

CTiC Environment Group

Carbon Trading September 2008

Abstract

The carbon market at the heart of the Kyoto Protocol is a mighty edifice built upon small evidence that such a construct could actually work. Its prime purpose appears to be wealth and job creation rather than reduction of carbon emissions. It is bedevilled by problems, open to corruption and virtually impossible to implement. It is imperative that Christians seek and promote a fair and effective alternative whilst there is yet time to influence the post-Kyoto talks.

Emissions trading principles are based on proposals by the Technocracy movement of the 1930s designed to promote balanced and harmonious development throughout the world using a system of Energy Accounting. In *Wealth, Virtual Wealth and Debt* (1926), Prof. Frederick Soddy looked at the role of energy in economic systems. He criticized the focus on monetary flows in economics, arguing that 'real' wealth was derived from the use of energy to transform materials into physical goods and services. His writings were largely ignored at the time, but were later applied to the development of ecological economics in the late 20th century; thus was trading in the right to pollute born. The idea is that by putting a price on nature's 'services' such as the earth's ability to absorb pollution, markets will 'internalise externalities'. The first such trading system was set up in the USA in 1990 to deal with sulphur dioxide pollution from burning coal (which causes acid rain). Other similar programmes have since been set up to reduce lead, nitrous oxide and other pollutants.

In 1992 the UN Framework Convention on Climate Change (UNFCCC) called for 'stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system . . . within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner'. Following the above US initiatives, enormous amounts of time and energy were devoted by economists, business groups, UN agencies, governments and even NGOs to create a market for the most important greenhouse gas – carbon dioxide. However, the 'success' of the sulphur dioxide scheme is largely due to the fact that only a small number of companies were involved; any notion of extending this idea to the entire developed world based on such limited experience was to sail in uncharted territories.

As things have developed, there are now two types of carbon trading:

- **Emissions Trading (or 'cap and trade')**

An Emissions Trading Scheme (ETS) is a mechanism that creates a competitive market to control polluting emissions by providing incentives to achieving reductions, by putting a price on those emissions. A regulatory body sets an overall limit (the 'cap') on all sources covered by the scheme on the amount of pollutant that can be emitted in total in a year. Permits are then given or sold on a proportional basis to all polluters in the scheme; these allowances (or credits) represent the right to emit a specific amount. The theory is that parties that can reduce emissions more cheaply will do so by more than the statutory amount, enabling parties with a high cost to reduce pollution to buy their excess permits, thereby achieving reductions at the lowest overall cost. The aim is that by reducing the 'cap' year on year, the total amount of pollution is reduced. The American pollution control measures described above were all emissions trading schemes.

- **Trading in Project-based Credits (or ‘baseline and credit’)**

The idea of emissions trading has been extended to allow the parties involved to invest in other projects which ‘reduce’ emissions below what would have happened otherwise (the ‘baseline’). The **UK Emissions Trading Scheme (UK ETS)** was an example of a ‘baseline and credit’ scheme, which ran from April 2002 until Dec 2006. It was the world’s first economy-wide greenhouse gas (GHG) emissions trading scheme and was introduced into a complex climate policy framework including the Climate Change Levy (a carbon tax), and negotiated Climate Change Agreements. The aims were to achieve cost-effective emission reductions, to give UK companies early experience with ETS and to establish London as a carbon trading hub. Thirty-three organisations voluntarily took on emission reduction targets to reduce their emissions against 1998-2000 levels by trading in Renewables Obligation Certificates (ROCs) issued for renewable electricity generated within the UK and supplied to customers within the UK by a licensed electricity supplier. Although the UK ETS has now finished, trading continues between companies with Climate Change Agreements.

Later emissions trading schemes involve putting both categories together to form a **hybrid trading scheme** in which governments allocate pollution permits to big industrial polluters to trade amongst themselves and surplus carbon credits are generated from carbon reduction projects that claim to reduce or avoid emissions in other locations, usually in countries in the South; these credits may be purchased to top up any shortfall in permits. The problem then arises that whilst emissions trading on its own forced the parties involved to reduce their emissions by the agreed target between them, once trading in project-based credits is allowed, if this were cheaper than reducing their own emissions, it would be possible for all parties involved to invest solely in outside schemes and not reduce their own emissions at all. This is in fact now happening.

