

K2S

The Kyoto2 Support Group

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AFTER COPENHAGEN

A radical rethink

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1 Introduction¹

It is now widely recognised that big cuts are needed, and soon, in worldwide emissions of greenhouse gases. But reaching agreement about how to do it has been proving difficult.

Conflicts of interest are part of the problem. But it appears that many of the difficulties arise from assumptions, inherited from the Kyoto Protocol, about how things will be organised.

We believe that a radical rethink is needed and that the ‘Kyoto2’ proposals, summarised in Appendix A, provide a good way forward. That said, our primary concern is to see an effective system in place, drawing on good ideas wherever they may come from.

In the following sections, we review a range of issues in relation to Kyoto2 and several other proposals that have been made. We will refer to those proposals, summarised in Appendix B, using the short names given there: ‘K1’ for the existing Kyoto system and other proposals in the same mould,² ‘K2’ for Kyoto2, and so on.

We believe that our analysis demonstrates the ‘logic’ of Kyoto2 or something like it. In particular, *we believe that there is an overwhelming case for controlling industrial greenhouse gases ‘upstream’, at or close to their origins* (Section 3).

2 A global cap on emissions

If we are to minimise the risk of dangerous climate change, there is a limit to the quantity of greenhouse gases that can be released into the atmosphere in the next few decades. This is true of emissions from both industrial and non-industrial sources but the focus here is on the former, while the latter are discussed in Section 8.

K2 and WBGU are the two proposals that recognise most clearly the need for a ‘budget’ for future emissions of industrial greenhouse gases. In K2 the budget is divided into permits which are sold in a global auction, while in WBGU the budget is divided amongst countries in proportion to population sizes.

We believe that, for the control of industrial greenhouse gases, this ‘budget’ approach is essential. Without that kind of global cap on emissions, attempts to control emissions are likely to be defeated by something similar to the phenomenon variously known as the ‘Jevons paradox’, the ‘boomerang effect’ or the ‘Khazzoom-Brookes postulate’.³ In the present context, if there is no global cap on emissions, people may simply use the new clean sources of power alongside the old dirty sources of power—without any reduction in emissions.

A key point about the global budget for emissions is that it should be determined by science and not negotiation. The planet does not know about compromise or deals.

3 ‘Upstream’ versus ‘downstream’ controls

It is widely assumed that industrial greenhouse gases should be controlled at the level of fossil-fuel-using people or businesses. This kind of ‘downstream’ approach to the problem,

¹ An electronic copy of this document with live links may be downloaded from <http://www.mng.org.uk/ac>.

² Including schemes such as the EU Emissions Trading Scheme, the Clean Development Mechanism, and voluntary carbon offsets.

³ The idea here is that, as technological improvements increase the efficiency with which a resource is used, total consumption of that resource may increase, rather than decrease. For example, if aeroplanes are made more fuel-efficient, this may help to make flying cheaper and this may lead people to fly more. As a result, there may be more CO₂ emissions than there were before.

with national targets for reductions in emissions, is the basis of K1. The main alternative is to apply controls, wherever possible, at or near the origins of industrial greenhouse gases. Thus, for example, permits would be required to extract oil, gas or coal from the ground. This kind of ‘upstream’ control of industrial greenhouse gases, which removes the need for national targets, is a central plank in K2 and other proposals such as CD, CS and FD.

As described here and in Sections 4, 6 and 10 below, upstream controls offer several benefits and solve several of the problems with K1 and other downstream systems:

- Compared with the billions of emissions-producing people in the world or millions of emissions-producing businesses, there is only a tiny number of places that coal, oil or gas are extracted from the ground. This can mean a dramatic simplification of the system for controlling emissions.
- It is *very* much easier to ensure compliance by the operators of coal mines, oil wells or gas wells than to put whole countries in the dock if they fail to meet their targets.
- There is no need for complex negotiations about national targets for each country.
- It is much easier to ensure that caps on emissions conform to science and not political expediency.
- With upstream controls, there is no need for ‘carbon offsets’, the ‘Clean Development Mechanism’ or the like, so all the associated problems are avoided.
- Problems associated with fossil carbon that is ‘embedded’ in traded products would be avoided.
- There is no risk of ‘leakage’ of industries between countries.
- Industries in rich countries do not face ‘unfair’ competition from industries in poorer countries because of differences in national targets for reductions in emissions.
- There is no need for special arrangements for international aviation or shipping.
- There is no need for ‘dual-level carbon trading’ or ‘sectoral trading and sectoral crediting’.
- There is no need for special provision to deal with loose targets from the past or with the problem of ‘hot air’.
- These kinds of simplifications can reduce or eliminate problems arising from complexity itself:
 - Causing negotiations to become bogged down in a multiplicity of options,
 - Providing opportunities for the rich and powerful to skew things in their favour,
 - Multiplying the costs of administration,
 - Multiplying the opportunities for fraud.
- Upstream controls can help shift the focus of negotiations from the ‘burdens’ of cutting emissions to the benefits and opportunities of new green economies.

4 Carbon trading

With some exceptions, most proposals for controlling industrial greenhouse gases see a role for some form of cap-and-trade with fossil carbon, but what that means in practice depends very much on whether controls are applied upstream or downstream.

