

Environment and Climate Change

Simon Caney raises questions of ethics and justice

Few now dispute the gravity of the problems associated with climate change. The likely impacts – increased temperatures, rising sea-levels and unpredictable weather events – have been exhaustively chronicled by climate scientists worldwide. The most recent authoritative analysis is the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). In the ‘Technical Summary’ to the first volume of its 2007 report the IPCC projects that by the end of this century temperatures may rise by between 1.8°C and 4.0°C. It further projects that sea-levels may rise by between 18cm and 38cm (S. Solomon et al ‘Technical Summary’, p.70: available at http://ipcc-wg1.ucar.edu/wg1/Report/AR4WG1_Print_TS.pdf).

The economic issues at stake have been analysed in Nicholas Stern’s report on *The Economics of Climate Change*. The Stern Review found that taking no action would result in considerable economic costs and maintained that an aggressive policy of cutting emissions would not be unduly expensive. More precisely it argued that the cost of stabilising carbon dioxide at 550ppm was approximately 1 percent of global GDP. The scientific and economic aspects of climate change, thus, have received considerable attention. However, the ethical issues surrounding human-induced climate change have not received the same amount of attention.

The Ethical Dimension

This is somewhat surprising because anthropogenic climate change raises a host of ethical questions.

- The first is ‘what is wrong with climate change?’ Is it because of its impact on human happiness or

human rights? Or should we take a broader view and include the impact that climate change has on non-human animals and the natural world?

- A second, and related issue, also arises, namely, what should we count as ‘dangerous anthropogenic forcing’? The United Nations Framework Convention on Climate Change (UNFCCC) states that the parties to that agreement should avoid ‘dangerous anthropogenic forcing’ but what change would count as dangerous? This is, of course, in part a scientific question but it goes beyond that for it asks us to determine when the changes become a matter of moral concern.
- A third key question is: What obligations do current generations owe to future generations? The emission of greenhouse gases has effects not simply on those who are alive but also on future people. How should we think about this? One radical answer would be that we owe future generations nothing. Many, however, find this view unpalatable. A less radical view maintains that we should care less for future generations the further they are born into the future. To employ the terminology often employed, they argue that there should be a positive discount rate. Is this ethical?

The preceding three questions do not exhaust the ethical challenges that confront the current generations. Four further ethical issues remain.

- One concerns risk and uncertainty. Climate scientists stress that there is considerable lack of clarity about just how much temperatures will increase and sea-levels will rise. We do not possess certain knowledge of the impacts and costs of climate change. Given this, policymakers need to know how they should act in cases where there is a low probability of a catastrophic outcome (risk) and cases where the

probability of a dire outcome is unknown (uncertainty).

- In addition to this, policymakers also face the question of how to trade-off competing claims. Combating climate change will involve both cutting emissions and spending money on adaptation. Before policymakers commit themselves to such policies they must ask whether they have other obligations or commitments which should take priority.
- Once we have answers to this question we then need to ask: Who should bear the burdens of combating climate change? Should it be those that brought about the problem in the first place? This adopts the principle that the polluter should pay. Or should the burden be borne by those with the greatest ability to pay? Or should it be borne by those who have benefited from the activities that led to anthropogenic climate change? The UNFCCC asserts that the responsibility should be borne according to the doctrine of ‘common but differentiated responsibility’ (Article 3). This returns us to the preceding question because when determining who should pay for climate change one needs also to examine what other legitimate goals political actors might have.
- One further key question remains: namely, who should decide what policies to adopt? Who has the right to make decisions as to how much mitigation should occur and who should make which sacrifices? Similarly, who should decide the level of adaptation and how this is funded? Should all states be included in setting emissions targets? Or should this only comprise those who are required to cut their emissions? All the preceding questions are controversial. It is, therefore, crucial that they be arrived at through a fair political procedure and that those who have

a legitimate stake are included in climate negotiations.

Cost Benefit Analysis?

How should we think about these issues? The dominant approach is cost-benefit analysis. At first glance this seems an eminently reasonable way of addressing the above issues. Should one not compare the costs of combating climate change with the benefits of any such policy and act on this basis? This is the framework that is adopted by the leading economic analyses of climate change, including the Stern Review.

“What obligations do current generations owe to future generations?”

It is, however, problematic for a number of reasons. First, it represents an implausible way of thinking about risk and uncertainty. At its most basic, cost-benefit analysis aims to calculate the expected utility of a policy and it does this by multiplying the utility (or disutility) of an outcome by the probability that it will arise. If the probability is extremely low then even a major catastrophe will not result in a high expected disutility. The problem with this is that it overlooks the fact that *some* (those emitting high levels of greenhouse gases) are rendering *others* vulnerable to risks. Whether this is fair or not cannot be determined solely by whether the expected benefit to the risk-taker exceeds the expected cost to the potential victims. Whether some are entitled to expose others to risks requires more than this. In particular, we need to know the entitlements and rights of both the risk-takers and the potential victims and the other opportunities available to them.

Second, cost-benefit analysis provides a counter-intuitive way of reflecting about the costs of combating climate change. It maintains that when determining whether one actor should continue engaging in activity one must

include the cost to them of stopping and compare it with the resulting benefit to others. This, however, is not an appropriate model to use in cases where some are *harming* others. In cases of harm (such as, for example, assaulting others or damaging their property or enslaving them) we do not think that the cost of ceasing the harmful activity can entail that we should not cease the harmful activity. Rather we think that those engaging in the harmful activity (in this case emitting high levels of greenhouse gases) should desist.