In 1997, the **Kyoto Protocol** (itself a subsidiary instrument of the UNFCCC), a legally binding treaty to reduce emissions of the six main GHGs on average to 5.2% below 1990 levels by 2008-2012, was agreed but did not come into force until 2006. It assigned targets to 38 industrialised countries but allowed these targets to be met by trading not only in emissions allowances but also credits earned from carbon reduction projects in transition countries such as those in the former Soviet Union (Joint Implementation (JI) projects) or in developing countries to contribute to their sustainable development (Clean Development Mechanism (CDM) projects), and also domestic projects involving increasing carbon sinks (land use, land-use change and forestry (LULUCF) activities such as reforestation, improved crop and grazing land management and restoration of degraded lands). These mechanisms were included in the Protocol at America’s behest; they then refused to sign the treaty by which time it was too late to return to emissions trading only.

The **European Union Emission Trading System (EU ETS)** was originally designed as a ‘cap and trade’ scheme, the first phase of which operated from Jan 2005 to Dec 2007. It is the largest multi-national, emissions trading scheme in the world, and is the cornerstone of EU climate policy. The ETS currently covers more than 10,000 installations in the energy and industrial sectors (power stations, oil refineries, iron and steel industries, paper mills etc) which are collectively responsible for nearly half of the EU’s emissions of CO₂ and 40% of its total GHG emissions. Currently, the installations are given the allowances free (called grandfathering) from the EU member states’ governments. Besides receiving this initial allocation on a plant-by-plant basis, an operator may purchase EU allowances from other installations, traders or the government; if an installation has received more free allowances than it needs, it can sell the excess. The first phase has not been a success: verified emissions increased by 2% over this period. In order to obtain industry’s cooperation, too many allowances were issued initially thus not providing the necessary incentive to reduce emissions and at the same time enabling many installations to make a windfall gain when they sold the excess (corporate participants were granted about 10% more allowances than they needed, which amounted to 1.8 bn Euros of free money). As a result, the price of carbon crashed from 30 euros per tonne in May 2006 to 0.03 euros per tonne in Dec 2007.

The second Trading Period is now under way, from Jan 2008 until December 2012. There are some changes in place for this phase which mean that it has now become a hybrid scheme. Kyoto flexible mechanism certificates are now accepted as compliance tools within the EU ETS; carbon credits from Joint Implementation projects and Clean Development Mechanism projects acquired under the Kyoto Protocol can be used towards EU ETS commitments. Currently, the EU does not accept credits obtained from land use activities such as reforestation but some governments and industry representatives are lobbying for their inclusion; this is currently opposed by NGOs as well as the EU commission itself, arguing that there are too many scientific uncertainties over the permanence of carbon sinks and that they have inferior long-term contribution to climate change compared to reducing emissions from industrial sources. The carbon permits continue to be given away for free: whether the consequent windfall gains find their way into renewable energy investment or shareholder's and executives' pockets is a moot point.

Further changes to the scheme are now being discussed which would become effective for the third Trading Period, ie from January 2013 until 2020, including centralised allocation by an EU authority (rather than by individual nations); the scheme may also be widened to include emissions from air and sea transport. It has however been agreed that from 2013, nations will be able to auction the permits instead of donating them. Economists predict that if all countries do so, the net effect 'would be a swipe of the entire multibillion-pound windfall for European exchequers: arguably the biggest tax raid in history'¹. Britain has announced that it will auction all of its carbon permits, thereby possibly raising as much as £5 billion per year. If this money were hypothecated to green spending the possibilities are legion: renewable energy, carbon capture and storage for coal-fired power stations, or infra-structure for public transport. Alternatively it could be used to alleviate fuel poverty: auctioning carbon credits will increase the cost of energy, and as permits get scarcer, costs will continue to escalate so should we continue down this route, this will be an ever-increasing problem that will need to be addressed. Or it might not be hypothecated, and be used to pay off some of our debts instead.