4.1 Criticisms of carbon trading

Carbon trading, as it has been practiced under K1 (in the EU Emissions Trading System, the Clean Development Mechanism, and voluntary ‘carbon offsets’), has been heavily criticised, with some justice, by several commentators, the most prominent of which is James Hansen.⁴

Amongst the problems that have been identified by these critics are the practice of giving away permits for nothing (‘grandfathering’) leading to windfall profits and collapse in the value of permits, the way in which the number of permits issued can be influenced by powerful lobbies, and the several problems with carbon offsets and the Clean Development Mechanism including ‘additionality’, opportunities for fraud and spurious accounting, and credits for projects that achieve no net reductions in emissions.⁵

It appears that *with upstream controls and, more specifically with the K2 proposals, most of these problems disappear*. The problems, and the way in which K2 provides solutions, are summarised in Appendix C.

4.2 Carbon trading or taxation?

The several problems with carbon trading as outlined above have led some people to suggest that a tax or fee may be a better way to raise the price of emissions. In FD, for example, the money raised from charges on fossil carbon would be returned to the public as a ‘dividend’.

4.2.1 Setting the level of taxation

In this context, the main problems with taxation are:

- There is no carbon budget and no cap on emissions. It is hard to know how high the tax or fee must be set in order to achieve the reductions in emissions which are needed to minimise the risk of dangerous climate change.⁶
- The high level of taxation on road fuels in the UK has not prevented the steady growth of traffic, including many gas-guzzling SUVs, and it has not led to decarbonisation of the nation’s fleet of vehicles.
- Lobbyists will put intense pressure on politicians to make carbon taxes lower than they should be. This is what happened with the road-fuel protests in the UK in the year 2000, when the government backed down from its policy of annual, above-inflation increases in the taxes on road fuels.

⁴ See <http://www.k2support.org/carbon-trading>.

⁵ There is a fuller account of these problems at <http://www.mng.org.uk/offsets>.

⁶ In his FD proposals, James Hansen suggests that “As time goes on, fossil fuel use will collapse, coal will be left in the ground, and we will have arrived at a clean energy future.” (<http://www.guardian.co.uk/environment/2009/dec/27/james-hansen-copenhagen-agreement-opportunities>) But, given the convenience of fossil fuels, and the fact that in some cases such as aviation, it will not be easy to replace fossil fuels, it seems likely that the use of fossil fuels will persist unless there is an outright ban or, equivalently, permits for their use are reduced to zero.

4.2.2 Cap-and-trade creates a floor on emissions?

It has been suggested that, in a cap-and-trade system, there would be an effective floor on how fast emissions may be cut because steep cuts would mean falling prices for permits which would encourage emissions to rise.⁷ This may be true in theory but it seems likely that the main challenge will be to keep below the caps on emissions that are needed to minimise the risk of dangerous climate change. Also, under K2, it is easy to put a floor on the price of permits to provide a continuing incentive to cut emissions.

4.3 Reform of trading

We believe that, with upstream controls and the kinds of reforms outlined in Appendix C, the auctioning and trading of permits have an important role to play in determining their market value and providing the means of assigning fossil fuels to areas of economic activity where their value is greatest. This is the key ‘flexibility mechanism’ in K2, ensuring economic efficiency without the need for such things as carbon offsets, Clean Development Mechanism, or Joint Implementation.

Of course, national governments would be free to apply carbon taxes in their own areas if they wished, to complement and reinforce the global system of controls.

5 The role of regulation

In the Montreal Protocol, direct regulation has been the main instrument for the successful control of emissions of ozone-depleting chemicals. It also has an important role to play, alongside market mechanisms, in K2 and other proposals for cutting worldwide emissions of greenhouse gases.

There may, for example, be a case for setting a limit, or a series of decreasing limits, on emissions from electricity generating plants.

Regulations can help drive improvements in the efficiency of energy-consuming equipment throughout the world.

It is likely that regulation will have a particularly important role to play in the control of diffuse and hard-to-measure emissions from non-industrial sources (Section 8).

6 National targets for emissions

Part of the downstream approach to controlling greenhouse gases is the commonly-made assumption that each country’s emissions may be measured and made the subject of one or more national targets for reductions in emissions. With upstream controls, national targets are not necessary, although they may have a useful role to play as an informal guide to progress in different countries and as a spur to action.

We believe that the present focus on national targets for emissions is one of the main obstacles to progress. It creates a range of problems that largely disappear in K2 and other upstream systems, as discussed in the following subsections. That said, we welcome national initiatives, as outlined in Section 6.6, that complement and reinforce global controls.

⁷ *Storms of my grandchildren*, James Hansen, London: Bloomsbury, 2009, ISBN 978 1 4088 0744 6, p. 214.

6.1 *Problems in assigning emissions to countries*

As outlined in the following two subsections, assigning emissions to countries is not straightforward. By eliminating the need for national targets, upstream controls can sidestep these problems.

6.1.1 Fossil carbon embodied in traded products

As Oliver Tickell has written:⁸

If a product is made in China, by a company based in Singapore, using Australian coal, for a company in the UK, and exported to end users in the US, then which country should 'own' the emissions?

As things stand, the answer is 'China' but there is at least as much justice in assigning the emissions to the end users (in the US in this example).

With national targets for emissions, trying to account for the fossil carbon that is embodied in traded products is likely to be too complex to be manageable. But failing to account for that carbon will lead to anomalies and unfairness, as indicated above.