Third, cost-benefit analyses are often indifferent to who bears the burden of combating climate change. They focus solely on bringing about an outcome in which benefits exceed costs. We care, however, about whether the costs are distributed fairly, and cost-benefit analysis cannot capture this concern.

Rights and Justice

These three objections are grounded in a common concern, namely that cost-benefit analysis fails to deal with people justly. This suggests that we need to consider what would be a just response to climate change. A plausible justice-based approach would, I believe, comprise the following components.

First, persons are entitled not to have their vital interests jeopardised by others. Anthropogenic climate change does, however, jeopardise a number of different vital interests, including an interest in having enough food to survive and an interest in health. The former is undermined by drought, freak weather events and flooding; and the latter will be jeopardised by the increase in heat stress and water-borne and vector-borne diseases. Persons are therefore entitled not to be exposed to climate change that undermines these basic interests. Adopting this approach we may then see ‘dangerous’ climate change as climate change that systematically and pervasively jeopardises these fundamental entitlements.

Second, however, we need to take into account the risks and uncertainties associated with climate change. Two key features are worth stressing

here. (a) Those most responsible for the problem are primarily the most disadvantaged in the world. It is true that China now emits more carbon dioxide than the USA but when we take into account the different population sizes, we see that the per capita emissions of contemporary Chinese people are much lower than that of Americans or Europeans. Furthermore, (b), the global poor are disproportionately vulnerable to climate change. Given these two facts it would be very unjust for the highest per capita emitters (who are also the wealthiest) to impose risks on others, such as the inhabitants of Bangladesh or small island states, (who are the most disadvantaged). The latter have a right not to be exposed to the risk of dangerous climate change.

“cost-benefit analyses are often indifferent to who bears the burden of combating climate change”

Third, we need to confront the inter-generational nature of climate change. What obligations are owed to future people? Some suggest that we should discount the entitlements of future generations merely because they are born in the future. This, however, is unjust for it treats some humans as inferior to others. It is a form of discrimination and it penalises people for morally arbitrary aspects about them. This is *not* to say that we may not spend more money on people who are currently alive but it is to say that pure time preference is unethical.

This leaves a fourth critical issue: Who should bear the burden of dealing with anthropogenic climate change? What is the fairest way of distributing the responsibility to mitigate and fund adaptation? One fundamental moral conviction is that the polluter should pay. It follows from this that those who have caused anthropogenic climate change should bear the responsibility to prevent dangerous climate change. This is the view famously articulated in Brazil’s

proposal to the UNFCCC in 1997. Although it is highly unlikely that this proposal will come into force, this does not undermine the force of the argument. To do that, someone will have to show why the deeply rooted idea that those who cause a problem are morally required to address it is misplaced. One qualification is nevertheless in order. The Polluter Pays Principle is indifferent to the standard of living of those emitting carbon dioxide. This, however, seems implausible. Some (the poor and vulnerable) need to emit carbon dioxide to cover their basic needs and it would be unjust to make them pay the full cost of their emissions if the effect of this is to leave them beneath a decent standard of living. The Polluter Pays Principle should thus be sensitive to people's rights to a minimum standard of living.

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Policies

What do these principles entail in practice? A number of different policy instruments –including carbon taxes, carbon trading, geo-engineering, the clean development mechanism, joint implementation, and regulations – have been proposed. The preceding principles of justice would, I believe, provide support for the following guidelines for a post-Kyoto policy framework.

1. Many argue that some scheme of carbon trading is essential if the concentration of carbon dioxide in the atmosphere is to stabilise at a safe level. A key advantage of such schemes is, of course, that by allowing high emitters to purchase carbon permits from others they provide flexibility. There are many different kinds of carbon trading schemes. Some advocate allocating

tradable permits to individuals; others think that permits should be allocated to states; and others suggest auctioning them to firms. Much could be said about each of these but the key point to observe here is that from the point of view of justice two conditions are paramount. First, the trading schemes must lower emissions and thereby secure the right not to be exposed to dangerous climate change.

Second, any trading scheme must distribute the burdens of lowering emissions fairly. The distribution of rights to emit greenhouse gases must be equitable.

2. It is widely recognised that, given the emissions of greenhouse gases in the past, some adaptation will be necessary. However, many of those who most need adaptation are neither responsible for the problem nor are they equipped to finance adaptation. Given this and given the above reflections on the Polluter Pays Principle, it follows that there needs to be a global adaptation fund that is financed by those who have caused dangerous climate change.
3. If we are to prevent dangerous climate change and also enable developing countries to develop it is essential that the governments of industrialised countries incentivise the development and transfer of new clean technologies. Without such initiatives China and India's greenhouse gas emissions (and indeed those of the industrialised world) will inevitably continue to rise at an alarming rate.

These proposals are, of course, not exhaustive but they do represent the start of an equitable response to the prospect of dangerous climate change.



Benito Müller presents a possible solution to the food miles controversy

The issue of the ecological impacts of food transport, particularly long-haul aviation, has been around for some time and has led to a drive by environmental organisations to promote the buying of local produce. A favourite example is fresh beans, particularly 'designer' ones such as mange-touts, air-freighted from places like Kenya.