Problems with market-based carbon trading

Nicholas Stern described climate change as the 'greatest market failure the world has seen'; this has now been super-ceded by the Kyoto Protocol and the EU ETS. Improvements could be made to these schemes but there are still grave doubts about whether the complicated market-based carbon trading approach could ever work; indeed it is likely to cause new problems which could actually increase global warming. Problems include the following:

1. In order to work, emission trading has to create a special system of property rights in the earth's carbon-cycling capacity: rights which not only legally oblige the emitter to reduce emissions to the specified limit but also legally entitle them to emit up to that amount. Governments have given away a huge number of these rights, free of charge, to industrialised corporations and nations. Industry, economists, governments and lawyers all agree that these are substantial assets, the value of which now appears on companies' balance sheets. This means that Kyoto and EU ETS (as practised to 2012) are both perverse programmes where the polluter is rewarded rather than the common-sense idea that the polluter should pay. It also means that the system is widening the gulfs between fossil fuel users (which get allowances) and renewable energy producers (which get none) and also between the North (which gets all the allowances) and the South (which gets none).
2. Emission trading is an inefficient way of reducing pollution compared with regulation and/or taxation, eg the sulphur dioxide programme is regarded by some as a success in that total emissions are expected to be reduced by 35% from 1980 to 2010, and this to have been achieved much more

¹ Faisal Islam, 'Cornering the Market': the Ecologist

cheaply than if each source had been required to achieve the same reduction, but this conclusion is suspect, as 20% of the reduction had already happened between 1980 and 1990, due to the availability of low-sulphur coal; by contrast, Germany cut its sulphur emissions between 1982 and 1998 by 90%, without trading. Also, in the first three years of the nitrogen oxides trading programme in the US, emissions fell by 3% compared to a 13% decline in the previous three year period under a different regulatory scheme. And the US took 23 years to eliminate lead in petrol using a trading scheme, whereas China took only three without trading.

3. Pollution trading is a poor mechanism for stimulating the social and technical changes needed to address climate change. Because it treats all one-tonne cuts as equivalent, no matter where they occur (and no matter whether they be 'survival emissions' or 'luxury emissions'), it results in the cheapest cuts being made first. Instead of encouraging the type of innovations, long-term investments and broad re-structuring that are crucial to the transition to a low carbon future, it discourages them in favour of scattered stop-gap measures. This risks delaying progress in dealing with climate change. The sulphur dioxide and nitrous oxide schemes did not stimulate and indeed may have hampered new innovations: the cuts were made by efficiencies which could have been effected under regulation.
4. The attempt to build new carbon-cycling capacity is interfering with genuine action on climate change. The JI and CDM and schemes could be emission-saving technology like refitting factories in India to capture HFCs, or investment in hydroelectricity dam projects in China, or renewable energy projects, or setting up biofuel plantations, or using methane from waste dumps or pig farms to generate electricity, or digging holes in the ground or under the seas for dumping liquified carbon dioxide or . . . so long as the project emits less GHGs than BAU, it can claim credits. It is, however, impossible to measure savings that are additional to those that would have occurred without the projects especially as BAU is determined by the project's own consultant, thereby creating a conflict of interest. Indeed it has been claimed that up to 50% of projects are not really additional but merely relabelled BAU, ie they are schemes that would have happened anyway. For example, 96% of all dam projects to produce hydroelectricity were either already built or under construction when they were approved. The problems of verification mean that transaction costs escalate; the CDM is therefore dominated by big non-renewable projects that generate a lot of credits but do not lead to structural change, while community-friendly renewable energy projects or basic energy efficiency measures that generate few credits lose out. (The figures from 2006 show carbon capture 72%, biomass 21%, dams 3%, renewables 2%, energy efficiency 2%). There are even more verification problems with LULUCF carbon sink projects, eg the probability that a particular wooded region will maintain a given carbon balance over the next 50 or 100 years cannot be calculated – it involves unknowns like fires, insect infestation, the effect of climate change on the trees' ability to absorb carbon dioxide, social effects etc.
5. Baseline accounting is creating perverse incentives throughout the South for emission-related environmental laws not to be enforced since the greater the baseline emissions, the greater the number of credits that can be derived from CDM projects. Projects are certified by the government of the host country, which opens the way for corruption. It is in the interests of both buyers and sellers to inflate the number of carbon credits that a project generates. It is also in the interests of business, Northern governments and agencies like the World Bank to have cheap credits flowing onto the market as fast as possible as this enables them to continue BAU – there is therefore a move to fast-track verification as much as possible which makes it less likely that projects are genuinely reducing emissions or contributing to sustainable development.
6. The JI and CDM projects (and those of the proliferation of private carbon-offset companies) are encouraging the continued extraction of fossil fuels for the benefit of companies and individuals

wishing to salve their consciences in industrialised countries; they also encourage the abuse of indigenous peoples and environmental destruction while producing no additional reductions; tree plantations claimed to absorb carbon dioxide often drive people off their lands and destroy biological diversity.