With upstream controls in place, end users of any product would pay for the permits used at any stage in their production or transportation, without the need for complex carbon accounting.⁹

6.1.2 Non-industrial greenhouse gases

For most of the non-industrial greenhouse gases, it is difficult to assign emissions to countries for two main reasons:

- Because these kinds of emissions are often hard to measure.
- Some emissions, such as potential emissions from methane hydrates in ocean sediments, may come from areas that are outside national territories.

Section 8 discusses how non-industrial greenhouse gases may be controlled without the need for legally-binding national targets.

6.2 *Burdens versus opportunities*

In terms of human psychology, a focus on national targets in the global system for controlling emissions encourages each country to concentrate on the perceived 'burdens' of cutting emissions and to try to minimise its own burden. By removing national targets from the global system, K2 reduces the temptation to indulge this kind of beggar-thy-neighbour approach to negotiations (see Section 9). And by raising the price of fossil carbon and creating a large fund to be spent on mitigation and adaptation (Section 7), it opens up new markets and shifts the focus on to how to share the benefits and opportunities of moving to a green economy (Section 9.1).

⁸ "Science says we need a 100% cut in carbon. Here's how to achieve it," Oliver Tickell, *Green Futures*, October 2008, p. 17.

⁹ Upstream controls would, incidentally, resolve such questions as whether it is better to air freight fruit and vegetables from tropical countries to temperate ones or whether it might be better to grow them closer to consumers in greenhouses that are heated with fossil fuels. In each case, the cost of permits would feed through into the prices paid by consumers.

6.3 Negotiations

A series of decreasing global caps on emissions, determined by science and not negotiation, eliminates the complexity of negotiating national targets for reductions in emissions—and eliminates the temptation to water those targets down.¹⁰

6.4 Enforcement

Although the word ‘enforcement’ is a harsh word, there is no escaping the fact that any system of controls is useless unless there is some means of ensuring that the reductions which are aimed for are actually achieved.

Under K1, this kind of discipline has been conspicuous by its absence. Countries like Canada have been allowed to flout their commitments with barely a slap on the wrist.

This is not simply a problem with K1. *Enforcement appears to be the Achilles heel of any downstream system in which the responsibility for cuts in emissions is assigned to countries.* It is in the nature of international politics that the penalties for failure will *never* be big enough to ensure that all countries meet their commitments. *We have not seen any convincing solution to this problem.*

Fortunately, upstream controls provide a way round the problem. *It is very much easier to ensure compliance by the operators of coal mines, oil wells or gas wells than to put whole countries in the dock if they fail to meet their targets.*

6.4.1 On-site inspections and enforcement

Although K2 avoids the need to put countries in the dock if their emissions are too high, it does require some system to ensure that coal mines, oil wells and gas wells are not producing more coal, oil or gas than they have permits for. Much of this can be done via documentation but to minimise the risk of fraud, on-site inspections will also be needed. And the cooperation of host countries will be needed in applying fines or other penalties when the rules are breached.

Those kinds of measures may be seen as a problem in some countries but it seems likely that any such doubts may eventually be overcome. Meanwhile, a coalition of the willing may go ahead with K2 as outlined in Section 11. That in itself would create an incentive for other countries to join the scheme.

6.5 Leakage and competition

With national targets for reductions in emissions and without any accounting for fossil carbon embodied in traded products, there is a strong temptation to move industrial production from countries with tough targets to those with easier targets. This allows rich countries to carry on polluting using poorer countries to do their dirty work—and with no net reduction in emissions.

Even without this kind of ‘leakage’ of industries between countries, there is the political problem that, whatever the justice of the case, industries in countries with tough targets will complain that they are facing unfair competition from industries in countries with more relaxed targets.

¹⁰ This is true of both WBGU and K2, although national targets are retained in the former but not in the latter.

With upstream controls on emissions, as in K2, these problems of leakage and competition simply disappear.

6.6 Sovereignty

It appears that the current emphasis on national targets is motivated in part by assumptions about national ‘sovereignty’ and unease about anything that has the flavour of ‘world government’. But it is well established that certain kinds of problems need regional or global systems. Examples include:

- Technical standards and systems to manage international telephony and the internet.
- International law governing the movement of aircraft and ships.
- Systems for catching international criminals.
- International bodies such as the UN and the World Bank.

Since climate change is a global problem, and since the world’s atmosphere does not recognise national borders, a global system is clearly required.

But there is no need for any kind of world government and there is plenty of scope for the exercise of national initiatives and national sovereignty, to complement and reinforce global mechanisms.

Although the concept of national targets for reductions in emissions is not entirely coherent (Section 6.1), it can be a useful informal guide to progress in any given country.

6.7 International aviation and shipping

The assumption that there will be national targets for emissions creates the problem of what to do about international aviation and shipping. Various solutions have been proposed, such as the suggestion that “International aviation and shipping sectors should each have a dedicated transnational system to cap emissions.” (GCT, p. x), the ASCT proposal for a dedicated cap-and-trade system, and the WBGU proposal for a levy on international aviation and shipping.