It is argued that because they have to be transported by air, their carbon footprint (the carbon emitted in the course of growing and transporting the beans to the table of the consumer) is unacceptably high compared with local produce. This is, of course, not quite true. What is correct is that fresh beans in winter most likely have a higher carbon footprint than seasonal locally grown ones. What is not necessarily true, however, is that the carbon footprint of beans grown in Kenya is higher than that of out-of-season ones grown in the UK, even if air freight emissions are included. Indeed, there have been a number of studies which demonstrate that this need not be the case, and hence that for climate change purposes, the concept of 'food miles' is at best simplistic which can lead to unfair trade distortions.

Moreover, the export of fresh food and vegetables is one of the key ingredients with which some of the poorest countries in the world are trying to reap at least some high value-added benefits from global trade which otherwise passes them by. This must be kept in mind even if the total carbon footprint of their produce, as delivered in countries like the UK, were indeed higher than its local competition (grown in artificially heated and lighted greenhouses).

The Controversy

The Soil Association (SA), the UK's leading campaigning and certification

organisation for organic food and farming, which has been at the centre of the current controversy in the UK on the issue of food miles, has just come out with a press release explaining their position on certifying air freighted produce as 'organic' (www.soilassociation.org/airfreight). The press release begins with the SA decision that 'In future, air freighted organic food will have to meet the Soil Association's own Ethical Trade standards or the Fairtrade Foundation's standards, ... The Soil Association's goal is to minimise the use of air freight The new air freight standards will ... require our licensees to develop plans for reducing any remaining dependence on air freight.' While acknowledging that 'being able to export fresh organic fruit and vegetables provides significant economic, social and local environmental benefits, often for farmers with otherwise very low carbon footprints, [and that] For a small number of organic producers there are no available alternative markets offering the same development returns' the SA declared its intention to do 'all it can to encourage farmers in developing countries to create and build organic markets that do not depend on air freight'. For this reason the SA 'Standards Board will consider implementing carbon labelling within our standards for all organic goods – not just air freighted produce – when a good scheme is available. In the interim, we will be publishing information about air freight drawing on the material we have gathered during the consultation.'

With respect to internalising the carbon footprint, the UK Department for International Development (DfID), in turn, contends that 'the only fair option, which considers the livelihoods of those in developing countries as well as the need to protect the environment, is to ensure that the prices of the goods we consume cover the costs of their environmental impact, wherever they are from and however they are produced.'

It is certainly true that this approach is fairer than singling out air-freighted agricultural produce as intrinsically

bad, but it is by no means the only fair option, or indeed the fairest one. As has been pointed out by a number of commentators, such as James MacGregor, it can be cogently argued that produce of countries like Kenya, with per capita emissions of 0.1tC (155th in world-wide ranking, and 50 times less than the UK) should not be discriminated against on carbon intensity grounds, because they are within the boundaries of their 'ecological space,' i.e. the emissions that they should be allowed to emit for sustainable development.

The Facts

Food-miles are an over-simplified indicator of harming the global climate. A number of studies analysing the total carbon footprint of agrarian products, particularly those sold in the UK, have conclusively shown that the full life-cycle climate change impact of food supply in industrialised countries cannot be reduced to simple distances between consumers and producers. According to DfID, research has shown that 'the emissions produced by growing flowers in Kenya and flying them to the UK can be less than a fifth of those grown in heated and lighted greenhouses in Holland.' In other words, 'food miles' – the distance between grower/producer and consumer – are woefully inadequate as a measure of the climate change impacts of agricultural produce, indeed of any product! What is required instead is indeed a full *life-cycle carbon footprint analysis*, as ultimately envisaged by the SA.

The emissions due to importing fresh produce from the poorest and most vulnerable countries are manageable. The transport carbon dioxide emissions associated with fresh fruit and vegetable imports to the UK from Sub-Saharan Africa (excl. South Africa) have been estimated to be between 279,000 and 686,000 tCO₂, which at current prices would cost between £2.8m and £6.7m to offset through, say, the acquisition of credits (Certified Emission Reduction or CER) generated.

The harm to the poorest and most vulnerable countries through boycotting

their fresh agricultural produce is significant. 'While the climate change debate identifies air-freighted fresh produce from sub-Saharan Africa as the epitome of unsustainable consumption, research shows over one million livelihoods are supported in part owing to the fresh produce trade with the UK alone' (*Fresh Perspectives*, September 2007). According to the Kenyan High Commission in London, the Kenyan horticultural industry supports around 135,000 Kenyans directly and many hundreds of thousands more indirectly, and the produce supplied to the UK alone generates at least £100m per year for Kenya. In other words, the benefits of trading these high value-added goods for these countries are significant.

A Possible Solution

There is a way in which both the environmental and the developmental concerns involved in the food-miles controversy can be resolved equitably – taking into account the 'ecological space' argument – without trying to deprive the poorest producers in the world to partake in the benefits of global trade.

Equitable offsetting. Use public finance to offset the international transport emissions generated for fresh fruit and vegetables imported from the poorest and most vulnerable countries, say through the acquisition and retirement of credits generated under the Kyoto Protocol Clean Development Mechanism, preferably in the producing countries, indeed in the producing sectors in question, thus providing not only a double sustainable development dividend, but also providing much needed pilot CDM projects in these countries. Unfortunately, the CDM has thus far largely passed by these countries in favour of the large developing country emitters like Brazil, China and India; and most of the poorest countries have not even had a single demonstration project on the ground.