7. If its aim was to reduce GHG emissions it has failed, in that the rate of increase of global emissions has increased from 1.1% per year for 1990-99 to more than 3% per year for 2000-2004. If its aim was to obfuscate the whole system in order to carry on with business as usual (BAU), it has succeeded. The inclusion of project-based credits in Kyoto and now EU ETS is a disaster. The continuance of this practice in the EU ETS from 2013 would mean that the money realised by the auction could well be less than anticipated.
8. Kyoto was devised by middle class Westerners whose values are not necessarily held by the rest of the world; it rests on unexamined and unrealistic cultural assumptions. For instance, the theory assumes that industry everywhere wants to reduce the cost of obeying environmental laws: this is not the case in countries where environmental laws are not respected. Also, in much of the world where industry is kept going with government support, efficiency and profit are secondary to production and employment².
9. Building a trading system reduces the political space available for education, movement-building and planning the necessary transition away from fossil fuels. The European Market has stifled long-term innovation in favour of making marginal efficiency improvements, political lobbying, devising means of passing cost onto the customer and generally learning how to play the system.
10. Global trading systems for GHGs cannot work without much better global enforcement regimes than are likely in the near future. The rules of the US pollution markets could easily be enforced by the government of that country. It is much more difficult to enforce a multi-national system: measurement and monitoring are inadequate or even impossible, penalties are derisory (the Kyoto penalty is a cut in future allocation, but as allocations are negotiable, this is meaningless). Indeed, without a world government, it is difficult to see how Kyoto can be enforced.

These points are valid arguments against carbon trading. But they miss the vital point that the root cause of all our environmental problems including global warming is the economic growth required by capitalism. During the years of strong economic growth between 1992 and 2001, American carbon emissions grew by 13%. By contrast, during the stagnant years from 1970 to 1982, carbon emissions were stable. So the most damning indictment of Kyoto is that the purpose of the protocol is to hand over entire control of global warming to capitalism, the very system that caused the problem. A fantastically complex structure has been designed which is virtually impossible to implement, the main purpose of which is to make money out of reducing emissions; and the opportunities for fraud are many. It was deliberately set up to avoid the most rational policy, which would be to keep the carbon in the ground in the first place. Finally, and most importantly, if the scheme fails it will result in continued eco-destruction, but if it succeeds on its own terms it will also fail the world because the wealth created from the market will be used to make more money which will in turn be invested in more eco-destructive schemes. George W. Bush refused to sign America up to Kyoto on the grounds that it would be bad for the economy, but in fact many American capitalists can't wait for the huge market that will result if Kyoto is expanded worldwide.

² Ruth Greenspan Bell, 'The Kyoto Placebo': Issues in Science and Technology, Winter 2006

Yvo de Boer, executive secretary of UNFCCC, said 'I have a dream' as he set out his belief that carbon trading would help stabilise GHG emissions and aid developing countries by transferring £50 billion a year to developing nations (so far this figure only amounts to tens of millions). James Lovelock thinks such dreams are dangerous, saying 'these new markets do some good in that they generate wealth and keep these people employed, but they and the IPCC are just raising false hopes'. Kevin Smith of Carbon Trade Watch describes carbon trading as an 'obscenity', stating that 'from the Stern review to Europe's Trading Scheme, the aim of reducing emissions has been perverted by neo-liberal dogma and corporate self-interest'. This point would appear to be supported by Tony Blair who said in 2005: 'the truth is, no country is going to cut its growth or consumption substantially in the light of a long term environmental problem'.

Clearly, Kyoto will not do, but the Bali Roadmap (Dec 2007) would indicate that unless something very significant happens, the Protocol's essential framework is likely to continue: the European Council for Sustainable Energy called for a new climate agreement that would 'maintain continuity in the legally binding frameworks underpinning the carbon market'. Even NGOs who should know better support it, presumably because they have been advised that 'Kyoto is the only game in town'. So what alternatives have been proposed for a possible follow-on treaty?