In K2 and other upstream systems, none of that complexity is needed: the problem simply disappears.¹¹

6.8 Dual-level carbon trading?

GCT proposes a system of dual-level carbon trading, at emitter level and government level. The main reason seems to be because of the difficulties of controlling all emissions at emitter level and to “ensure governments take responsibility for limiting emissions in line with the latest science.” (GCT, p. iv). With K2, since emissions are controlled upstream and there are no national targets, none of this complexity is needed.

¹¹ The aviation and shipping industries would simply buy whatever permit-paid fossil fuels that they need, plus permits that may be needed for other emissions, such as nitrous oxide and other non-CO₂ greenhouse gases that are emitted in flight.

6.9 Sectoral trading and sectoral crediting?

In GCT, a system of ‘sectoral trading and sectoral crediting’ is proposed for developing countries, apparently as a successor to the Clean Development Mechanism. In K2 and other upstream systems, none of this complexity is needed.

6.10 Dealing with loose targets of the past

GCT says “... an important challenge will be to address excessive surpluses of emissions allowances generated through loose targets under the first commitment period of Kyoto.” And it suggests that developed countries should agree to cancel a substantial proportion of surplus allowances or set up some kind of ‘green investment scheme’, with systematic measurement and verification of reductions in emissions.

In K2, none of this complexity is needed. Countries that have allowed their emissions to rise will find that they are paying more into the Climate Fund than countries that have kept their emissions low.

6.11 Hot air

According to a report in the *New Scientist* magazine,¹² one of the leakiest loopholes in the present system is ‘hot air’:

... the emissions permits that Russia and other east European countries were granted under the Kyoto Protocol but didn't use because their industries collapsed post-1990. The emissions of almost all of these nations have dropped by more than one third since 1990, and their governments have hoarded the permits, whose value increases with growing pledges to cut global emissions. Now it looks like Russia and others will be allowed to sell them right through to 2020.

EU environment commissioner Stavros Dimas agrees that hot air is a major loophole. He estimates that there could be some 10.7 billion tonnes of hot air permits on offer in 2012. That's roughly one third global annual emissions and nearly three times the EU's emissions. This is huge. It means the EU could offset all its promised cuts between 2012 and 2020 with hot air – even if it ups its pledge from 20 to 30 per cent of 1990 emissions in the final days of the Copenhagen talks.

This is clearly bad news in the fight against climate change. *But the problem disappears with upstream controls on emissions, as in K2.* Although countries with reduced emissions would lose their surplus permits under the old system, they would have the compensating advantage under the new system of requiring relatively small amounts of permit-paid fossil fuels.

7 Paying for mitigation and adaptation

It is now widely accepted that, while much of the cost of new clean technologies will be met from ordinary commercial sources, additional funds will be needed to help bring forward new technologies, to help poorer countries pay for the transition to clean technologies, to pay for measures to reduce emissions from non-industrial sources (Section 8) and to help meet the cost of adaptation to changes in the climate that are already in the pipeline. And it is widely accepted that most of that additional money should come from richer countries.

¹² ‘Loopholes in climate deal could render it useless’, *New Scientist*, 2009-12-16, <http://www.newscientist.com/article/dn18297-loopholes-in-climate-deal-could-render-it-useless.html>.

7.1 How to raise the funds

Evidence to date suggests that there will be strong resistance from national treasuries and national taxpayers to anything that they regard as a raid on ‘their’ money. It is probably better to raise most of the money in a manner that does not make a direct call on government funds.¹³

One such proposal (ASCT) is to raise at least some of the money via a cap-and-trade system applied to international aviation and shipping. In WBGU, the international trade in permits would produce a net flow of money from richer to poorer countries. In FD, some of the money needed to fight climate change in poorer countries would be raised via duties imposed on goods imported into the FD area. Under K2, proceeds from the sale of permits to pollute would be invested in a large and continually-replenished ‘Climate Fund’ of about US\$1 trillion every year.

K2 appears to be more comprehensive than alternative proposals, it is likely to raise more money, and it appears that the funds would be more precisely targeted at mitigation and adaptation. There is a large measure of fairness in this proposal, as described in Section 9.3.

Of course, any person or organisation would be free to make voluntary contributions, either into the Climate Fund or to charitable organisations working to reduce emissions or help adaptation to climate change.

7.2 How to spend the money

Naturally, a large international climate fund needs to be spent with care. In outline, this is how it may be done:

- Overall control would lie with national governments, with voting rights in proportion to population sizes at a given reference date.
- Some such body as the UNFCCC would administer the scheme, perhaps in conjunction with bodies such as the World Bank.
- There would be guidelines:
 - On the balance of expenditure between mitigation and adaptation.
 - On the balance of expenditure across different countries and regions, bearing in mind that, in general:
 - Money for mitigation should be spent where it will be most effective in cutting emissions.
 - There should be fairness in the allocation of moneys for adaptation, taking account of the varying severity of problems in different countries and regions.
 - To help ensure the effectiveness and efficiency of mitigation projects (see also Section 7.3, below)
- Any type of organisation, including national governments, would be free to submit project proposals. These would be evaluated by specialists with relevant knowledge using a range of criteria designed to ensure that projects are effective and efficient, that the proposing organisation has the necessary organisational skills, and so on.

¹³ But see Section 9.3.1.

- Project proposals would need to demonstrate close consultation with relevant local communities, and involvement of those communities.
- Projects would be monitored via reports and on-site inspections to ensure effectiveness and efficiency.