Fair labelling. Use proper carbon labelling – such as that currently developed by the UK Carbon Trust – ensuring that the carbon offsets are taken into account, as well as

emphasising the development benefits of these produce, be it indirectly as in the 'grown under the sun' labels proposed by the Kenyan High Commission or directly through some sort of fair trade label.

Support of shift towards less carbon intensive transport. In addition to offsetting the offending international transport emissions the consumer countries should also help the producers (1) by improving maritime technology to make it amenable for shipping their products, as well as (2) to help them grow produce of equal social benefit which can be transported by sea.

Using these measures will ensure that the poorest producers will continue to be able to reap the benefits of global trade in a fair and sustainable manner.

This article is based on an OIES Energy and Environment Comment at www.oxfordenergy.org



Robert Ritz discusses the relative merits of emissions taxes or trading?

Introduction and Recent Policy Experience

Climate change has taken centre-stage on the agenda of business, politics and economics. The Stern Report on the Economics of Climate Change recently concluded that the benefits of addressing climate change are likely to far outweigh the associated costs and a strong consensus has emerged that 'something needs to be done'.

However, there is still considerable disagreement about what the most

appropriate policies to tackle climate change are. The problem has two key features. First, there is substantial (scientific) uncertainty surrounding the causes and, especially, the effects of climate change, complicating the policy analysis. Second, a clean environment is a 'global public good' in which all have a stake, and amongst all of whom solutions need to be coordinated.

From an economic viewpoint, the policy objective is to achieve emissions abatement at least cost. Two market-based instruments in particular have been at the forefront of the debate: emissions taxes and emissions trading. The idea behind both of these instruments is to make polluters internalise the negative environmental externality they impose on others by making pollution costly.

An emissions tax (often also referred to as a 'carbon tax') directly puts a price on each unit of emissions (say, per ton of CO₂), but leaves polluters free to emit as much as they see fit. By contrast, an emissions trading scheme (also known as a 'cap-and-trade' scheme) fixes the overall amount of emissions by creating a fixed supply of emissions permits, which participating firms can trade amongst each other, or with outside parties.

Both instruments have been used in recent climate policy. The European Union's emissions trading scheme (EU ETS) – which has been in operation since January 2005 and covers approximately 50 percent of European carbon emissions – is probably the most well-known example of a cap-and-trade scheme. In Sweden, a carbon tax related to emissions from domestic travel was introduced as far back as 1991.

Market-based Instruments or Command-and-control?

Before discussing the relative merits of emissions taxes and trading, one might ask when, and why, market-based instruments are better than other forms of regulation. Indeed, 'command-and-control' regulatory policies such as standards and outright bans continue to be widely employed in some parts

of the economy, arguably not without success (consider, for example, food or safety standards).

In practice, there are two inter-related problems with such forms of regulation. First, a policymaker in general does not have perfect – indeed typically only highly incomplete – information on the actual costs (borne by firms) and benefits of emissions reduction and therefore must, in effect, resort to a 'one-size-fits-all' policy. Second, polluting firms are very likely to be asymmetric in that they do not all have exactly identical costs of abatement, so a one-size-fits-all policy will inevitably be economically inefficient.

Consider a stylised example. Suppose that there are two firms that each emits two units of pollution. Firm 1 can cut its emissions at very low cost, whereas Firm 2 has much higher costs. Suppose further that the regulator imposes a policy that *each* firm must cut its emissions by one unit.

This creates a substantial imbalance in the unit ('marginal') cost of emissions abatement, which is economically inefficient. In this example, it would be much better for Firm 1 to cut its emissions by two units and then sell its 'surplus' reduction to Firm 2, say in the form of an unneeded emissions allowance in a trading scheme. The overall cost of achieving the regulator's two-unit emissions reduction then is substantially lower.

Hence, as applied to large-scale climate policy, there is a strong presumption that market-based instruments – that make use of the price mechanism – are preferred, at least for the time being.

Relative Merits of Emissions Taxes and Trading

The basic economic cost-benefit analysis of emissions taxes and trading determines which instrument can be expected to lead to higher welfare. Thereby, emissions taxes are seen as a price instrument, while quota-based emissions trading is regarded as a quantity instrument.

In a hypothetical world in which a

policy maker has perfect information on the costs and benefits of emissions abatement, price and quantity instruments are easily seen to be equivalent. Indeed, the price (emissions tax) set would directly imply a certain single quantity (level of emissions) that perfectly internalises the social cost of carbon, and vice versa. Because of this equivalence, neither an emissions tax nor emissions trading is intrinsically preferable to the other in a world of perfect information.

However, as already noted above, in practice there is considerable uncertainty surrounding costs and benefits and policymakers' information is highly imperfect. In this setting, an emissions tax is more efficient than an emissions quota if the marginal cost of emissions reductions is steeper than the marginal benefit curve. Put differently, if a unit reduction in emissions becomes increasingly costly relative to the benefits it yields, then a tax is preferable to a trading scheme. Conversely, if a unit reduction in emissions yields fairly stable benefits relative to costs, then an emissions trading scheme is preferable to an emissions tax.

The current consensus appears to be that this analysis favours taxes over trading. The logic is that emissions abatement is already becoming increasingly more costly for firms at the margin (for example, as they have to switch to new production technologies), whilst the state of the environment really depends on the *stock* of past emissions, so the marginal benefit curve is rather flat.