Contraction and Convergence (C&C)

This suggestion put forward in 1990 by the Global Commons Institute was founded on two fundamental principles:

- (i) that the global emission of carbon must be progressively reduced and
- (ii) that global governance must be based on justice and fairness.

They concluded from the second principal that emissions must be based on an equal per capita allowance. C&C then consists of three elements:

- **Contraction:** an international agreement on the maximum permissible level of carbon emissions in the atmosphere
- **Convergence:** the date by which global per capita shares (based on national or regional populations at some agreed date) should converge to this level
- **Trading of GHG emission rights:** the ability of countries unable to manage within their agreed shares to buy the unused parts of allocations of countries which use less than their agreed share. Sales of unused allocations would enable vendor countries to fund their development in sustainable ways.

C&C is thus a 'cap and trade' scheme. It is a mechanism by which money would flow from rich nations to poor nations as of right, not as aid; as a result, the world economy would move towards greater equality. Although discussed at the talks leading up to Kyoto, C&C was not adopted at the time; however, many accepted it as an ideal to be aimed for at some time in the future. It has been adopted as the basis for future negotiations by India, China and the African Group of Nations; many other countries, organisations and eminent individuals have also expressed their support. Indeed in Sept 2007, the German Government proposed the C&C approach as the basis of the post-Kyoto agreement. GCI is now conducting an international campaign, called Carbon Countdown, to gather support for C&C as the framework for the post-Kyoto agreement amongst corporate leaders. As Christians desirous of saving God's creation we cannot but prefer the certainty of a scientifically determined and internationally agreed upper limit to emissions to the uncertainty of ad hoc percentage cuts applied to some countries as agreed at Kyoto. Also, commanded to 'love our neighbours', we cannot fail to accept that the equity of per capita shares is right; indeed it has been the official position of the Church of England since 2006.

Tradeable Energy Quotas (TEQS)

C&C is a mechanism for dividing up carbon internationally between nations; the policy of TEQS (an idea developed by David Fleming from his earlier work on Domestic Tradable Quotas) is the logical extension to a national system. This is a carbon-rationing, 'cap and trade' scheme, whereby the 40% of carbon (actually all GHGs) currently used by UK citizens would be distributed to adults on a per capita basis in the form of

TEQs. The remaining 60% would be sold to businesses etc, also as TEQs, by auction; the revenue raised would be ring-fenced for use in easing the transition to a low-carbon economy. An independent, science driven body, the Energy Policy Committee would administer the carbon budget, which would decrease year on year. The budget would be set twenty years in advance (but with inbuilt flexibility) to create a stable environment in which individuals and businesses could operate with confidence. Central to the success of such a policy would be the setting up of a carbon market in which individuals who live within their carbon budget can sell their excess permits. Businesses, organisations and individuals who need more permits could buy them at the market price. All transactions would be conducted electronically via carbon banks, at the same time as the financial transaction was taking place; it would be no more difficult to operate than handling credit cards.

In May 2006, David Miliband, discussed the possibility of introducing personal carbon trading when he was Environment Secretary. However, two years later, the Department for the Environment, now led by Hilary Benn, said that the policy will not be investigated beyond a 'pre-feasibility study'.

Cap and Share (C&S)

This policy (a variation of C&C), was devised by Feasta (The Foundation for the Economics of Sustainability) in 2005; it suggests that global emissions be capped at their current level and then brought down year by year, but each year, the available emissions would be shared equally amongst all the Earth's adult population, each of whom would receive a certificate for their individual entitlement. The recipients would then sell their certificates through the banking system to oil, coal and gas producers who would need to acquire enough of them to cover the carbon dioxide emissions from every tonne of fossil fuel they sold; the main advantage of this system is that it would charge a small number of companies for permission to extract fossil fuels from the ground, which might encourage the idea that under the ground is where they should remain. C&S also differs from C&C in that it insists that emissions allocation be distributed equally to individuals as their right, whereas C&C allows governments to decide how, or indeed if, they wish to share out the national allocation. (It therefore encompasses both C&C and TEQs and hence would be more straightforward). Also, while C&C allows a convergence period during which the richer countries would receive higher per capita emissions allowances than poorer countries, C&S says people in rich countries should get the same emissions entitlement as those in poor countries from the start; it also suggests that in the early years of the system, a portion of everyone's emissions entitlement should be held back and distributed to governments of countries which were facing exceptional difficulties in adapting to climate change or to low levels of fossil energy use. C&S has been adopted by Ireland as the best way forward.