7.3 *Additionality?*

A possible objection to the idea that mitigation projects may be at least partly paid for from an international climate fund is that there may be the same kinds of problems that have arisen with the Clean Development Mechanism and voluntary carbon offsets. In particular, moneys from the fund may be used to pay for mitigation projects that would have gone ahead anyway so that there would be no net effect in cutting emissions.

That kind of problem may be overcome by ensuring that projects that are commercially viable in themselves would not be eligible for funds. In that connection, raising the price of emissions of industrial greenhouse gases will increase the number of projects that are commercially viable without the need for additional support. The projects that remain may be divided into two categories:

- Those that are not commercially viable because they are poor value for money compared with the alternatives. These should not be funded.¹⁴
- Other kinds of projects where support is likely to be justified. These include support for new clean technologies until they are properly established, and payments to protect areas of forest that may otherwise be cut down.

8 Emissions from non-industrial sources

Emissions from non-industrial sources such as deforestation, agriculture, and soils are problematic because of difficulties in measuring the emissions and, in some cases, difficulties in assigning responsibility for emissions to particular countries or industries (Section 6.1.2).

Despite these kinds of problems, some proposals envisage that all kinds of emissions would be squeezed into the Procrustean bed of national targets. For example:

In future, national targets will need to be more stringent and will have to cover a broad range of sectors in order to meet global emissions targets. All domestic sectors – power supply, industry, domestic transport, waste, buildings, agriculture and forestry – should be included under national targets. (GCT, p. 104).

Because there would be similar problems in trying to control these kinds of emissions via the sale of permits, K2 adopts a different approach:

As for diffuse land-based emissions from deforestation, agriculture and soils, these are excluded from the market mechanism owing mainly to the difficulty of measuring and monitoring them. (Kyoto2: How to Manage the Global Greenhouse, pp. 11-12).

In brief, K2 proposes that those kinds of diffuse and hard-to-measure emissions would be controlled by a combination of regulations in the manner of the Montreal Protocol (Section 5), and funding for mitigation measures via the Climate Fund. Similar proposals have been made, for much the same reasons, by WBGU.

¹⁴ Any assessment of value for money needs to take account of subsidies and hidden costs that may make some technologies appear to be cheaper than they are (see Section 9.2).

Examples of projects that may be funded in this way include projects to ensure that forests are more profitable if they are left standing than if they are cut down, projects to minimise loss of carbon from soils, projects to capture carbon in soils via biochar,¹⁵ and more.

9 Motivations

International negotiations on climate change will not succeed unless the costs and benefits are generally acceptable and arrangements are seen to be fair. Some relevant considerations are sketched in the following subsections.

9.1 *Costs and benefits*

One of the problems in this area is the tendency of everyone to pay more attention to costs and benefits that arise on short timescales than to ones that are further in the future. Despite Nicholas Stern's influential argument that the medium-to-long-term cost of inaction is likely to be very much higher than the short-term cost of action, the banking crisis still trumps the climate crisis.

A second problem is the conflict of interest that exists, both at national and global levels, between some vested interests and the broader interests of everyone else.

Fortunately, there is increasing recognition by a variety of people, industries and countries that what is good for the world is good for them as well:

- Without effective action on climate change, we are all at risk, rich and poor alike.
- On the positive side, there is huge potential in renewables and conservation of energy:
 - Using technologies that are available now, renewable sources of power can certainly meet all the world's current and anticipated future needs for energy (not just electricity).¹⁶
 - The transition to renewables with conservation of energy will open up colossal commercial opportunities, and jobs.
 - When environmental and hidden costs are properly accounted for, renewables are already cheaper than traditional sources of power and are becoming cheaper, while the cost of power from traditional sources is on a rising trend.¹⁷
 - Renewables provide greater security than traditional sources of power.¹⁸
 - The development of renewables with conservation of energy will reduce or eliminate several other problems with traditional sources of power.¹⁹

By raising the price of fossil carbon to its proper level and by providing funds for clean technologies (from the Climate Fund), K2 can help to create commercial opportunities and

¹⁵ See, for example, <http://en.wikipedia.org/wiki/Biochar>.

¹⁶ For information about the huge potential of renewables, with pointers to relevant sources, see <http://www.energyfair.org.uk/potential-of-renewables>.

¹⁷ For a discussion of these issues in relation to the cost of concentrating solar power, see <http://www.trec-uk.org.uk/links/energycosts.html>.

¹⁸ The USA, for example, can be self-sufficient in renewables thus avoiding its dangerous over-dependence on imported oil.

¹⁹ For example, mercury and arsenic pollution from coal-fired power stations, smog and associated breathing problems caused by the burning of fossil fuels.

jobs in green industries and it can help us all reap the other benefits of a transition to renewables and the conservation of energy.

9.2 Quality of information

One of the main obstacles to progress has been and continues to be well-funded campaigns and lobbying by vested interests spreading doubt and confusion about the realities of human-induced climate change, and false information about solutions. This has led to complacency about the threats of climate change and unfounded pessimism about renewable sources of power and the conservation of energy.

By showing more clearly the risks of business-as-usual and the feasibility, affordability and benefits of a green economy (as outlined in Section 9.1), good information will help to show that ‘fossil fuels = wealth’ is not the only game in town, and it will thus help to smooth the path for climate change negotiations.

