croyptb&x=20&y=9>.

School of Environment and Development, University of Manchester SED is a centre of excellence for research on chronic poverty, poverty reduction, inequality and growth. Reports are available at [www.sed.manchester.ac.uk/research/publications/wp/](http://www.sed.manchester.ac.uk/research/publications/wp/).

School of the Earth and Environment, Leeds University One of the largest schools in the UK, focusing on a multidisciplinary approach to understanding our environment. studying the earth from its core to its atmosphere and examining the social and economic dimensions of sustainability. Abstracts on their

climate change research are available at [www.see.leeds.ac.uk/research/icas/climate\\_change/index.htm](http://www.see.leeds.ac.uk/research/icas/climate_change/index.htm).

Solve Climate.com A blog providing daily climate news and analysis, <http://solveclimate.com>.

Sustainability Commission Papers There are scores of excellent papers on various environmental themes, mostly downloadable at [www.sd-commission.org.uk/publications.php?id=listall&sortorder=ASC&sortby=attach\\_title&page=a](http://www.sd-commission.org.uk/publications.php?id=listall&sortorder=ASC&sortby=attach_title&page=a).

World Development Movement Campaign group for environmental justice. Articles available at [www.wdm.org.uk/climate-change-campaign](http://www.wdm.org.uk/climate-change-campaign).

World Resources Institute: Earth Trends A web-based compendium of environmental information, <http://earthtrends.wri.org>.

Yarra Valley Climate Action Group publications YVCAG is a climate action group of concerned citizens based in Yarra Valley in Melbourne, Australia, <http://sites.google.com/site/yarravalleyclimateactiongroup/>.

Znet: Ecology Watch, and Climate Watch Two sections of the Znet site, containing specialist commentaries on the main issues of the day, [www.zmag.org/znet/places/Ecology](http://www.zmag.org/znet/places/Ecology) [www.zmag.org/znet/places/Global+Warming](http://www.zmag.org/znet/places/Global+Warming).