However, the reverse argument can also be made. If there are still many 'low-hanging fruit' (unused, low-cost opportunities), such that the unit cost of abatement does not rise too quickly, and the climate is indeed close to a 'tipping point' (implying rapidly increasing marginal benefits), then an emissions trading scheme is the better policy.

Further refinement can also be achieved by 'hybrid' policies that combine particular features of both taxes and trading. For example, an emissions trading scheme can have a ceiling (say, by way of a 'buy-out'

price) and/or a floor on the (otherwise market-determined) permit price.

Moreover, as policymakers learn and gain experience over time, and uncertainty over costs and benefits decreases, making appropriate adjustments to an existing scheme (either taxes or trading) will tend to make the two instruments more similar in their (potential) effects.

As the underlying science means that limiting emissions is the main long-run concern, these points taken together may suggest a carbon tax (and hence a stable price signal) in the short run, and an emissions quota for the long run.

Revenue Usage and Distributional Issues

The benchmark analysis above abstracts from a number of political-economy considerations that can play important roles in practice. Indeed, both emissions taxes and trading in principle are sources of government revenue and can have substantial distributional consequences.

While the 'current' EU ETS (Phases I and II, 2005–2012), in which almost all emissions permits are given to the participating firms for free, is not (yet) a significant source of government revenue, any emissions trading scheme with a sizeable proportion of allowances sold to firms at auction is. However, the allowance allocation methodology underpinning a cap-and-trade scheme at the same time offers an important policy lever to help ensure 'buy-in' from firms.

Most recent research suggests that even a profit-neutral emissions trading scheme (that preserves industry-level profits) would typically involve auctioning of around 50–70 percent of emissions allowances. The levels of free allocation in the current EU ETS thus appear too high, also given the other efficiency gains associated with auctioning. An emissions tax obviously raises tax revenue and (loosely speaking) corresponds to a 100 percent-auctioned trading scheme in this respect.

A standard argument is that such

government policies should be 'revenue-neutral'. There are two leading – but not mutually exclusive – options. First, other taxes (such as income taxes, perhaps especially for lower incomes) could be decreased in tandem. Second, some of the revenue could be directed towards supporting investment and R&D in low-carbon technologies.

Emissions trading schemes also have the potential advantage that they can naturally be 'linked' internationally to other policy initiatives such as Kyoto's Clean Development Mechanism (CDM).

Conclusions and Policy Implications

Climate policy is becoming increasingly important to business, politics and economics and market-based instruments are likely to continue to play a central role. Economic theory yields a sharp characterisation of the circumstances under which emissions taxes are preferred to trading schemes (and vice versa).

However, the relevant parameters are extremely hard to pinpoint as a practical matter and the debate is likely to remain ongoing for some time in this regard. Several political-economy considerations appear to point towards an emissions trading scheme, in particular those related to distributional issues.

The existing emissions taxes and trading schemes are steps in the right direction, but far from perfect. There is still too little international coordination between schemes and probably too little thought is being given to the question of revenue generation and usage, especially in the current EU ETS.

Future climate policy thereby needs to acquire credibility in the eyes of firms (and citizens) much along the lines of other government policies.



Paul Newman assesses the development of the EU emissions market place

The Carbon Market has recently emerged in Europe, and *it* is developing all the time. Two and a half years ago, my company ICAP was arranging the odd 'grey market' deal once a fortnight or so, and we had one research graduate looking at the sector. Now, we employ five full-time specialists and arrange seventy or so deals a day, with total daily volumes of one and a half to two million tonnes. What does two million tonnes mean? To give these numbers a bit of context, there has been a recent estimate for how much CO₂ we would save in the UK if we switched over all of the 130 million incandescent light bulbs sold every year to those nasty looking energy saving ones. And that estimate is 1.9 million tonnes a year, which is pretty much the same volume that we arrange at ICAP on an average day.

I have already made the mistake of calling the Carbon Market an '*it*'. It is not an '*it*'. In the first place, let us remember that the trade is not in carbon ... but in non-carbon. What a certificate certifies is that a tonne of CO₂ has *not* been emitted by the seller, and can therefore be emitted by someone else, that is by the buyer. In fact, *The Economist* suggested some time ago that the more appropriate name is the 'Not-Carbon Market'. And again, I have dropped into using '*it*' as if this was one market, one thing, one locus of price transparency. Of course this is not the case.

Even at the most basic level, there are three distinct activities. First, the EU trading scheme and its EU Allowances, secondly, the Clean Development Mechanism with its Certified Emission Reduction Units (CERs), thirdly, the Voluntary Sector, what I would call here the 'Have a Go and Feel Good' stuff. And this third area should always be approached

with flashing Latin lights saying 'Caveat Emptor', or 'buyer be VERY wary'.

There are clear overlaps between these three activities, but of course the largest, most coherent one is the EU Trading Scheme. It is thought to be worth some Euro 25 billion a year now, and we have well-developed markets up and running in both listed futures and bilateral over-the-counter trade (OTC).