9.2.1 Subsidies

One source of confusion is the continued existence of subsidies for fossil fuels²⁰ and for nuclear power.²¹ These should be phased out forthwith.²²

9.2.2 Factoring in environmental and hidden costs

Another source of confusion is failure to take account of environmental and hidden costs. This can make traditional sources of power appear to be cheaper than they really are. A robust global system for rationing fossil carbon will be a useful means of internalising some of its environmental costs.

9.3 Fairness

The auctioning of permits under K2 is broadly fair because most of the money would come from the big polluters. Countries with the biggest emissions *per capita* would be making the biggest payments *per capita* into the Climate Fund. And the scheme should satisfy those calling for “equitable sharing of the remaining carbon space” because all the moneys raised via the sale of permits from the remaining carbon space would be devoted to fighting climate change and helping people to adapt to changes that are already in the pipeline.

But there are likely to be residual concerns about fairness, as discussed in the following subsections.

9.3.1 Historical responsibilities

To take account of historical responsibilities, there is a strong case for countries with the biggest cumulative emissions *per capita* to make additional payments into the Climate Fund at the beginning. This would help to get things moving. Proposals of that kind have been made by WBGU and M, and as an extension of the original K2 proposals.

²⁰ In a report published in 2004 (see <http://news.bbc.co.uk/1/hi/sci/tech/3818995.stm>), the New Economics Foundation made a conservative estimate that worldwide subsidies for fossil fuels amounted to about \$235bn a year—and there seems not to have been much change since then.

²¹ See the *Nuclear Subsidies* report from the Energy Fair group which may be downloaded from <http://www.mng.org.uk/nsubsidies.pdf> or via a link from <http://www.energyfair.org.uk/home>.

²² The G20 countries have already indicated that they propose to phase out subsidies for fossil fuels (see “G20 fossil fuel subsidy push may aid climate talks”, Reuters, 2009-09-25, <http://www.reuters.com/article/idUSTRE58O3RN20090925>).

9.3.2 Everyone pays the same for their fossil fuels?

It is true that, under K2, poorer countries would pay as much for their fossil fuels as richer countries, with prices that include the cost of permits—and this may seem unfair. But:

- The need for permits in developing countries would be minimised since those countries can leapfrog the ‘dirty’ phase of development and move directly into clean technologies. Much of the money needed to pay for those clean technologies would come from the Climate Fund.
- Under K2, it is envisaged that the greater part of the money in the Climate Fund would be spent in poorer countries and regions. This should more than offset the cost of permits.

If the price of fossil carbon was to rise before good affordable alternatives were to become available, that may cause hardship for poorer people. In that case, payments may be made to alleviate hardship, pending the introduction of new clean technologies.

9.3.3 Loss of markets

Cutting emissions of industrial greenhouse gases is likely to mean shrinking markets for fossil fuels, HCFCs, and more. Although this may seem ‘unfair’, it is no different from the way in which gas lamps gave way to electric lights, horse-drawn carriages gave way to cars, or traditional photography has been largely replaced by digital photography.

To help sweeten the pill, the Climate Fund under K2 may provide grants to help countries and industries make the transition to clean technologies (but see Section 7.3). By a happy chance, many of the countries involved in the production of fossil fuels (eg Saudi Arabia, Australia and the USA) have colossal potential for the production of renewable power, especially solar power. One door may close but others open.

10 Complexity

In accordance with Occam’s razor (“entities must not be multiplied beyond necessity”), the system for controlling global emissions of greenhouse gases must have enough structure to be effective and efficient but without unnecessary complexities.

Of the range of proposals identified in Appendix B, we believe that K2 provides the best balance between complexity and simplicity. It provides what is needed for it to be effective and efficient but it eliminates many of the complexities in other proposals, as described in the Sections 3, 4 and 6.

Too much complexity is a problem in itself, as outlined in the following subsections.

10.1 Negotiations

Complexity can cause negotiations to fail and can work against the interests of poorer peoples and countries.

10.1.1 The tar pit

In his essay on *The Tar Pit*,²³ Fred Brooks describes how too much complexity can cause large software engineering projects to fail, with large numbers of staff sucked into the mêlée,

²³ In *The Mythical Man Month: Essays on Software Engineering*, Fred Brooks, Addison-Wesley, 1995, ISBN-13: 9780201835953.

somewhat like a pre-historic tar pit trapping many animals, with each victim serving as bait for new victims.

It appears that failure to reach a satisfactory agreement at Copenhagen was due in part to complexities arising from a range of assumptions inherited from K1.

10.1.2 Safeguarding the interests of poorer peoples and countries

Too much complexity creates many opportunities for the rich and powerful to skew negotiations in their favour. Simplicity and transparency is an advantage for everyone.

10.2 Complexity in administration

Too much complexity in the system for controlling worldwide emissions of greenhouse gases causes costs to multiply but, probably more important, it creates many opportunities for fraud.

10.3 The need for speed

Given the urgency of the need to bring down emissions of greenhouse gases and the time that has already been lost in tackling the problem, an effective system needs to be in place soon. *We simply don't have the luxury of waiting decades to achieve an effective global system for controlling emissions of greenhouse gases.*

But complexity can slow things up. For example, GCT envisages that a global system for carbon trading would evolve via the progressive linking of national and regional emissions trading schemes. But for this to work:

A notice period of several years should be provided prior to linking ETSs to allow time to negotiate common standards, give emitters and investors time to prepare, and smooth the convergence of prices in different systems. (GCT, p. xi).