Kyoto2: How to Manage the Global Greenhouse

In this book, Oliver Tickell, a well-known writer on the environment, exposes the flaws in the current system and proposes a set of mechanisms that aim to stabilise GHG emissions at no more than 350 ppm CO₂ eq. Its key points are:

1. It is a global system to auction transferable permits to pollute the atmosphere with industrial GHGs up to a series of annual caps defined at levels that would prevent dangerous interference with the Earth's climate system.
2. As a global system it would apply equally in all countries; there would be no national emissions allocations.
3. GHG emissions would be regulated 'upstream' – that is, as near as possible to the point of production, and in the case of emissions from fossil fuels, as close as practical to the point of production of the fuels themselves.
4. This system would create market incentives for the wide scale and systematic reduction of GHG emissions and the development of alternatives, to be supported in turn by regulations and standards aimed at overcoming the market failures of the Kyoto Protocol.

5. The funds raised at auction would be invested to tackle both the causes and the consequences of climate change, with an emphasis on addressing the needs of the poor and of those most adversely impacted, including to:
- help adaptation to such climate change as is already inevitable;
 - accelerate progress towards a clean, energy-efficient, low-carbon economy;
 - reform land use so as to conserve biological carbon within soils, peatlands, forests and other ecosystems, and reduce emissions from land of other greenhouse gases;
 - research low-cost and environmentally benign geo-engineering options that could *in extremis* prevent a ‘runaway greenhouse effect’ from taking hold³.

The proposals have met with the approval of George Monbiot: ‘the most intelligent treatment of the politics and economics of climate change I have ever read. Brilliant, clear and unanswerable’, Marl Lynas: ‘elegantly simple and eminently workable, this is a proposal that could change the world’ and Jonathon Porritt: ‘exactly the kind of fresh, radical thinking that is now so urgently required’. However, it still aims to produce strong economic growth and therefore does not address the root cause.

A Proposal by Friends of the Earth

Friends of the Earth think that the principle of C&C could be implemented more effectively and comprehensively by changes in tax and public spending; they suggest that in the long term we need to shift sources of public revenue

away from taxing the rewards people and businesses get for contributing to the common wealth to making people and businesses pay for the value they take from common resources; and to shift public spending away from perverse subsidies for unsustainable activities and projects, and from payments to businesses for providing public services, to a Citizen's Income, reflecting every citizen's right to a share in the value of common resources. This would be a more fundamental change than rationing, but also easier for people to understand and accept.

The way forward

Formal negotiations for a post-Kyoto treaty start in 2009. The outcome will affect the future of all life on earth; without a radical change of direction, humanity is about to sleepwalk to social collapse.

All the above proposed ‘solutions’ have good and bad points. The drawback to C&C is that there is no guarantee that the wealth it would transfer from rich nations to poor would be spent on low carbon technology, or mitigating climate change, or improving the lot of the poor in any way, and without great improvement in governance, it probably wouldn't be. (Also, it would count emissions for goods produced in developing countries for export to developed countries as part of the allocation of the country of origin). C&S gets round the governance problem in principle; the idea of extending equal energy rights direct to all individual citizens is appealing and could work in developed countries with a robust identification system, but developing countries are unlikely to have an accurate database. Kyoto2 is right to regulate fossil fuel at the point of extraction (which is possible) rather than at point of emission (which is almost impossible), and would create a large pot of money for avoidance and mitigation of climate change. The author claims it could still maintain strong economic growth, but maybe it could also operate within a steady-state economy.

All faith groups have a moral imperative to inform themselves of the facts and possible alternatives, and to initiate discussions both with their congregations and with political leaders. Now is the time to return to the fundamentals of our faith, to be mindful of our teachings of ‘enoughness’ and to advocate a more frugal and fairer way of life. The Church should seek and advocate a solution which takes account of the ‘Limits to Growth’ which were evident thirty years ago and steers a course away from international capitalism.

³ Oliver Tickell, ‘Kyoto2: How to Manage the Global Greenhouse’

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