The second set, the Kyoto Protocol 'Clean Development Mechanism' has its own instrument in the CER which carries the imprimatur of the United Nations, and which in certain limited ways can be traded into the liquidity pool of the EU Trading System. I mentioned 'overlap' above, and I think it is worth pointing out that this overlap is not just of the market mechanism type; it is real political, collaborative overlap between some of the great pieces of today's supranational furniture. Incidentally, over half the approved CERs so far have been in China. There is in that a third pretty large toy in collaborative play as well. Finally, this March, Gazprom, Merrill Lynch, Dresdner Bank and others were reported to be getting together to look at Russian CERs.

My purpose here is not to concentrate specifically on the great political issues of our time, but I hope I am building up a picture showing that the early years of the market for emissions has become something of an engine to coalesce some – perhaps unlikely – bedfellows under a common purpose. On 31 May, President Bush announced his administration's determination to downplay the traded market mechanism, United Nations and Kyoto-inspired initiatives, and pan-continental collaborations of all stripe if they were 'under' multilateral leadership. That day, a journalist asked me for my reaction to the speech, and I did not hesitate to say that at this point, the correct way to look at President Bush's position is to ask, 'so what?' The market as it is now has moved from No where to Some where very quickly, and will carry on developing and maturing with or without support from the Bush

administration. The EU has committed to reduce its emissions by 20 per cent from 1990 levels by 2020, and this is a simple, highly visible target which will be delivered whatever the rest of the world does.

One of the surprises in the Bush speech on 31 May was his rejection of the Cap and Trade market mechanism as the right way forward. And some indeed ask the ambiguous question, 'Is Cap and Trade the right way?' By 'the right way' what we have to mean, surely, is the right way of moving towards lower emissions.

"What a certificate certifies is that a tonne of CO₂ has *not* been emitted by the seller, and can therefore be emitted by someone else, that is by the buyer"

Among the alternatives to 'Doing Nothing', taxes are often suggested as a way forward. But actually, if we get the mechanisms right, and we can put together a proper well-organised Cap and Trade marketplace, we should be moving on the right track. This is because one of the nice things about a market-trading approach is that it ensures that the emissions reductions take place where the cost of the reduction is lowest; and that, in turn, means that we are therefore lowering the overall costs of combating climate change.

At this point it may be worthwhile to give Defra (the UK Department of the Environment, Food and Rural Affairs) due credit for being visionary and pro-active in their support for this market. The Defra website unequivocally makes the point that 'by allowing participants the flexibility to trade allowances, the overall emissions reductions are achieved in the most cost-effective way possible' (www.defra.gov.uk). And when it comes to taking the job seriously, and applying for fair and reasonable national allocations, for instance, Defra have also led the way for others as an example

of membership-integrity and professionalism.

When we compare a trading scheme with a tax-based approach, we find an interesting technical reason why it makes more sense for the EU decision makers to prefer a trading programme over taxes. Within EU policymaking, taxes require unanimity. An emissions trading programme, on the other hand, counts as ‘environmental’ which leaves it in the territory of Qualified Majority Voting. And it is a lot easier to get something as complex and tricky as this through if there is no requirement for unanimity, and no opportunity for single country veto.

There has been a good deal of comment – and a good deal of pain – following Phase 1 of the programme, and its shortcomings. Most of us remember the price action last May when Phase 1 EU certificates lost half their value in a matter of days, and went on to lose the other half over the next months. But let us not forget the scale of the ambition here. Three years ago, this market was a pipe dream; and not just the actual market itself. In less than three years, the whole subject of emissions control has come from more or less nowhere to the centre of contemporary discussion. PointCarbon tells us that their recent Copenhagen conference was 500 per cent up on attendance compared with previous years. So yes, this has come a long way in a short period of time, and for all the loss of confidence over the price collapse, we have to see Phase 1 as just a first shot; a first shot at what it would be like to force companies to find their own lowest cost of abatement by internally decreasing their emissions, and then selling unused permits into the market.

The penalties imposed for failure (40 Euros per tonne in Phase 1 compared to 100 Euros in Phase 2 starting next January) also show that Phase 1 was always intended as somehow a test-bed. And I would argue that as a Beta run it was not so bad. Remember, that although the price collapse did leave a bad taste, in fact the Allocation Plan organisers were only out by about 2 percent for an entire plan of

6.3 billion tonnes of CO₂ allowances. Putting things in context, it would appear that 2 per cent either side is hardly the mad gaffe that is often claimed. Furthermore, this claim is most often heard from corners of the room where long positions were held as the price moved from 6 Euros to 31 Euros in its first fifteen months of trading; and from corners of the room where traders felt they had not had a good enough chance to run for the door when the meltdown came.

“one key ingredient we do always need for an ordered marketplace is clear and well recorded information about what is actually happening on the day-to-day trade flow”

So what are the lessons for Phase 2, and indeed for other trading schemes elsewhere? The first lesson has to be a more disciplined and refined analysis of allocation needs; and the National Allocation Planning for Phase 2 seems to show that we now have that. But this can never be an exact science. It can not simply because, by definition, every time oil prices, or gas prices, or coal prices make a major move of any kind, there are new decisions to be made about how many certificates a firm may or may not now need, while it fine-tunes and adjusts its energy mix. That’s the market, that’s how it works. So while the Phase 1 price collapse last May was what we can call ‘Chaos’ rather than ‘Order’, we should always remember that continued price stability is *not* a necessary condition for an ordered marketplace.