Given those kinds of complexities, we believe that it is extraordinarily over-optimistic to suppose that a global system could be created within “the next five to ten years” (GCT, p. iv). It would be altogether quicker and simpler to aim directly for a global system, as proposed in K2.

K2 does recognise that it may not be possible to achieve a global system in one step and provides for the possibility that K2 principles may be applied in a ‘Kyoto2 group’, pending a global solution (as described in Section 11). Even if this two-stage process proves to be necessary, it appears that it would be quicker and simpler than what is envisaged in GCT.

11 Moving forward without a worldwide agreement

Although K2 would work best as a global system, it provides a way to make progress without it being necessary for all countries to participate. A ‘Kyoto2’ group of countries—which need not be geographically contiguous—may operate the scheme:

- Permits would be needed for the extraction of coal, oil or gas within the borders of the countries in the Kyoto2 group.
- Permits would be needed to import coal, oil or gas into the Kyoto2 group.
- Permits would be needed for the import of other products, to reflect their embodied carbon. A flat rate for all imported products may be sufficient, although there may be a case for different rates, depending on the type of product.

- Exporters of fossil fuels or other products from the Kyoto2 group would be credited with the corresponding permits so that they would not be at a competitive disadvantage outside the group.

Similar proposals have been made for FD. With these kinds of provisions in place, countries outside the K2 or FD group would have incentives to join the group.

In this connection, an interesting possibility is to reform the EU Emissions Trading Scheme by introducing upstream controls and other reforms outlined in Appendix C. That in itself would be most of what is required to allow the EU to be the foundation of a Kyoto2 group. From that foundation, it should be possible to make a relatively fast transition to a global system.

12 Conclusion

The main conclusion of this review is that K2 or something like it provides a sound basis for a worldwide system to control emissions of greenhouse gases. In particular:

- There must be a global cap or budget for emissions of industrial greenhouse gases within the next few decades. The budget should be determined by science, not negotiation.
- Most importantly, *there is an overwhelming case for controlling industrial greenhouse gases ‘upstream’, at or close to their origins.*
- In the main global system for controlling emissions, there should not be any national targets for reductions in emissions, although such targets may have a useful role to play as an informal guide to progress in different countries and as a spur to action.
- There should be a global auction of permits to extract coal, oil or gas from the ground, and permits may be traded. This, with associated reforms, would largely eliminate problems with ‘downstream’ cap-and-trade systems.
- Moneys from the sales of permits should be invested in a Climate Fund to be spent on mitigation and adaptation, with an emphasis on addressing the needs of the poor and those most adversely impacted.
- Emissions of greenhouse gases from non-industrial sources such as deforestation, agriculture, and soils may be controlled via a combination of regulations and funding for mitigation measures from the Climate Fund.
- Although it would be best to establish a global system in one step, a ‘Kyoto2 group’ of countries may adopt the K2 system, or something like it pending a global system. The establishment of this group would, in itself, create incentives for the remaining countries to join the group.
- The introduction of upstream controls in the EU Emissions Trading Scheme, with other reforms, would be most of what is needed to establish the EU as the foundation of a Kyoto2 group. This would be a good basis for the transition to a global system.

Appendix A: Kyoto2 in a nutshell

Kyoto2 aims to prevent catastrophic climate change by regulating greenhouse gases in a way which is *effective, efficient and equitable*:

1. In Kyoto2 there would be a single *global cap* on emissions of industrial greenhouse gases, *without national targets for reductions in emissions*.
2. Emissions of industrial greenhouse gases would be regulated ‘upstream,’ near to their origins. Oil, gas and coal would be controlled at or close to where they are extracted from the ground.
3. Kyoto2 is a cap-and-trade system but *without the many problems of ‘downstream’ cap-and-trade systems* (see Section 4). There would be an annual auction of permits to pollute, or to extract oil, gas and coal from the ground. Annual caps would be progressively reduced at levels aiming to prevent dangerous climate change.
4. Kyoto2 creates *incentives* to cut industrial greenhouse gases and develop clean sources of power. There would also be regulations and standards aimed at overcoming specific market failures and to reduce costs.
5. *The sale of permits would raise about US\$1 trillion every year*. This ‘Climate Fund’ 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 those most adversely impacted:
 - Helping adaptation to climate change that is already inevitable,
 - Supporting conservation of energy and the creation of clean sources of energy,
 - Managing land to reduce emissions of non-industrial greenhouse gases and to capture carbon in soils, peat lands, forests and other ecosystems,
 - Researching low cost and environmentally benign geo-engineering options that could *in extremis* prevent a ‘runaway greenhouse effect’ from taking hold.

Further information

Kyoto2: How to Manage the Global Greenhouse, Oliver Tickell, Zed Books, 2008, ISBN 978-1-84813-025-8 pb. Web: www.kyoto2.org, www.k2support.org, Email: info@kyoto2.org.

Appendix B: proposals for cutting worldwide emissions of greenhouse gases²⁴

The following table summarises the main features of the Kyoto2 proposals and others for how to cut worldwide emissions of greenhouse gases.

Short name	Full name	Budget	U or D	Funds	GHG scope
ASCT	Aviation and shipping cap-and-trade ²⁵	Yes	D	Yes	CO ₂
CD	Cap and dividend ²⁶	Yes	U	No	CO ₂
CS	Cap and share ²⁷	Yes	U	No	CO ₂
C&C	Contraction and convergence ²⁸	Yes	D	Yes	All
FD	Fee and dividend ²⁹	No	U	Yes	CO ₂
GCT	Global carbon trading ³⁰	Yes	D	No	All
GDR	Greenhouse development rights ³¹	No	D	Yes	CO ₂
K1	Kyoto1 ³²	No	D	Yes	All
K2	Kyoto2 ³³	Yes*	U	Yes	All
M	Submission by Mexico ³⁴	No	?	Yes	CO ₂
PCA	Personal carbon allowances ³⁵	Yes	D	No	CO ₂
WBGU	German Advisory Council on Climate Change (WBGU) ³⁶	Yes*	D	Yes	All

Key:

- *Budget*: a global budget for emissions of industrial greenhouse gases. ‘Yes*’ means that the importance of a global budget is given particular emphasis.
- *U or D*: ‘Upstream’ or ‘downstream’ controls?
- *Funds*: Proposes mechanisms to raise funds for mitigation and adaptation?
- *GHG scope*: The range of greenhouse gases that are controlled.

²⁴ A more comprehensive version of the information in this appendix, with live links, may be seen at <http://www.k2support.org/cutting-emissions>.

²⁵ See <http://www.latimes.com/news/nation-and-world/la-fg-climate-bunker18-2009dec18.0.5819030.story>.

²⁶ See <http://capanddividend.org/>.

²⁷ See <http://www.capandshare.org/>.

²⁸ See <http://www.gci.org.uk/contconv/cc.html>.

²⁹ See <http://www.guardian.co.uk/environment/2009/dec/27/james-hansen-copenhagen-agreement-opportunities> and *Storms of my grandchildren*, James Hansen, London: Bloomsbury, 2009, ISBN 978 1 4088 0744 6.

³⁰ See http://www.mng.org.uk/gh/private/mark_lazarowicz_report_july_2009.pdf.

³¹ See <http://www.sei-us.org/climate-and-energy/GDR.html>.

³² Kyoto1 with associated schemes such as the EU Emissions Trading Scheme, the Clean Development Mechanism, and voluntary carbon offsets—and other proposals cast in the same mould.

³³ See Appendix A.

³⁴ See http://www.mng.org.uk/gh/private/mexico_green_fund_13_august_2008.pdf.

³⁵ See http://www.eci.ox.ac.uk/research/energy/downloads/40house/background_doc_1.pdf.

³⁶ “Solving the climate dilemma: the budget approach”, German Advisory Council on Global Change (WBGU), Berlin, 2009, http://www.mng.org.uk/gh/private/wbgu_sn2009_en.pdf.

Appendix C. Problems with carbon trading and how they may be solved

EU ETS, CDM, and related schemes	Kyoto2
Permits have been given away for nothing ('grandfathering') leading to windfall profits.	All permits would be auctioned.
There is no mechanism to raise funds to pay for mitigation and adaptation.	Money from the auctioning of permits would go into a 'Climate Fund' of about US\$1 trillion every year, to be spent on mitigation and adaptation.
The number of permits issued is determined by negotiations, with many temptations to issue too many.	The number of permits issued would be determined by science, not negotiation.
National targets for reductions, and baseline dates, are determined by negotiation, with many temptations to water them down.	Since there is only a global cap on emissions, without national targets or baseline dates, and since the cap would be determined by science, not negotiation, there are less opportunities to water things down.
Countries or businesses may buy 'carbon offsets' but there are several problems here including 'additionality', opportunities for fraud and spurious accounting, credits for projects that achieve no net reductions in emissions, and more. ³⁷	Concepts like 'carbon offsets' make no sense in an 'upstream' system like K2. Consequently, all the associated problems disappear.
Buying carbon offsets is a distraction from the task of making real cuts in emissions.	There is no distraction because there are no carbon offsets to buy. The decreasing cap on permits will force up the price of fossil carbon and thus provide an incentive for all users of fossil fuels to cut emissions and migrate to clean technologies. The Climate Fund may also help smooth the transition from dirty to clean technologies.
With the grandfathering system of the EU ETS, the price of permits can collapse, undermining investment in clean technologies—which is exactly what has happened. Also, there may be spikes in the price that can be very disruptive in other areas of the economy.	With an auctioning system, it is easy to build in a floor price for permits. It is also possible to build in a ceiling price if that proves necessary. In general, K2 contains mechanisms to inhibit excessive peaks and troughs in the price of permits.
There is potential to create over-complex derivatives that may lead to speculative booms and busts, as in the banking crisis.	Regulations may be used to inhibit the creation of over-complex derivatives that may lead to speculative bubbles.
Both the EU ETS and the CD are vulnerable to fraud, largely because of their complexity.	The relative simplicity of upstream controls should help to make fraudulent activities more difficult.

There is more detail and more discussion on www.k2support.org/carbon-trading, <http://www.k2support.org/euets-problems>, <http://www.k2support.org/kyoto-flexibility-mechanisms>.

³⁷ See <http://www.mng.org.uk/offsets>.