However, one key ingredient we do always need for an ordered marketplace is clear and well recorded information about what is actually happening on the day-to-day trade flow. Let me mention that the trade body London Energy Brokers Association (LEBA) has done a good job of collating the daily flows in the bilateral over-the-counter (OTC)

market; otherwise these OTC flows would remain private and invisible. The collating works as follows: the mainline wholesale brokers submit all their activity into a central pot on a daily basis, and a Daily LEBA Index is computed and published on the LEBA website. In fact, this methodology is actually fairly sophisticated, because it volume-weights the different size of each trade that is reported. The resulting index really is a fair representation of the underlying activity.

Another reason for having sympathy for the EU organisers is that if Phase 1 involved 6.3bn tonnes, and if it only took 2 per cent surplus to cause such immediate price meltdown, then they certainly have their work cut out in Phase 2. While Phase 1 applied to only about half the total CO₂ emission activities, and only five dirty industries, the next Phase will include pretty much all the gases, all the industries and all the locations where they occur. So the increased complexity of Phase 2 presents a new challenge in how to accurately calibrate the allocation plans.

For me, the biggest question here is whether that calibration procedure really can happen with sufficient accuracy to allow for a continually ordered marketplace all the way out to 2012. I, for one, certainly hope that it can, because if it can not, this new and imaginative marketplace will finish up as a side note in the history book of human beings trying to do something intelligent together and failing.



Liz Bossley describes the background to Bali

As the world's climate leaders prepare for their last meeting before the Kyoto Protocol takes effect on 1 January 2008, the focus of attention will be on China, India and South Korea, three rapidly growing countries who have signed the Protocol, but who have not agreed to cap their emissions. These countries could have a much larger impact on the international price of carbon if they continued to reject Kyoto emissions caps and instead devised their own domestic greenhouse gas trading schemes better suited to their own needs and under their own control.

Background

The 13th Conference of Parties (COP 13) to the UN Framework Convention on Climate Change (UNFCCC) takes place in Bali between 3 and 14 December 2007, coinciding with the 3rd Meeting of Parties (MOP 3) to the Kyoto Protocol.

The Kyoto Protocol comes into full force and effect on 1 January 2008. Thirty-eight developed (UNFCCC Annex 1/Kyoto Annex B) countries have been given legally binding targets to reduce their emissions of greenhouse gases (GHGs) by on average 5.2 percent compared with 1990 levels in its first commitment period of 2008–2012. This average target was spread unevenly amongst the countries concerned as the result of a highly charged political negotiation:

EU	–8% average
USA	–7%
Croatia	–5%
Japan/Canada	–6%
New Zealand/Russia/Ukraine	0%
Norway	+1%
Australia	+8%
Iceland	+10%

Australia and the USA refused to ratify the protocol largely, but not solely, because the world's fastest developing economies, the so-called non-Annex 1 countries, were not

obliged to commit themselves to cap their own emissions growth.

In Bali discussions on the second Kyoto commitment period will centre on which countries will accept caps and what those caps will be for 2013 and beyond. It is now almost a foregone conclusion that Australia will ratify Kyoto after its elections on 24 November because both the main opposition parties have said that they will do so. It is also just a matter of time before the USA comes in to the Kyoto fold as the tide of US public opinion in favour of ratification is likely to prove too strong for the ultimate successor to George W. Bush to resist.

Pressure on China, India and South Korea to accept a cap from 2013 is growing but so far only South Korea is showing signs of weakening. It is this author's opinion that these three countries should stand firm and resist the imposition of Kyoto caps. This is because any caps that they might be induced to accept are likely to be set high for political reasons so as to undermine the whole Kyoto cap-and-trade concept.

The Cap and Trade Concept

The general idea of cap and trade is that a central authority, in this case the UN, sets a limit on permitted emissions levels. The central authority allocates a number of allowances, i.e. rights to emit, below current

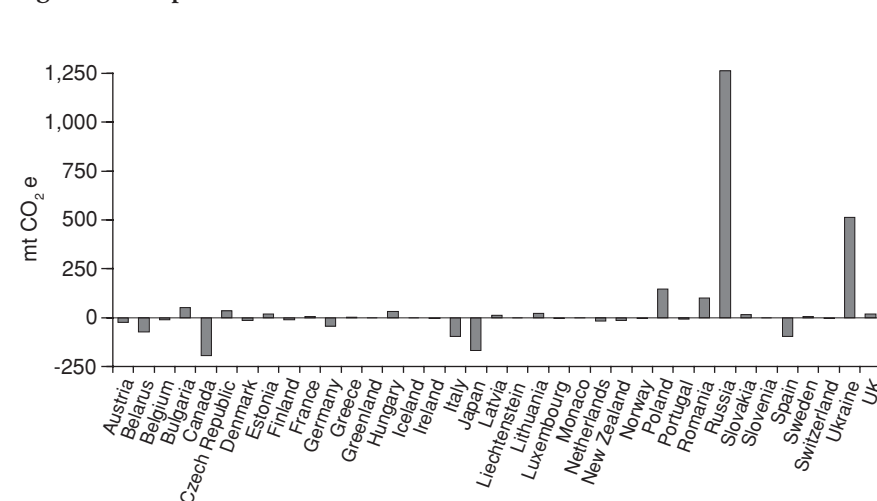
emissions levels, creating a shortage of allowances. The emitters must obtain sufficient allowances to cover their actual emissions levels over the target period, in this case 2008–2012. The emitter, faced with an allowance shortage, can then either cut its production or, invest in cleaner technology that emits less carbon per unit of production or, it can buy in the market sufficient allowances to cover its shortfall.

For Kyoto to achieve anything there must be a shortage of allowances such that their traded price is high enough to incentivise change. A positive allowance price will encourage countries and companies who can cut their emissions cheaply to do so, in order to generate a surplus of allowances to sell to those for whom emissions cuts are less easy and more expensive.

Kyoto looks to have fallen at the first fence in this objective. The surplus of allowances in the hands of Russia and the Ukraine during the period 2008–2012 is vastly greater than the shortages of all the other capped countries put together (see Figure 1). This is because of the choice of 1990 as the base year against which emissions caps were set: in 1990 the USSR's economy was much larger than that of the countries that emerged when it broke up.

This suggests that the price of carbon may be so low in the period 2008–2012 that there will be no

Figure 1: Surplus/Deficit of Allowances 2008–2012



incentive to cut emissions. However, the situation may be retrieved by the fact that Russia can choose to carry forward some of its surplus into 2013 and beyond when caps should be set lower. Furthermore the countries that are short, notably Canada and Japan, have said that they will not buy 'hot air' from Russia i.e. surplus allowances that have been generated without any effort to cut emissions levels. Nevertheless the existence of the Russian surplus should put a psychological ceiling on prices in the first period.

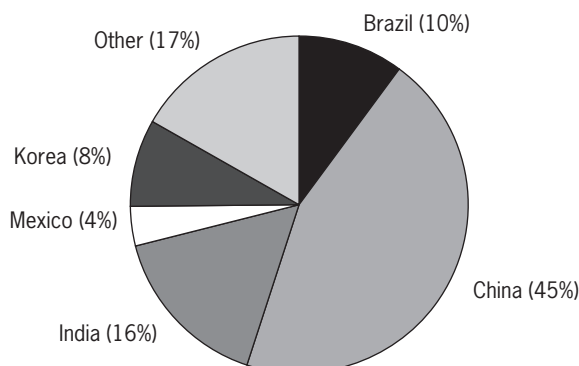
It would be unfortunate if the cooperation of the Non-Annex 1 countries such as China from 2013 were to be bought with a cap that is so high as to create a similar surplus in the second commitment period. It seems highly unlikely that China would accept a real limit on its rapidly growing economy and all of its rhetoric suggests that it will not do so. A high cap for China would not only fail to limit Chinese emissions, but could also create an emissions allowance price that is so low as to undermine efforts to cut emissions in the Annex 1 countries.

The Contribution of the Non-Annex 1 Countries

The fact that the Non-Annex 1 countries have not agreed to emissions caps does not mean that they are not contributing to the effort to mitigate climate change. Through the Kyoto Clean Development Mechanism (CDM) these countries are hosting clean technology projects financed by foreign investors who are rewarded in the form of tradable allowances, called Certified Emissions Reductions (CERs) (see Figure 2). These CERs can be sold on the international market or be used by Annex 1 countries to meet their own country-wide emissions caps set by the Kyoto Protocol.

The more CDM projects that are hosted by the Non-Annex 1 countries, the cleaner will be the technology underlying their inevitable economic growth. However the downside of this approach is that the more CDM projects that exist, the greater the

Figure 2: Clean Development Mechanism Projects



number of CER allowances that are created to add to the surplus already bearing down on the market price.

To guarantee a high emissions allowance price that incentivises green behaviour worldwide, there has to be a change in the fundamental supply and demand parameters of the Kyoto emissions trading scheme. This is where the Non-Annex 1 countries, particularly China, could achieve most from its position outside the Kyoto cap-and-trade mechanism.

If China were to devise its own domestic cap-and-trade mechanism, targeting whichever sectors, industries or regions within its own borders that it deemed appropriate, it could buy a significant proportion of the international market surplus of allowances for compliance with its own domestic scheme. This would rescue the price of allowances in the international market and support the objectives of the Kyoto Protocol without the need for negotiating a Kyoto-prescribed cap.

In this way China, or any other Non-Annex 1 country or even a country completely outside Kyoto for that matter, could encourage green growth in its own economy. If the international carbon price is low, this would be achieved at minimal cost. If, against all expectations, the international carbon price turns out to be high, the Non-Annex 1 country could adjust its domestic cap levels without consulting the UN if the compliance burden proved too onerous for its growing economy.

Mechanics

Any country, region, local authority, company or individual can trade in most of the different types of Kyoto allowance asset classes by opening up a registry 'Person Holding Account' in one of the 25 operating European allowance registries. This is achieved by a process similar to opening a bank account.

In time, as the various US regional schemes, such as the Californian or the RGGI scheme, the New Zealand and Australian emissions trading schemes start trading, a country such as China can recognise emissions allowances from around the world, not just those generated by Kyoto. It could, if it chose to do so, also recognise allowances from good quality voluntary emission reduction schemes (VERs).

At the moment, Kyoto-generated allowances are not fungible with allowances from other sources such as US, Australian and VERs. In other words a US allowance cannot be used by an Annex 1 country to meet its Kyoto cap, or vice versa.

If sufficient Non-Annex 1 countries chose to introduce domestic emissions trading schemes outside the direct control of the UN, but using existing Kyoto-based allowances and/or allowances generated by non-Kyoto schemes, it would not only raise the international carbon price but also provide a fungibility link between the prices of allowances from diverse sources that are not otherwise interchangeable.